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TÜRKİYE FİZYOTERAPİSTLER DERNEĞİ'nin bilimsel yayın organı ve yaygın süreli yayınıdır.
(The official scientific journal of Turkish Physiotherapy Association)

"Türk Fizyoterapi ve Rehabilitasyon Dergisi"; Emerging Sources Citation Index (ESCI), Cumulative Index to Nursing and Allied Health Literature (CINAHL), EBSCO, Excerpta Medica (EMBASE), Türkiye Atıf Dizini ve Ulakbim Türk Tıp Dizini'nde yer almaktadır.

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"Açık Erişim Dergi" yılda 3 kez (Nisan, Ağustos, Aralık) yayınlanır.
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YAZARLARIN DİKKATİNE
Genel Bilgiler

Türk Fizyoterapi ve Rehabilitasyon Dergisi, Türkiye Fizyoterapistler Derneği'nin yayın organı olup, yılda 3 kez (Nisan, Ağustos ve Aralık) Türkçe ve İngilizce olarak yayınlanmaktadır. Bununla birlikte İngilizce gönderilen makalelere yayınlanma aşamasında öncelik verilecektir. Dergi fizyoterapi ve rehabilitasyon konuları ile ilişkili özgün araştırmalar, çağrılı derlemeler, ilginç olgu sunumları ve editöre mektupları değerlendirmek üzere kabul eder. Türk Fizyoterapi ve Rehabilitasyon Dergisi, yayınladığı makalelerin konu ile ilgili en yüksek etik ve bilimsel standartlarda olması ve ticari kaygılarda olmaması şartını gözetmektedir. Derginin yazım kurallarında Uniform Requirements for Manuscripts Submitted to Biomedical Journals - International Committee of Medical Journal Editors (http://www.icmje.org) başlıklı belge temel alınmıştır.

Dergiye gönderilen makale biçimsel esaslara uygunsa, "Etik Kurul Onay Belgesi" ve "Telif Hakkı Devir Formu" da yüklenmişse, en az iki hakemin incelemesinden geçer; gerek görüldüğü takdirde, istenen değişiklikler yazarlarca yapıldıktan sonra tekrar değerlendirilir.

Makale bilimsel değerlendirme için işleme alındıktan sonra ise, "Telif Hakkı Devir Formunda" belirtilmiş olan yazar isimleri ve sıralaması esas alınır. Bu aşamadan sonra hiçbir aşamada makaleye "Telif Hakkı Devir Formunda" imzası bulunanlar dışında yazar ismi eklenemez ve yazar sırası değiştirilemez. Makale yazarlarından herhangi birinin isminin makaleden çıkartılması için, tüm yazarların açıklamalı ve yazılı izinleri alınır.

Telif hakkı devir formunda ismi belirtilmiş olan yazarların, gönderilen makaleye doğrudan katkısının olması gerekir. Yazar olarak belirlenen isim aşağıdaki özelliklerin tümüne sahip olmalıdır.

• Çalışmanın planlanmasına ve verilerin toplanmasına veya verilerin analizine ve yorumlanmasına katkısı olmalıdır.
• Makale taslağının hazırlanması veya revize edilmesine katkıda bulunmalıdır.
• Makalenin dergiye gönderilecek ve yayınlanacak son halini okuyup kabul etmelidir.

Makalede, kitaplarda veya dergilerde daha önce yayınlanmış alıntı yazı, tablo, şekil vb. mevcutsa, yazarlar ilgili yazı, tablo, şekil, anket ve ölçeğin telif hakkı sahibinden ve yazarlarından yazılı izin almak, izin yazısını makale ile birlikte göndermek ve bunu makalede belirtmek zorundadır.

Etik

Yazıların bilimsel içeriği ve etik kurallara uygunluğu yazar(lar)ın sorumluluğundadır. Dergiye Etik kurul onayı almış ve Helsinki Bildirgesi'ne uygun yazılar kabul edilir. Çalışmada "Hayvan" öğesi kullanılmış ise yazar(lar), makalenin "Yöntem" bölümünde Guide for the Care and Use of Laboratory Animals (http://www.nap.edu/catalog/5140.html) prensipleri doğrultusunda çalışmalarında hayvan haklarını koruduklarını ve kurumlarının etik kurullarından onay aldıklarını belirtmek zorundadır. "İnsan" öğesi ile yapılmış çalışmalardaysa yazar(lar), ilgili Etik Kurul onay belgesini makale ile birlikte yüklemelidir. Olgu sunumları için Klinik Araştırmalar Etik Kurul'undan alınan Etik Kurul onay belgesi sisteme yüklenmelidir. Etik Kurul onayı gerekmediğinde ise Klinik Araştırmalar Etik Kurulu'ndan alınan Etik Kurul muafiyet belgesinin sisteme olgu raporu ile birlikte yüklenmesi gerekir. Yazarlar araştırmaya katılan bireylerden yazılı aydınlatılmış onam (written informed consent) alındığını gönderilen makalede belirtmeli ve gerektiğinde onam formlarını belgeleyebilmelidir.

"Etik Kurul Onay Belgesi" ve "Telif Hakkı Devir Formunun" makale DergiPark sistemine yüklenirken ilk aşamada makale ile birlikte yüklenmesi gerekmektedir. "Etik Kurul Onay Belgesi" ve "Telif Hakkı Devir Formu" sisteme yüklenmeyen makaleler değerlendirmeye alınmayacaktır.

İletişimden sorumlu yazar, makalenin sunum aşamasından basımına kadar olan süreçlerde her türlü yazışmayı gerçekleştiren yazardır. İletişimden sorumlu yazar tarafından "Telif Hakkı Devir Formu" DergiPark sisteminden indirilerek, e-imza veya ıslak imza ile imzalanması sağlanmalı ve taranarak gönderilmelidir. Dergi gerektiğinde ıslak imzalı üst yazı isteme hakkına sahiptir.

Yazım Kuralları

Türkçe makalelerde Türk Dil Kurumu'nun Türkçe Sözlüğü esas alınmalıdır. İngilizce makaleler ve İngilizce özetlerin, dergiye gönderilmeden önce dil uzmanı tarafından değerlendirilmesi gerekmektedir.

Dergiye yayımlanmak üzere gönderilen makaleler, sayfa A4 boyutunda olacak şekilde, PC uyumlu Microsoft Word programı ile "Times New Roman" yazı tipi kullanılarak 12 punto ve makalenin tüm bölümleri çift aralıklı olarak yazılmalıdır. Sayfanın her iki kenarında en az 2,5 cm boşluk bırakılmalı, sayfalar ve satırlar numaralandırılmalıdır. Makalenin ana başlıkları (Giriş, Yöntem, Sonuçlar, Tartışma, Kaynaklar), büyük harf kullanılarak ve koyu olarak yazılmalıdır. Alt başlıklar ise, baş harf büyük ve koyu renk olacak şekilde yazılmalıdır. Metin içinde verilen sayısal değerlerde Türkçe makalelerde virgül (,); İngilizce makalelerde nokta (.) kullanılmalıdır. Verilen bu sayısal değerlerde virgül veya noktadan sonra sayının iki basamağı daha verilmelidir (örneğin: 13.31 veya 15,21), p ve r değerleri virgülden/noktadan sonra üç basamak olacak şekilde yazılmalıdır. Orijinal araştırma makaleleri 3000 kelime, derlemeler 5000 kelime, olgu sunumları 1000 kelime ve editöre mektuplar ise 500 kelimeyi aşmamalıdır.

Başlık Sayfası

Makalenin başlığı kısa fakat içeriği tanımlayıcı ve amaçla uyumlu olmalıdır. Başlıkta kısaltma kullanılmamalıdır. Makale başlığı Türkçe ve İngilizce yazılmalıdır. Türkçe ve İngilizce başlık büyük harfler ile koyu olarak yazılmalıdır. Ayrıca yazının 40 karakterlik kısa bir başlığı da Türkçe ve İngilizce olarak başlık sayfasında belirtilmelidir.

Tüm yazarların açık adları, soyadları (büyük harf ile yazılacak) ve akademik unvanları, çalıştıkları kurum, iletişim bilgileri, Open Researcher and Contributor ID (ORCID) numaraları, çalışmanın yapıldığı klinik, bölüm, enstitü, hastane veya üniversitenin açık adı ve adresi belirtilmeli ve her yazar için üst numaralandırma kullanılmalıdır. İletişimden sorumlu yazarın iletişim bilgileri ayrıca belirtilmelidir. Her yazarın iletişim bilgileri, adres, güncel e-posta adresi ve iş telefon numarasını içermelidir.

Özetler

Her makale Türkçe ve İngilizce özet içermelidir.

Türkçe Özet ve Anahtar Kelimeler

Türkçe özet ayrı bir sayfadan başlamalı ve 250 kelimeden fazla olmamalıdır. Türkçe özet bölümü çalışmanın amacını, uygulanan yöntemi, en önemli bulguları ve sonucu içermelidir.

Özet, "Öz" başlığını taşımalı ve "Amaç", "Yöntem", "Sonuçlar" ve "Tartışma" alt başlıklarına ayrılmalıdır. "Sonuçlar" kısmında p değeri belirtilmelidir. Türkçe makale özetlerinde ondalık sayılarda virgül (,) kullanılmalıdır. Anahtar kelimeler 3'ten az, 5'ten çok olmamalıdır. Anahtar kelimeler "Türkiye Bilim Terimleri" listesinden (http://www. bilimterimleri.com) seçilmelidir. Türkiye Bilim Terimleri, MeSH (Medical Subject Headings) terimlerinin Türkçe karşılıklarının bulunduğu bir anahtar kelimeler dizinidir. MeSH listesinde henüz yer almamış yeni bir kavram için liste dışı kelimeler kullanılabilir. Anahtar kelimelerin her biri büyük harf ile başlamalı; virgül ile birbirinden ayrılmalı ve alfabetik sıraya göre yazılmalıdır. Makale Türkçe ise İngilizce özet kısmındaki anahtar kelimeler (key words) Türkçe anahtar kelimelerin alfabetik sıralamasına uygun sıralanmalıdır.

İngilizce Özet (Abstract) ve Anahtar Kelimeler (Key Words)

İngilizce özet ayrı bir sayfadan başlamalı ve 250 kelimeden fazla olmamalıdır. İngilizce özette ondalık sayılarda nokta (.) kullanılmalıdır. İngilizce özet "Purpose", "Methods", "Results" ve "Conclusion" alt başlıklarına ayrılmalıdır. İngilizce özet ve anahtar kelimeler, Türkçe özet ve anahtar kelimelerin birebir aynısı olmalıdır. Anahtar kelimeler "MeSH (Medical Subject Headings)" terimlerinden seçilmiş olmalıdır. MeSH listesinde henüz yer almamış yeni bir kavram için liste dışı kelimeler kullanılabilir. Anahtar kelimelerin her biri büyük harf ile başlamalı; virgül ile birbirinden ayrılmalı ve alfabetik sıraya göre yazılmalıdır. Makale İngilizce ise İngilizce anahtar kelimelerin (key words) alfabetik sıralamasına göre, Türkçe anahtar kelimeler sıralanacaktır.

Araştırma Makalesinin Bölümleri

Makale metni Türkçe makalelerde "Giriş", "Yöntem", "Sonuçlar" ve "Tartışma" bölümlerinden oluşur. İngilizce makalelerde ise "Introduction", "Methods", "Results" ve "Discussion" bölümleri yer alır. Metin içinde, gerektiğinde 5 defadan fazla tekrar eden ifadeler için standart kısaltmalar kullanılmalıdır.

Giriş (Introduction)

Çalışma konusuyla ilgili önceki yayınlardan elde edilen temel bilgilerin özetini içermelidir. Çalışmanın yapılmasındaki gereklilik ve amaç kısaca belirtilmelidir.

Yöntem (Methods)

Çalışmadaki klinik, teknik veya deneysel yöntemler açıkça belirtilmelidir. Yöntem için uygun kaynaklar verilmelidir. 'İstatistiksel analiz', alt başlık halinde belirtilmelidir. İstatistik analiz için herhangi bir istatistik program kullanılmış ise kullanılan programın adı, sürüm numarası ve künyesi, firma bilgileri belirtilmelidir. İstatistik analiz yöntemleri gerekçeleri ile birlikte sunulmalı, gerektiğinde kaynaklarla desteklenmelidir.

Sonuçlar (Results)

Bulgular yorum yapmadan tanımlanmalıdır. Tablolarda sunulan verilerin, metin içinde tekrar edilmesinden kaçınılmalı, en önemli bulgular vurgulanmalıdır.

Tartışma (Discussion)

Tartışma çalışmada elde edilen en önemli sonuçlara ait bilgiler ile başlamalıdır. Çalışmadan elde edilen sonuçlar yorumlanmalı ve önceki çalışmaların sonuçları ile ilişkilendirilmelidir.

Tartışmada çalışmanın amacı ile uyumlu limitasyonları; literatüre ve klinik uygulamalara olan katkısı belirtilmelidir. "Sonuçlar" bölümünde ve tablolarda yer alan bulguların, detayları ile tartışma bölümünde tekrar edilmesinden kaçınılmalıdır. Araştırmada elde edilmeyen veriler tartışılmamalıdır.

Aşağıdaki başlıklar tartışma kısmından sonra açıklamalarıyla beraber eklenmelidir;

- **Destekleyen Kuruluş (Sources of Support)**
  Destekleyen kuruluşlar varsa belirtilmelidir.
- **Çıkar Çatışması (Conflict of Interest)**
  Çıkar çatışması varsa belirtilmelidir.
- **Etik Onay (Ethical Approval)**
  Etik kurul adı ve onay numarası yazılmalıdır.
- **Aydınlatılmış Onam (Informed Consent)**
  Yazılı aydınlatılmış onam alındığı belirtilmelidir.
- **Açıklamalar (Acknowledgements)**
  Yazı özet ve/veya bildiri şeklinde daha önce sunulmuş ise, sunulduğu bilimsel toplantı, sunum yeri, tarihi ve basılmışsa basımı yapılan yayın organına ilişkin bilgiler "Açıklamalar" kısmında belirtilmelidir. Makaleyi İngilizce yönünden değerlendiren, yazarlardan biri değil ise, bu kişinin ismi "Açıklamalar" bölümünde yazılmalıdır.

Kaynaklar

Kaynaklar makale ana metninin hemen bitiminden sonra yer almalıdır. Kaynaklar metinde geçiş sırasına göre numaralandırılmalıdır. Kaynak sayısının 30'u aşmamasına özen gösterilmelidir. Gerekmedikçe kitapların, web sayfalarının, yayınlanmamış gözlem ve kişisel görüşmelerin kaynak olarak kullanımından kaçınılmalıdır. Kaynaklar metinde cümle sonunda parantez içinde Arabik rakamlarla gösterilmelidir. Birden çok kaynağa atıf varsa, kaynaklar arasına virgül konulmalı ve virgülden önce ya da sonra boşluk bırakılmamalıdır. Ana metin içinde isim ile belirtilecek olan makaleler İngilizce ise "Yazar adı et. al" (örnek: Burtin et al.'un çalışmasında...); makaleler Türkçe ise "Yazar adı ve ark." (örnek: Burtin ve ark.'nın çalışmasında...) olarak belirtilmelidir. Dergi adları Index Medicus'a göre kısaltılmış olarak sunulmalıdır. Standart dergide yayınlanmış bir makalede, yazar sayısı 6 ve daha az ise, tüm yazarların adı yazılmalı; yazar sayısı 6'dan çok ise, ilk 6 yazar yazılmalı ve diğerleri "et al." olarak belirtilmelidir. Endnote kullanacak yazarlar Endnote programı içerisinde bulunan "VANCOUVER" stilini kullanmalıdır.

Vancouver stilinde verilen bir referansta mutlaka olması gereken bilgiler aşağıda belirtilmiştir:
- Yazar(lar) ad(ları),
- Makale adı,
- Dergi adı (Index Medicus'a göre kısaltılmış),
- Basım yılı,
- Dergi volümü ve sayısı,
- Sayfa aralığı (Ör:10-5).

Kaynak yazım örnekleri aşağıdaki gibidir:

Dergi;

Burtin C, Saey D, Saglam M, Langer D, Gosselink R, Janssens W, et al. Effectiveness of exercise training in patients with COPD: the role of muscle fatigue. Eur Respir J. 2012;40(2):338-44.

Dergi İlavesi;

Hielkema T, Hadders Algra M. Motor and cognitive outcome after specific early lesions of the brain–a systematic review. Dev Med Child Neurol. 2016;58(Suppl 4):46-52.

Kitap;

Murtagh J. John Murtagh's general practice. 4th ed. Sydney: McGraw-Hill Australia Pty Ltd; 2007.

Kitap Bölümü;

Cerulli G. Treatment of athletic injuries: what we have learned in 50 years. In: Doral MN, Tandogan RN, Mann G, Verdonk R, eds. Sports injuries. Prevention, diagnosis, treatment and rehabilitation. Berlin: Springer-Verlag; 2012: p. 15-9.

Kongre Bildirisi;

Callaghan MJ, Guney H, Bailey D, Reeves N, Kosolovska K, Maganaris K, et al. The effect of a patellar brace on patella position using weight bearing magnetic resonance imaging. 2014 World Congress of Osteoarthritis Research Society International, April 24-27, 2014, Paris. Osteoartr Cartilage; 2014;22(Suppl):S55.

Tablolar ve Şekiller

Tablolar, her biri ayrı sayfalarda olacak şekilde makalenin sonunda Microsoft Word dosyası olarak yer almalıdır. Tablo ve şekil sayısı toplam olarak en fazla 4 olmalıdır. Tablolarda her sütun başlığına kısa bir başlık yazılmalıdır. Tabloların sütunlarında her kelimenin ilk harfi büyük olmalıdır. Tablo başlığı tablonun üst kısmında yer almalı; koyu renk ile yazılmalı, iki nokta (:) ile ayrılmalıdır. Tabloların yatay ve dikey çizgileri olmalıdır. Tabloda yer alan p değerleri *, ** ile gösterilmelidir. Notlar ve tabloda kullanılan kısaltmaların açıklamaları tablonun alt kısmında yazılmalıdır. Kısaltmaların açıklamasının yazımında önce kısaltma yazılmalı, iki nokta üstü ":" işaretinden sonra, kısaltmanın açık hali yazılmalıdır. Kısaltmalar birbirinden virgül ile ayrılmalıdır. Tabloda kullanılan değişkenlerin birimleri, parantez içinde belirtilmelidir. Belirli bir aralığı kapsayan birimler aralık dilimi ile sayısal olarak ifade edilmelidir. Tabloda verilen ondalık sayılarda, Türkçe makalelerde virgül (,); İngilizce makalelerde nokta (.) kullanılmalıdır. Tablolarda verilen ondalık sayılarda virgül veya noktadan sonra iki basamak yazılmalıdır (örneğin: 31,12 veya 20.10). Ortalama, yüzde ortanca değerleri dışındaki değerler (p, r, vb.) virgülden/noktadan sonra üç basamak olarak yazılmalıdır. Şekiller profesyonel olarak çizilmeli, fotoğraflanmalı veya fotoğraf kalitesinde dijital baskı olarak sunulmalıdır. Şekil başlıkları tablolardan sonra ayrı bir sayfada yer almalıdır. Şekiller ise ayrı bir dosya olarak JPEG, TIFF, PNG formatında yüksek kalitede yüklenmelidir. Makale içinde kullanılan fotoğraflar net olmalıdır. Fotoğraf, tablo ve çizimler metin içinde geçiş sırasına göre numaralandırılmalıdır.

İnsan öğesinin bulunduğu fotoğraflarda, kişiden yazılı izin alınmalı; kimliğini gizleyecek önlemler alınmalı, izin metni makale ile birlikte dergiye gönderilmelidir.

Makale Gönderme Formatı

Makaleler Microsoft Office Word dosyası formatında hem yazar isimleri olan hem de yazar isimleri olmayan iki kopya şeklide DergiPark (http://dergipark.gov.tr/tjpr) sistemine kullanıcı olarak kayıt olunduktan sonra yüklenecektir. Yazar isimleri olmayan Word dosyasında yapılan kuruluş ve etik onay alınan kurumun da "X" ile kapatılması gerekmektedir.

Makale Değerlendirme Süreci

Makaleler derginin yayın kriterleri doğrultusunda değerlendirmeye alınacaktır. Yazar makalenin değerlendirme sürecini DergiPark sisteminden takip edebilecektir. Gerek görüldüğü takdirde, ön kontrolden sonra yazardan ilk teknik düzeltmeler istenecek, daha sonra hakem değerlendirme süreci başlayacaktır. Makaleler ilgili alanda uzman hakemler tarafından değerlendirmeye tabi tutulacak ve hakem raporları ilgili yazara bildirilecektir.

Telif Hakkı

Dergimizde yayınlanan yazıların tüm telif hakları Türkiye Fizyoterapistler Derneği'ne aittir.

Instructions for Authors

Turkish Journal of Physiotherapy and Rehabilitation is the official journal of the Turkish Physiotherapy Association and is published in Turkish and English, three times per year (April, August, and December). The manuscripts submitted in English will be given priority in the publication process. The journal welcomes original articles, invited reviews, interesting case presentations, and letters to the editor that are relevant to the science or practice of physiotherapy and rehabilitation. Turkish Journal of Physiotherapy and Rehabilitation stipulates that its published articles comply with the highest ethical and scientific standards, and are free from commercial concerns. Submission guidelines for the journal are based on the document entitled "Uniform Requirements for Manuscripts Submitted to Biomedical Journals," issued by the International Committee of Medical Journal Editors (http://www.icmje.org).

The corresponding author is the one who carries out all correspondence of the manuscript from submission to the publishing process. "Copyright Agreement Form" is downloaded from the DergiPark system, and e-signature or wet signature must be provided and scanned then must be submitted by the corresponding author. The journal holds the rights for asking the original signed cover letter when required.

If the submitted article complies with the formal principles, and Ethics Committee Approval Document" and "Copyright Agreement Form" are loaded, at least two reviewers are examine the manuscript; if necessary, the changes performed by the author(s) are re-evaluated. By the beginning of the scientific assessment process, the name(s) and order of author(s) that were specified in the "Copyright Agreement Form" will be relevant. After this stage, no author names can be added to the manuscript, except the ones who have signatures in the "Copyright Agreement Form," and no changes of author(s) name(s) order can be made. To delete an author name, written permission from all authors, including the justifications, should be obtained.

The authors, whose names were specified in the Copyright Agreement Form, should have had a direct contribution to the manuscript submitted. Authorship requires all three of the following:

• Substantial contributions to conception and design of the study, and acquisition of data or analysis and interpretation of data;

• Contributions to drafting or revising the manuscript critically for important intellectual content, and

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Full names, surnames (written in a capital letter), academic titles, institutions and digital identifiers Open Researcher and Contributor ID (ORCID) of the authors, full name and address of the clinic, department, institute, hospital or university which the study was conducted at should be declared using superscript numbers for each author. The communication information of the corresponding author should also be specified. Each author's the communication information should include; address, updated e-mail address, work phone number.

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Book:

Murtagh J. John Murtagh's general practice. 4th ed. Sydney: McGraw-Hill Australia Pty Ltd; 2007.

Book Chapter:

Cerulli G. Treatment of athletic injuries: what we have learned in 50 years. In: Doral MN, Tandogan RN, Mann G, Verdonk R, eds. Sports injuries. Prevention, diagnosis, treatment, and rehabilitation. Berlin: Springer-Verlag; 2012: p. 15-9.

Published Congress Presentation:

Callaghan MJ, Guney H, Bailey D, Reeves N, Kosolovska K, Maganaris K, et al. The effect of a patellar brace on patella position using weight-bearing magnetic resonance imaging. 2014 World Congress of Osteoarthritis Research Society International, April 24-27, 2014, Paris. Osteoartr Cartilage; 2014;22(Suppl):S55.

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EDİTÖRDEN

Değerli Meslektaşlarımız,

Türkiye Fizyoterapistler Derneği'nin bilimsel yayın organı olan Türk Fizyoterapi ve Rehabilitasyon Dergisi'nin 2019 yılı ilk sayısını yayımlamaktan mutluluk duyuyoruz. Bu sayı ile birlikte dergimizin yayın hayatındaki 45.yıla ve 30. cilde ulaşmış bulunuyoruz.

Dergimizin Nisan 2019 sayısında spastik serebral palsili çocuklarda bireysel yapılandırılmış gövde eğitiminin vücut yapı ve fonksiyonları üzerine etkisi, inmeli hastalarda alt ekstremiteye uygulanan modifiye kısıtlayıcı-zorunlu hareket tedavisinin kuvvet ve yaşam kalitesi üzerine etkisi; benign paroksismal pozisyonel vertigo hastalarında partikül yerleştirme manevrası sonrasında denge ve yürüme performansı; rotator manşet lezyonu olan olgularda üst ekstremite ve skapular propriyoseptif nöromüsküler tekniğinin etkisi; sağlıklı olgularda üç farklı egzersizin suprahyoid kaslar üzerine aktivasyon etkinliğinin karşılaştırılması; sağlık profesyonellerinde sigara içiciliği ile fiziksel aktivite arasındaki ilişkinin incelenmesi; lumbopelvik motor kontrol, postüral denge ve fiziksel performans arasındaki ilişki; Bakım Verenlerin Memnuniyeti Değerlendirme İndeksi'nin Türkçe versiyonunun geçerlik ve güvenirliği ile ilgili sekiz makale yer almaktadır.

Ayrıca, bu sayıda Kıbrıs Fizyoterapistler Birliği ve Lefke Avrupa Üniversitesi tarafından düzenlenen "Ağrısız Yaşamda Fizyoterapi ve Rehabilitasyon" konulu 3. Ulusal Fizyoterapi ve Rehabilitasyon Kongresi'nde sunulan bildiri özetlerine de yer verilmiştir.

Bu yıl bilimsel yayın organı olmakla gurur duyduğumuz Türkiye Fizyoterapistler Derneği'nin 50. Kuruluş Yılını da kutlamaktayız. Bu amaçla 18-20 Nisan 2019 tarihleri arasında Ankara'da gerçekleştirilecek olan 7. Ulusal Fizyoterapi ve Rehabilitasyon Kongresi'nin bildiri özetleri de Ağustos 2019 sayısında Dergimizde yayınlanacaktır.

Yayın kurulu olarak meslektaşlarımızın 8 Nisan Ulusal Fizyoterapi gününü kutlar ve bizleri destekleyen meslektaşlarımıza, yazarlarımıza ve hakemlerimize sonsuz teşekkür ederiz.

Yayın kurulu adına,

Saygılarımla

Prof. Dr. Deniz İnal İnce

Editör

EDITORIAL

Dear Colleagues,

We are pleased to publish the first issue of the year 2019 of the Turkish Journal of Physiotherapy and Rehabilitation, which is a scientific publication of Turkish Physiotherapy Association. This year is the 45th anniversary of the journal, and we are publishing the 30th volume.

The journal's April 2019 issue includes eight papers investigating the effects of individually structured trunk training on body function and structures in children with spastic cerebral palsy, the efficacy of modified constrained-induces movement therapy for lower extremity on strength and quality of life in patients with stroke, balance and gait performance after particle repositioning maneuver in benign paroxysmal positional vertigo patients, the efficacy of upper extremity and scapular proprioceptive neuromuscular facilitation technique in patients with rotator cuff lesions, a comparison of activation effects of three different exercises on suprahyoid muscles in healthy subjects, the relationship between smoking and physical activity in health care professionals, the relationship between lumbopelvic motor control and postural balance and physical performance, and the Turkish version, validation and reliability of the carer's assessment of satisfaction index (CAI-TR).

The current issue also includes the abstracts presented at the 3rd National Physiotherapy and Rehabilitation Congress with the main topic of "Physiotherapy in Pain-Free Life," which was organized by the Cyprus Physiotherapy Association and the European University of Lefke.

In this year, we are celebrating the 50th anniversary of Turkish Physiotherapy Association which we are proud to be its official scientific journal. The abstracts of the 7th National Physiotherapy and Rehabilitation Congress, which is going to be organized on April, 18-20 2019, to celebrate the 50th anniversary, will be published in the journal in the August 2019 issue.

We would like to congratulate our colleagues on the 8th of April National Physiotherapy Day and also thank our colleagues, authors, and reviewers who are supporting us.

Sincerely

On behalf of the editorial board

Deniz Inal-Ince, PhD, PT

Editor in Chief

Türkiye Fizyoterapistler Derneği 1969

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KONGRE BİLDİRİ ÖZETLERİ
(Congress Abstracts)

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2019 30(1)11-22

Ayşe NUMANOĞLU AKBAŞ, PhD, PT[1]
Mintaze KEREM GÜNEL, PhD, PT[2]

EFFECTS OF INDIVIDUALLY STRUCTURED TRUNK TRAINING ON BODY FUNCTION AND STRUCTURES IN CHILDREN WITH SPASTIC CEREBRAL PALSY: A STRATIFIED RANDOMIZED CONTROLLED TRIAL

ORIGINAL ARTICLE

ABSTRACT

Purpose: This study aimed to investigate the effects of trunk training on body function and structures of children with spastic cerebral palsy (CP).

Methods: Children included in this study were classified according to the Gross Motor Function Classification System (GMFCS) and divided into two groups by stratified randomization based on their GMFCS levels and ages. A total of 36 children with bilateral spastic CP were recruited for this study, and 19 children (4 females, 15 males, age=8.81±3.92 years) were included in the trunk training group, and 17 children (6 females, 11 males, age=10.44±4.63 years) were included in the control group. Muscle tone of upper and lower extremity muscles was assessed using the Modified Tardieu Scale (MTS), and muscle activation of the trunk muscles was assessed using Surface Electromyography during rest (sEMG minimum) and forward reaching (sEMG maximum) at baseline and after an eight-week intervention.

Results: When the therapy-induced changes were considered, it was seen that there was no difference in muscle tone in both groups (p>0.05). The sEMG maximum scores for erector spinae muscles (p=0.025 for right and p=0.006 for left) improved in the trunk training group. There was no change in the sEMG scores of lumbar multifidus, M. rectus abdominis, internal oblique-transversus abdominis, external oblique, and M. gluteus maximus muscles (p>0.05).

Conclusion: Individually-structured trunk training is a promising method to increase activation of trunk extensors. This intervention can be used safely without the risk of increasing muscle tone of upper and lower extremities in children with CP.

Key Words: Cerebral Palsy; Child, Exercise; Muscles; Rehabilitation.

SPASTİK SEREBRAL PALSİLİ ÇOCUKLARDA BİREYSEL YAPILANDIRILMIŞ GÖVDE EĞİTİMİNİN VÜCUT YAPI VE FONKSİYONU ÜZERİNE ETKİSİ: TABAKALANDIRILMIŞ RANDOMİZE KONTROLLÜ ÇALIŞMA

ARAŞTIRMA MAKALESİ

ÖZ

Amaç: Bu çalışmanın amacı, spastik serebral palsili (SP) çocuklarda gövde eğitiminin; vücut yapıları ve fonksiyonları üzerindeki etkilerini araştırmaktı.

Yöntem: Bu çalışmaya dahil edilen çocuklar Kaba Motor Fonksiyon Sınıflandırma Sistemi'ne (KMFSS) göre sınıflandırıldı; yaşlarına ve KMFSS seviyelerine göre tabakalı randomizasyon ile iki gruba ayrıldı. Gövde eğitimi grubuna 19 çocuk (4 kız, 15 erkek, yaş=8,81±3,92 yıl), kontrol grubuna 17 çocuk (6 kız, 11 erkek, yaş=10,44±4,63 yıl) olmak üzere toplam 36 bilateral spastik SP tanılı çocuk dahil edildi. Üst ve alt ekstremite kaslarının kas tonusu Modifiye Tardieu Ölçeği (MTÖ) ile, gövde kaslarının kas aktivasyonu yüzey elektromiyografi ile dinlenme (sEMG minimum) ve ileri doğru uzanma aktivitesi (sEMG maksimum) sırasında değerlendirildi. Değerlendirmeler başlangıçta ve sekiz hafta süren müdahaleden sonra yapıldı.

Sonuçlar: Tedavinin etkisi ile meydana gelen değişimler incelendiğinde, her iki grupta da kas tonusunda herhangi bir değişim olmadığı görüldü (p>0,05). Erektör spina kasları sEMG maksimum skorları gövde eğitimi grubunda iyileşme gösterdi (sağ için p=0,025 ve sol için p=0,006). Lumbal multifidus, M. rectus abdominis, internal oblik-transversus abdominis, eksternal oblik ve M. gluteus maximus kaslarının sEMG değerlerinde herhangi bir değişim yoktu (p>0.05).

Tartışma: Bireysel yapılandırılmış gövde eğitimi gövde ekstansör kaslarının aktivasyonunu artırmak için umut verici bir yöntemdir. Bu müdahale, SP'li çocuklarda üst ve alt ekstremitelerde kas tonusunda artış riski olmaksızın güvenle kullanılabilir.

Anahtar Kelimeler: Serebral Palsi; Çocuk; Egzersiz; Kaslar; Rehabilitasyon.

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INTRODUCTION

A considerable amount of definitions of cerebral palsy (CP) can be found in the literature. "International Working Group on Definition and Classification of Cerebral Palsy" defines CP as a group of permanent disorders of the movement and posture development causing activity limitation as a result of non-progressive disturbances that develop in the immature brain (1).

Nearly half of the children with CP needs assistance to stand or walk because they have difficulty in achieving their postural alignment and stability against gravity (1). They also have difficulty in maintaining a stable sitting position, and they generally sit in an asymmetric position with increased kyphosis (2). The trunk is the center of the body and has an essential role in postural control and balance reactions (3). Coordinated activation of flexors and extensors of the trunk and hip is necessary for maintaining a balanced sitting position. Trunk control and active participation of trunk muscles are necessary to ensure a stable support surface during upper and lower extremity functions, including reaching and walking (4,5). However, insufficient control of trunk muscles leads to compensation of extremity muscles to maintain an upright posture. Impaired upper extremity kinematics during reaching is related with abnormal trunk movements, including excessive anterior positioning of the trunk.

Despite trunk involvement is one of the main factors affecting motor skills of children with CP, it seems that this issue has not been investigated in the literature adequately. Many studies are assessing the effects of hippotherapy/therapeutic horseback riding, electrotherapy and kinesiological taping on trunk control (2,6-9) in children with CP. However, a small number of studies was concerned with trunk training directly, and they concluded that the inclusion of exercises aiming the trunk in conventional physiotherapy affected motor function positively (10,11). However, exercises in these studies were not individually structured.

The effects of trunk training can be assessed using various methods, including manual muscle testing. However, it has been concluded that muscle strength cannot be assessed precisely with standard manual muscle testing or performance tests in children with CP. Problems such as insufficient motor control and increased co-activation of antagonistic muscles especially can decrease the force production capacity of agonistic muscles. Furthermore, muscle shortness and contractures restrain standard testing positions, and therefore, modifications should be made during testing (12). Assessments performed using isometric and isokinetic dynamometers at slow velocities have been found as reliable but, motor control problems may hinder manual muscle tests and the tests that use dynamometers in children with severe motor involvement (13,14).

Surface Electromyography (sEMG), which does not assess muscle strength directly yet it is an objective method of giving information about muscle activation patterns. Muscle activation of the trunk muscles was assessed using sEMG at rest (sEMG minimum) and during forward reaching (sEMG maximum). Forward reaching activity rather than specific activities for specific muscles is preferred because it is a functional activity that children use in their daily life and is easy to understand (9,12).

The importance of trunk control, and the necessity and the difficulty of determination of the effects of trunk training are mentioned above in details. In line with these requirements, the purpose of this study was to investigate the effect of individually structured trunk training on body functions and structures of children with bilateral spastic CP.

METHODS

Participants

Children between the ages of 4 years and 18 years, who had bilateral involvement and were diagnosed as spastic CP by pediatric neurologists, who understood and followed verbal instructions and whose family accepted to participate, were included in this study. Children, who had orthopedic surgery or received Botulinum Toxin A (BoNT-A) injection during the last six months or had seizures in the past year, were excluded.

Study Design

Participants joined the study between January 2014 and October 2015. Design of the study was stratified randomized controlled trial. Hacettepe

University Ethics Committee approval was obtained for this study (Number: GO 14/135). Children included in this study had received a consultation for a physiotherapy program and were enrolled in a physiotherapy program in a specialized education center in Bolu and Düzce cities, or their parents attended Department of Physical Therapy and Rehabilitation, Abant İzzet Baysal University. Parents of the children were informed about the interventions and benefits of the study and written informed consents of them were received. Some of the children recruited for this study lived at government's care centers for disabled children. Permission of the concerned ministry was received for those children.

G*Power (Version 3.1, Dusseldorf, Germany) power analysis program was used to determine the sample size. The parameters were set as α=0.05, 1-β=0.95 and effect size=0.25, and the number of cases to be included in the study was found to be 36 in total for the two groups. Children were divided into two groups according to their ages and Gross Motor Function Classification System (GMFCS) levels by stratified random sampling. The XLSTAT (XLSTAT, Addinsoft, Paris, France) data analysis software was used to perform stratified randomization. Participants were recorded in the system and divided into two groups by using the software. This study has been registered at ClinicalTrials.gov with the title of "Analyzing the Effect of Trunk Training on Limbs in Children with Spastic Cerebral Palsy" and the number is ID NCT02643160.

Intervention

Trunk Training Group

Exercises and activities focusing on activation of the trunk muscles, pelvic control, and proximal stabilization, combined with trunk and gluteal muscle strengthening exercises, were used in children who were included in the trunk training group (TTG) according to the neuro-developmental treatment (NDT) principles (15). These exercises can be summarized as follows: tone-influencing patterns, reaching activities with trunk elongation (in different sitting positions and different surfaces), selective pelvic movements, facilitation of spinal extension in prone position by using hands on/hands off techniques at different key points (on therapy mat, ball, roll, etc.), facilitation of spinal extension in sitting position by using hands-on/handoff techniques at different key points (in different sitting positions and different surfaces), facilitation of trunk flexion in supine position by using hands on/hand off techniques at different key points (on therapy mat, ball, roll, etc.), weight shifting and weight-bearing activities on pelvis (in different sitting positions and different surfaces), bridging exercises with extended knees (with ball, roll, etc.), unilateral hip abduction in bridge position, hip abduction in side lying, hip extension in prone position, crunches, lateral crunches, oblique crunches, and lower abdominal strengthening exercises. Exercises were performed as active assistive, active or manually resisted based on the child's capacity.

Tone-influencing patterns were used as preparation at the beginning of the session, and they were repeated when needed. Other exercises were performed as 30 repetitions; however, when the quality of the movement was worsened during the performance, a small break (1-3 minutes) was taken, and then the next exercise was continued. At the trunk training sessions; a parent or caretaker of the child had to be present in the therapy room, and had to watch the exercises and motivate the child during exercises. Poor postures were determined, and habits leading to those postures were questioned for all children, and specific recommendations were given according to their condition to maintain a good posture at school, home or any environment during the day.

Children in the TTG had received 45 to 75 minutes of physiotherapy twice a week during eight weeks in addition to their regular physiotherapy (twice a week for 45 minutes at a specialized education center). Exercises were individually structured according to gross motor function levels, performances, cognitive abilities, and fatigue levels of the children.

Control Group

Children who were recruited for the control group (CG) were asked to continue their routine physiotherapy (for 45 minutes, twice a week during eight weeks at a specialized education center). Physiotherapy programs of the children in the

control group were carried out by a physiotherapist at a specialized education center. The content of the therapy programs was questioned, and it was made sure that none of the children had received individually-structured interventions focusing on the trunk.

Outcome Measurements

Information on the age, height, weight, gender, the method of delivery, birth week, birth weight, topographic distribution, and oral medications were recorded for all of the participants.

Muscle Activation: Surface Electromyography

In this study, sEMG was performed based on recommendations of Surface EMG for the Non-Invasive Assessment of Muscles Project (Seniam Project). The skin was shaved in case there was hair and was cleaned with alcohol or wet wipes before electrode placement. First, electrodes were attached to the wires of Myomed 932 sEMG Biofeedback device (Enraf-Nonius International, Rotterdam, The Netherlands) and then they were placed on the targeted muscles to avoid uncomfortable manual pressure. Electrode placement was performed according to Seniam Project for lumbal multifidus and erector spinae muscles and M. gluteus maximus muscle (16-18) and literature review for M. rectus abdominis, internal oblique-transversus abdominis, external oblique muscles (18-20). Additional information about electrode placement is provided in Appendix

Table 1: Characteristic of the Children.

Variables		TTG (n=19)	CG (n=17)	p
		Mean±SD	Mean±SD	
Age (years)		8.81±3.92	10.44±4.63	0.377$^{\phi}$
Height (cm)		121.12±19.85	131.25±26.61	0.273$^{\phi}$
Weight (kg)		26.18±12.66	35.42±19.70	0.438$^{\phi}$
		n (%)	n (%)	
Gender	Girl	4 (21.05)	6 (35.29)	0.351$^{\delta}$
	Boy	15 (78.95)	11 (64.71)	
Topographic Distribution	Diparetic	10 (52.63)	11 (35.29)	0.463$^{\delta}$
	Quadriparetic	9 (47.37)	6 (64.71)	
Birth Week	<37 weeks	11 (57.89)	10 (58.82)	0.878$^{\delta}$
	37-40 weeks	8 (42.11)	7 (41.18)	
Method of Delivery	Natural	4 (21.05)	8 (47.05)	0.218$^{\delta}$
	Cesarean	15 (78.95)	9 (52.95)	
Birth Weight (gr)	<1500 gr	8 (42.10)	9 (52.94)	0.866$^{\delta}$
	>1500 gr	11 (57.90)	8 (47.06)	
Use of Oral Myorelaxant	Yes	12 (63.15)	12 (70.58)	0.632$^{\delta}$
	No	7 (36.85)	5 (29.42)	
GMFCS Levels	Level I	6 (31.57)	8 (47.05)	0.478$^{\phi}$
	Level II	4 (21.06)	3 (17.65)	
	Level III	2 (10.52)	1 (5.88)	
	Level IV	4 (21.06)	3 (17.65)	
	Level V	3 (15.79)	2 (11.77)	

$^{\phi}$Mann Whitney u test; $^{\delta}$Chi-square test. GMFCS: Gross Motor Function Classification System; TTG: Trunk Training Group; CG: Control Group.

Table 2: Baseline Surface Electromyography and Modified Tardieu Scale Values of Trunk Training Group and Control Group.

Variables		TTG (n=19)	CG (n=17)	p
		Mean±SD	Mean±SD	
sEMG-Minimum Values				
Lumbal Multifidius	**Right**	3.17±5.94	1.67±2.32	0.436
	Left	3.17±5.97	2.13±2.64	0.779
Erector Spinae	**Right**	7.28±9.63	3.67±5.20	0.187
	Left	5.28±8.95	5.47±8.63	0.700
Rectus Abdominis	**Right**	2.78±3.43	2.27±2.21	0.783
	Left	3.89±4.89	1.60±1.80	0.106
Internal Oblique/TransversusAbdominis	**Right**	3.44±4.93	1.33±1.63	0.148
	Left	2.61±3.69	0.80±1.14	0.079
External Oblique	**Right**	2.72±3.00	1.73±1.58	0.303
	Left	2.56±2.43	1.80±1.85	0.351
Gluteus Maximus	**Right**	1.61±2.20	0.07±0.25	**0.001***
	Left	4.17±9.64	0.00±0.00	**0.004***
sEMG-Maximum Values				
Lumbar Multifidius	**Right**	45.94±31.40	65.93±63.37	0.448
	Left	82.44±118.60	63.07±41.06	0.704
Erector Spinae	**Right**	63.78±26.39	87.33±43.57	0.143
	Left	73.56±44.29	94.67±50.70	0.199
M. Rectus Abdominis	**Right**	36.89±49.56	27.80±13.84	0.691
	Left	34.44±19.50	35.40±38.99	0.469
Internal Oblique/Transversus Abdominis	**Right**	23.89±16.94	26.67±30.43	0.786
	Left	28.22±24.10	41.60±93.32	0.319
External Oblique	**Right**	39.78±32.13	43.47±36.60	0.899
	Left	32.50±14.20	64.40±56.41	0.071
M. Gluteus Maximus	**Right**	18.00±16.16	30.33±46.53	0.664
	Left	23.89±30.40	32.40±94.05	0.799
MTS R2-R1				
Shoulder Adductors	**Right**	6.50±21.58	8.06±24.66	0.869
	Left	12.50±31.49	5.33±13.16	0.697
Shoulder Internal Rotators	**Right**	9.50±17.00	7.78±19.86	0.571
	Left	11.00±18.89	4.11±8.71	0.385
Elbow Flexors	**Right**	21.40±35.08	8.44±25.18	0.112
	Left	33.35±41.99	11.67±34.34	**0.028***
Forearm Pronators	**Right**	7.25±18.02	5.56±16.88	0.795
	Left	8.85±16.76	3.44±11.95	0.270
Wrist Flexors	**Right**	5.50±10.50	5.56±16.88	0.538
	Left	10.50±19.59	1.67±5.14	0.065
Finger Flexors	**Right**	10.00±22.00	4.44±16.52	0.270
	Left	7.00±17.52	3.89±16.49	0.128
Hip Adductors	**Right**	7.00±7.14	7.89±8.27	0.775
	Left	8.10±8.82	10.17±10.22	0.518
Hamstrings	**Right**	11.85±10.14	9.00±8.57	0.436
	Left	9.45±10.89	7.00±7.36	0.702
M. Gastrocnemius	**Right**	19.00±10.77	17.78±7.32	0.780
	Left	16.95±10.62	17.11±9.43	0.626
M. Soleus	**Right**	20.30±9.75	16.72±10.19	0.227
	Left	16.40±13.12	17.89±8.69	0.454

*p<0.05. TTG: Trunk Training Group; CG: Control Group; sEMG: Surface Electromyography; MTS R2 R1: Modified Tardieu Scale Spasticity Degree.

I. Data were collected in sitting position during rest (minimum values, microvolt μv) and during forward reaching (maximum values, microvolt μv) using sEMG biofeedback device. The EMG work-rest, pair channel mode of the device was used. Sensitivity was set at 1000 μv, and the threshold value was set at 0 μv, and the filter was set as average. During sEMG assessment, children sat in a chair with back support that allowed foot contact with the ground and 90 degrees of knee and hip flexion. The forearm of each child was measured. An object was positioned on the wall at eye level and at forearm distance. Children were asked to sit as resting with their arms on their lap and then they were asked to reach to the object with both hands upon the "reach" command. The "reach" command was repeated in 5 seconds to make sure that maximal muscle contraction was obtained and maintained. After 5 seconds of forward reaching, children were asked to relax. Each child was applied a practice session, and in case they were successful in the test, the assessment was commenced.

Modified Tardieu Scale

The Modified Tardieu Scale (MTS) is a clinical scale to assess spasticity by grading resistance to passive movement. Assessments were performed in supine position and other parts of the body, especially the head position, must be stable during the assessment. Muscle reaction angle (Y) consisting of goniometric assessment was performed at two velocities. The V1 (as slow as possible and slower

Table 3: Comparison of Changes in Outcomes from Baseline to Eight Weeks in the Trunk Training Group and the Control Group for Surface Electromyography Values.

Surface Electromyography		**TTG (n=19)**	**CG (n=17)**	**p**
Minimum Values		**Mean±SD**	**Mean±SD**	
Lumbar Multifidius	**Right**	-0.64±7.55	-0.68±1.30	0.420
	Left	-0.70±6.74	-1.06±1.83	0.389
Erector Spinae	**Right**	-3.82±9.10	-0.60±4.25	0.251
	Left	-1.35±10.23	-1.53±4.65	0.480
M. Rectus Abdominis	**Right**	-0.64±4.10	-0.11±1.69	0.058
	Left	-2.76±4.95	0.06±1.79	**0.030***
Internal Oblique/Transversus Abdominis	**Right**	-2.23±4.73	-0.33±0.81	0.190
	Left	-1.17±2.96	-0.20±1.20	0.500
External Oblique	**Right**	0.76±2.70	-0.43±1.31	0.553
	Left	-0.64±2.42	-0.31±1.92	0.711
M. Gluteus Maximus	**Right**	1.61±2.20	0.07±0.25	**0.001***
	Left	4.17±9.64	0.00±0.00	**0.004***
Maximum Values				
Lumbar Multifidius	**Right**	19.70±34.14	4.20±97.84	0.227
	Left	22.64±85.25	16.06±83.42	0.428
Erector Spinae	**Right**	14.52±29.57	-7.13±32.40	**0.025***
	Left	13.17±32.98	-21.26±32.84	**0.006***
M. Rectus Abdominis	**Right**	-9.17±49.33	-1.53±16.15	0.623
	Left	1.17±22.96	-6.06±31.44	0.734
Internal Oblique/Transversus Abdominis	**Right**	8.05±27.46	-0.86±20.07	0.484
	Left	12.29±55.88	-16.73±89.66	0.265
External Oblique	**Right**	3.05±59.19	9.00±49.69	0.335
	Left	5.41±35.84	0.40±72.87	0.910
M. Gluteus Maximus	**Right**	18.0±16.16	30.33±46.53	0.664
	Left	23.89±30.40	32.40±94.05	0.799

*p<0.05. TTG: Trunk Training Group; CG: Control Group.

Table 4: Comparison of Changes in Outcomes from Baseline to Eight Weeks in the Trunk Training Group and the Control Group for Modified Tardieu Scale.

Modified Tardieu Scale R2-R1		TTG (n=19)	CG (n=17)	p
		Mean± SD	Mean± SD	
Shoulder Adductors	Right	7.26±23.76	1.47±11.14	0.663
	Left	2.10±11.51	1.70±10.69	0.748
Shoulder Internal Rotators	Right	-0.63±11.29	-1.76±13.80	0.630
	Left	-4.21±13.48	4.00±9.72	0.080
Elbow Flexors	Right	-2.42±17.60	3.41±10.71	0.229
	Left	-9.63±29.35	-3.29±22.51	0.571
Forearm Pronators	Right	-2.89±17.59	-3.05±17.58	0.931
	Left	-1.15±16.51	-1.88±10.13	0.739
Wrist Flexors	Right	-0.10±7.61	-0.11±2.86	0.731
	Left	-1.36±14.98	-1.05±4.90	0.281
Finger Flexors	Right	-6.84±24.73	-1.76±5.28	0.663
	Left	3.68±21.91	-1.76±7.27	0.654
Hip Adductors	Right	-0.84±9.56	0.82±7.04	0.301
	Left	-1.84±8.92	0.35±7.77	0.821
Hamstrings	Right	-1.63±10.03	1.17±14.83	0.631
	Left	2.36±10.76	0.00±11.81	0.327
M. Gastrocnemius	Right	-0.21±14.00	-1.41±9.29	1.000
	Left	1.10±8.33	-2.58±7.47	0.192
M. Soleus	Right	0.94±8.31	0.76±9.36	0.911
	Left	2.05±10.09	1.35±8.75	0.886

TTG: Trunk Training Group, CG: Control Group; MTS: Modified Tardieu Scale; R2-R1: Modified Tardieu Scale Spasticity Degree.

than the natural drop of the limb segment under gravity) was used to assess the static component, and V3 (as fast as possible and faster than the rate of the natural drop of the limb segment under gravity) was used to assess the dynamic component. Bony landmarks were determined for the standardization of the goniometric measurements, and standard goniometry was used. Muscles were assessed first at V1 velocity and subsequently at V3 velocity. The Y parameter of V1 velocity was presented as R2, and Y parameter of V3 velocity was presented as R1. R2-R1 values gave the degree of spasticity (21-23). In this study, we calculated R2-R1 values for shoulder adductors and shoulder internally rotators, elbow flexors, forearm pronators, wrist flexors and finger flexors in the upper extremity, and hip adductors, hamstrings, gastrocnemius, and soleus muscles in the lower extremity. Testing positions are provided in Appendix II.

Assessment of the children performed and exercises of TTG were performed in the pediatric rehabilitation unit of Abant İzzet Baysal University by a physiotherapist, who had a nine-year pediatric rehabilitation experience.

Statistical Analysis

The Statistical Package for the Social Sciences (SPSS) (PASW 18, SPSS Inc, Chicago, USA) was used for statistical analyses. Descriptive analyses were presented as means and standard deviations for continuous variables and in numbers and percentages for categorical variables (gender,

topographic distribution). The differences in demographic characteristics between the groups were analyzed by using Chi-square test for categorical variables (gender, topographic distribution, delivery method, prematurity, birth weight classification) and Mann–Whitney U test was used for continuous variables (age, height, weight). The Wilcoxon Signed-rank Test was used to compare the differences between the baselines and post-intervention scores within the groups. Mann–Whitney U test was used to compare the differences between the groups. The level of significance was set at $p<0.05$.

RESULTS

We designated 65 children with CP to include in this study. Parents of the two children did not accept to join the study because of transportation problems, and they reported that it was complicated to travel with a child who was unable to walk. Sixteen children had severe cognitive impairments, two had unilateral Spastic CP, four had dyskinetic CP, three kept crying, and did not want to join the assessments or exercises, and therefore these children were not included. Overall 38 children with spastic CP, who accepted to join the study and were suitable according to the inclusion criteria, were included in this study.

One child from TTG had a seizure during the intervention period, and he did not develop seizure at the therapy session, however, since this condition was one of our exclusion criteria, this child was dropped from the study. One of the children from CG was dropped from the study because he had received a BoNT-A injection. The study was carried out with 36 children, 19 children (4 females, 15 males, mean age=8.81±3.92 years) were in TTG and 17 children (6 females, 11 males, mean age=10.44±4.63 years) were in CG. There was no difference between the groups regarding age, gender, topographic distribution, birth week, and birth weight. Demographic characteristics of the children and the distribution of the children in TTG and CG according to their GMFCS levels are shown in Table 1.

Baseline values of sEMG minimum for Gluteus Maximus muscle (right/left) were higher in TTG in comparison to the control group ($p<0.05$). There was no difference in baseline minimum and maximum sEMG values between the groups ($p>0.05$) for the other muscles. There were differences in MTS R2-R1 values of left elbow flexors between the groups ($p<0.05$) based on the baseline values and spasticity of these muscles were higher in TTG. There were no differences in the baseline values of MTS R2-R1 of other muscles between the groups ($p>0.05$). Baseline sEMG and MTS values of TTG and CG are shown in Table 2.

When the changes between the groups were analyzed, there was a decrease in M. rectus abdominis (left) and M. gluteus maximus (right/left) sEMG minimum values of TTG in comparison to CG ($p<0.05$). Moreover, there was an increase in Erector Spinae (right/left) sEMG maximum values of TTG in comparison to CG ($p<0.05$). When the changes that occurred following the treatment were analyzed, there was no difference in any of the muscles between-group comparisons for TTG or CG for MTS ($p>0.05$). The comparison of changes in the outcomes with eight week-intervention in the TTG and CG is shown in Table 3 and Table 4.

DISCUSSION

In this study, we analyzed the effects of trunk training on body functions and structures of children with spastic CP. We showed a decrease in M. rectus abdominis (left) and internal oblique/transversus abdominis (right/left) sEMG minimum values in TTG when compared with the baseline values. Moreover, the decrease of sEMG minimum values in TTG in M. rectus abdominis (left) and M. gluteus maximus (right/left) muscles was higher in CG. We did not have a control group of healthy children for comparison. However, we thought that sEMG activity at rest decreased since the children were able to maintain a stable sitting position and achieved better postural control. There was an increase in erector spinae (right/left) sEMG maximum values in TTG when compared with CG. It was a significant result for us because we performed many exercises to improve lumbar extension in TTG. There was no study reported in the literature as methodologically similar to our study. However, it has been shown in some studies that muscle activation can be changed with the NDT approach. Dos Santos et al. (24) have shown an

increase in trunk extensor muscle activity by EMG during humeral external rotation facilitation (this technique is identical to the one that we used in our exercises in the prone position and during sitting). They have concluded that both internal rotation and external rotation facilitations increased trunk extensor activity, but the increase was higher with external rotation (24). However, there was no information provided about the content of the applied trunk control program in these studies. This situation makes it difficult to compare the results. Unger et al. (25) have reported improvement in the posture of children with CP as accompanied with full body vibration after a four-week trunk training. On the other hand, Curtis et al. (26) have reported that there was no difference in trunk control between children with CP who received segmental trunk control training and children who received routine physiotherapy.

Arı and Günel (11) applied Bobath therapy for trunk control in children with CP in addition to the classical physiotherapy programs, and they found improvement in trunk extensor strength as assessed by using manual muscle testing. The methodology (exercises used for trunk training, assessment methods, therapy duration, and frequency), which applied trunk training in these four studies mentioned above is different from our study substantially. This situation makes the comparison of the results and drawing a general conclusion about the effects of trunk training difficult.

Abnormal movement patterns can be observed in upper and lower extremities in children with CP during antigravity motor performances. Researchers have shown that insufficient trunk control worsens this condition, but it does not affect muscle tone (5,27). In this study, we assessed spasticity with MTS, a reliable technique to assess spasticity in children with CP (21,22). Muscle tone of upper and lower extremity muscles did not change with the intervention in TTG or CG. In contrast to our results, Arı and Günel (11) have reported a decrease in lower extremity muscle tone with a 6-week trunk control training. It has been reported in the literature that muscle strengthening exercises did not improve muscle tone. Fowler et al. (28) have reported that quadriceps strengthening exercises did not improve spasticity in children with CP. Lee et al. (29) have reported that there was an improvement in muscle strength with lower extremity closed kinetic chain exercises performed on an unstable ground and gait characteristics did not change in spasticity.

It was seen that the results of the measurements had high standard deviations because the children at all GMFCS levels were included in the study. We believe that the inclusion of an equal number of cases at each GMFCS level and making separate analyses of each level may be beneficial to determine the effects of the trunk training in children at different GMFCS levels in the future studies.

In conclusion, according to our study, trunk training based on NDT and muscle strengthening had positive effects on lumbar extensor muscle activation, and it can be used safely without the risk of increasing spasticity. Therapy programs of the children with CP must be individually structured based on children's capacity and needs.

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Conflict of Interest: The authors report no conflicts of interest.

Ethical Approval: The study was approved by the Ethics Committee of Non-interventional Clinical Research of Hacettepe University (GO 14/135).

Informed Consent: Written informed consent was obtained from all study participants.

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Appendix I: Electrode Placement Regions for Surface Electromyography.

1. Lumbar Multifidus	**Electrode Placement**	Aligned with the line from caudal tip posterior superior iliac spine to the interspace between L1 and L2 interspace at the level of L5 spinous process (i.e., about 2-3 cm from the midline).
	Reference Electrode	On the spinous process of C7.
2. Mm. Erector Spinae	**Electrode Placement**	Two finger width lateral from the spinous process of L1.
	Reference Electrode	On the spinous process of C7.
3. M. Rectus Abdominis	**Electrode Placement**	1 cm above the umbilicus, 2 cm lateral to the midline
	Reference Electrode	On the spinous process of C7, near wrist or ankle
4. M. Internal Oblique/ Transversus Abdominis	**Electrode Placement**	2 cm below, medial from the anterior superior iliac spine
	Reference Electrode	On the spinous process of C7, near wrist or ankle
5. External Oblique	**Electrode Placement**	Below the rib cage, oblique to the inferior costal angle
	Reference Electrode	On the spinous process of C7, near wrist or ankle
6. M. Gluteus Maximus	**Electrode Placement**	At the midpoint of the line between the sacral vertebra and the trochanter major (middle of the line between the SIPS and the gluteal fold).
	Reference Electrode	On the spinous process of C7, near wrist or ankle

Appendix II: Modified Tardieu Scale (Assessment Protocol for Muscle Reaction Angle).

Muscles	Reference Points for Goniometric Assessment		Movement
Shoulder Adductors: Arm positioned in rest on the assessment table, near to the body	**Axis**	Acromion	One hand placed on the humerus and the other hand on forearm. The shoulder has taken from a neutral position to full abduction.
	Stabilization Arm	Parallel to the sternum and columna vertebralis	
	Movement Arm	Anterior midline of the humerus	
Shoulder Internal Rotators: Arm positioned in 90 degrees of shoulder abduction and full internal rotation	**Axis**	Olecranon	One hand placed on the humerus and the other hand on forearm. The shoulder has taken from full internal rotation to full external rotation.
	Stabilization Arm	Parallel to the floor	
	Movement Arm	Between radius and ulna, parallel to the 3rd metacarpal bone	
Elbow Flexors: Arm positioned in rest on the assessment table with full elbow flexion	**Axis**	Lateral epicondyle of humerus	One hand placed on the humerus and the other hand on forearm. Elbow has taken from full flexion to full extension.
	Stabilization Arm	Lateral midline of humerus	
	Movement Arm	Proximal phalanx of the 3rd finger	
Forearm Pronators: Arm positioned in rest on the assessment table with 90 degrees elbow flexion and full forearm pronation, a pencil hold in hand	**Axis**	3rd metacarpophalangeal joint	One hand placed on the humerus and the other hand on forearm. Forearm has taken from full pronation to full supination
	Stabilization Arm	Parallel to the long axis of humerus or assessment table	
	Movement Arm	Parallel to the pencil	
Wrist Flexors: Arm positioned in rest on the assessment table, wrist flexed, hanged down from the lateral side of the assessment table	**Axis**	Styloid process of ulna	One hand placed on the forearm, the other hand on metacarpal bones. The wrist has taken from full flexion to full extension.
	Stabilization Arm:	Parallel to the ulna	
	Movement Arm	5th metacarpal bone	
Finger Flexors: Arm positioned in rest on the assessment table, with 90 degrees elbow flexion	**Axis**	5th metacarpophalangeal joint	One hand placed on metacarpal bones and the other hand on phalanxes. Fingers have taken from full flexion to full extension
	Stabilization Arm	Parallel to the 5th metacarpal bone	
	Movement Arm	Parallel to the 5th phalanx	
Hip Adductors: Hips positioned in the neutral position, knees in extension. Pelvis stabilized from the other side	**Axis**	Projection of trochanter major on anterior of the femur	One hand placed on the femur and the other hand on proximal to ankle. Hip joint has taken from full adduction to full abduction
	Stabilization Arm	Parallel to the line between two anterior superior iliac spine	
	Movement Arm	Anterior midline of the femur	
Hamstrings: Hips positioned in 90 degrees of flexion and knees in full flexion	**Axis**	Lateral condyle of the femur	One hand placed on the femur and the other hand on proximal to ankle. The knee joint has taken from full flexion to full extension
	Stabilization Arm	Lateral midline of the femur	
	Movement Arm	Lateral midline of the fibula	
M. Gastrocnemius: Hip positioned in rest and knee in extension	**Axis**	Lateral malleolus	One hand placed on proximal to ankle and the other hand on metatarsal bones. The ankle has taken from full plantar flexion to full dorsal flexion
	Stabilization Arm	Parallel to the lateral aspect of the fibula	
	Movement Arm	Midline of the 5th metatarsal bone	
M. Soleus: Hip and knee positioned in 45 degrees of flexion	**Axis**	Lateral malleolus	One hand placed on proximal to ankle and the other hand on metatarsal bones. The ankle has taken from full plantar flexion to full dorsal flexion
	Stabilization Arm	Parallel to the lateral aspect of the fibula	
	Movement Arm	Midline of the 5th metatarsal bone	

All the assessments made in the supine position, the child in rest, had in the midline, no pillow or a thin pillow can be used

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EFFICACY OF MODIFIED CONSTRAINT-INDUCED MOVEMENT THERAPY FOR LOWER EXTREMITY IN PATIENTS WITH STROKE: STRENGTH AND QUALITY OF LIFE OUTCOMES

ORIGINAL ARTICLE

ABSTRACT

Purpose: This study was aimed to examine the efficacy of modified constraint-induced movement therapy (mCIMT), which was applied to lower extremity, on strength and quality of life (QoL) in patients with stroke.

Methods: Thirty patients with stroke were randomly divided into two groups. Both groups received neuro-developmental therapy (NDT) for four weeks as baseline treatment. After four weeks, when the study group received mCIMT, the control group continued NDT for two weeks as the experimental treatment. The strength was evaluated using Motricity Index, and QoL was evaluated using Stroke Specific Quality of Life Scale (SS-QoL), and Stroke Impact Scale (SIS) for three times (baseline, post 4 weeks, and post 6 weeks).

Results: The strength and QoL improved in both groups for all treatment periods ($p<0.01$). The paretic lower limb strength developed more in the mCIMT group for the total treatment period ($p=0.029$). The total score of the SS-QoL and mobility, self-care, thinking, mood, family, and social roles subdomain scores of the SS-QoL were more pronounced in the mCIMT group after the mCIMT period ($p<0.05$). The amount of perceived recovery domain of SIS was greater in the mCIMT group after mCIMT and total treatment periods according to the control group ($p<0.001$). The total changes in strength and QOL were strongly correlated with the improvement in the mCIMT period ($r=0.709$, $p<0.01$ and $r=0.769$, $p<0.01$) than in the baseline period ($r=0.660$, $p<0.01$ and $r=0.505$, $p<0.01$).

Conclusion: The study showed that mCIMT could be used as an effective treatment method for patients with stroke to improve paretic lower extremity strength and health-related QoL.

Key Words: Muscle Strength; Quality of Life; Stroke Rehabilitation.

İNMELİ HASTALARDA ALT EKSTREMİTEYE UYGULANAN MODİFİYE KISITLAYICI-ZORUNLU HAREKET TEDAVİSİNİN ETKİNLİĞİ: KUVVET VE YAŞAM KALİTESİ SONUÇLARI

ARAŞTIRMA MAKALESİ

ÖZ

Amaç: Bu çalışmanın amacı inmeli hastalarda alt ekstremiteye uygulanan modifiye kısıtlayıcı-zorunlu hareket tedavisinin (mKZHT) kuvvet ve yaşam kalitesi (YK) üzerine etkinliğini değerlendirmekti.

Yöntem: Otuz inmeli hasta rastgele iki gruba ayrıldı. Her iki gruba başlangıç tedavisi olarak dört hafta süre ile nörogelişimsel tedavi (NGT), ardından iki hafta süreyle çalışma grubuna deneysel tedavi olarak mKZHT, kontrol grubuna ise NGT uygulandı. Kuvvet Motrisite İndeksi ile, YK ise İnmeye Özgü Yaşam Kalitesi Ölçeği (İÖYKÖ) ve İnme Etki Ölçeği (İEÖ) ile üç kez (başlangıçta, 4 hafta sonra ve 6 hafta sonra) değerlendirildi.

Sonuçlar: Kuvvet ve YK her iki grupta da tüm tedavi periyodları sonrasında gelişti ($p<0,01$). Paretik alt ekstremite kuvveti toplam tedavi periyodunda mKHZT grubunda daha fazla gelişti ($p=0,029$). İÖYKÖ toplam puanı ve İÖYKÖ mobilite, kendine bakım, düşünme, ruh hali, aile ve sosyal roller alt alan puanlarında deneysel tedavi periyodu sonrasında görülen değişim mKHZT grubunda daha fazlaydı ($p<0,05$). mKHZT grubunda hem mKHZT tedavi hem de toplam tedavi periyodu sonrasında İEÖ'nde algılanan iyileşme miktarındaki artış kontrol grubuna göre daha fazlaydı ($p<0,01$). Kuvvet ve YK'deki toplam değişimler, mKHZT periyoddaki gelişmeler ($r=0,709$, $p<0,01$ ve $r=0,769$, $p<0,01$) ile başlangıç periyodundaki gelişmelere ($r=0,660$, $p<0,01$ ve $r=0,505$, $p<0,01$) göre daha güçlü ilişkideydi.

Tartışma: Bu çalışma inmeli hastalarda paretik alt ekstremite kuvvetini ve sağlıkla ilişkili YK geliştirmede mKZHT'nin etkili bir tedavi yöntemi olarak kullanılabileceğini göstermektedir.

Anahtar Kelimeler: İnme Rehabilitasyonu; Kas Kuvveti; Yaşam Kalitesi.

INTRODUCTION

Stroke is one of the significant factors for disability and mortality in the developed world (1). Patients with stroke can live longer, despite the high rates of disability and morbidity associated with stroke (2). Disability and morbidity elicit an attenuation in quality of life (QoL) in patients with stroke (3). The QoL has a multidimensional structure that includes physical, psychologic, functional, and social health-related domains. Carod et al. showed that mobility and muscle strength were the most highly correlated domains with health-related QoL (4). Therefore, rehabilitation programs, which are aimed to improve QoL, should be targeted primarily at the mobility and strength of paretic lower extremity. There are many different rehabilitation approaches to improve lower extremity function (5). Regardless of which the rehabilitation approach used, first it is necessary to break the "learned misuse" phenomenon that has developed in the lower extremity because one of the main problems following stroke is the misuse of paretic lower extremity during mobility (6). Some authors have reported that patients with stroke are in tendency prefer to use the nonparetic lower extremity during functional activities and even during exercise sessions depending on the inefficacy in weight-bearing tasks of paretic extremity (7). Despite this inclination to use the nonparetic extremity, the practicability and efficiency of the rehabilitation approaches which promote the use of paretic lower extremity should be improved (8).

In recent years, constraint-induced movement therapy (CIMT) or modified CIMT, which was first used for upper extremity rehabilitation, has begun to be used for lower extremity as well (9-12). Even though there are some difficulties for lower extremity rehabilitation with mCIMT in clinical settings, many researchers have tried it nonetheless and have shown that CIMT or mCIMT significantly improved motor functions (9,10,12-14).

However, to our knowledge, the effects of mCIMT on the lower extremities on QoL and muscle strength have not yet been investigated. Therefore, the present study aimed to evaluate the efficacy of mCIMT on QoL and muscle strength in stroke survivors. In addition, we also investigated the association between the total developments in muscle strength and QoL and particular change according to the treatment period.

METHODS

Study Design and Participants

This study was designed as a prospective, single-blind, randomized controlled study. The sample size was determined by G*Power 3.0.10 (G*Power 3.1 software, F. Faul, E. Erdfelder, A.G. Lang and A. Buchner, University of Kiel, Germany; http://www.gpower.hhu.de). The confidence level was set at 5% with power 80%. An average difference between groups for the SIS score was postulated 9.09 according to a previous study (15). The sample size calculated as 11, but at least 15 participants were included in each group to prevent dropouts. Before they were randomized into two groups, the participants were stratified based on age (≤60 or >60 years), gender, hemiplegic side, type of stroke, and length of time post-stroke to obtain a balanced distribution of the participants according to essential parameters which have known prognostic effects by a physiotherapist (16). The participants were identified into blocks, and simple randomization is performed using computer-generated random numbers.

Inclusion criteria were as follows: clinical diagnosis of a single, unilateral stroke; being over the age of 18 years; the time since the stroke was between 3 and 12 months; the exhibition of mild to moderate disability according to lower extremity recovery stages (Brunnstrom recovery stages III-V); no attendance in any rehabilitation programme; and permitted to participate in an intensive rehabilitation program. Patients were excluded if they had a recurring stroke; medical comorbidities; cognitive impairment (less than 24 points on the Mini-Mental Status Examination); additional neurological or orthopedic problems. Patients were also excluded from the study if they missed ≥3 consecutive treatment sessions. It was especially noted that the medical condition of the participants was stable and had not previously received physiotherapy, so the participants were called from the patient list, that waiting to receive physiotherapy for the first time. Signed informed consent was obtained from all participants, as approved by the Hacettepe University Ethics Committee (GO 14/22-15).

Outcome Measures

All participants were evaluated by a physiotherapist who was blinded to their grouping, a total of three times, at baseline, post 4 weeks, and post 6 weeks.

The Motricity Index is a useful, valid and reliable assessment tool for muscle strength that can predict mobility outcomes poststroke (17). Hip flexion, knee extension, and ankle dorsiflexion were graded based on weighted scores between 0 and 33, as Motricity Scores (18). During the test, the patient applied force against resistance. The score was recorded according to the quality of muscle contraction. Finally, all three scores were summed with 1 more point added. Then, the scores for the lower extremities, which changed from 0 (paresis) to 100 (normal), were calculated.

Quality of life was determined using the Turkish version of the Stroke Specific Quality of Life (SS-QoL) scale (19). This tool is a patient-oriented questionnaire including of 12 domains, such as self-care, vision, language, mobility, work, upper extremity, thinking, personality, mood, family, social roles, and energy. Each domain scored between 1 and 5 (20). A total score and the score of each subdomain were calculated separately.

The Turkish translated Stroke Impact Scale (SIS), version 3.0, was used to determine the impact of stroke on patients (21). The SIS contains eight domains, but only the lower extremity strength (2 items), mobility (9 items) domains were used in the present study. Each item is scored on a 5-point scale, and total scores of each domain could change between 0 and 100. In addition, one question investigates the amount of the perceived recovery after stroke using a Visual Analogue Scale, on 100 scores (22).

Intervention

The treatment program was conducted in two phases. The first phase was baseline treatment and the second phase was the experimental treatment. The neurodevelopmental therapy (NDT), was also used in the control and study groups during the baseline treatment period (BP), three sessions per week, 60 minutes per session, for four weeks. Each session was executed by a physiotherapist, who had eight years of work experience in the neurologic rehabilitation field. The NDT requires continuous observation, evaluation, progression, and modification of the program dealing with participants' progression (23). Therefore, the physiotherapist followed the progression to choose appropriate exercises for the patient's abilities and needs. Exercises in the NDT program consisted of weight shifting in different position, facilitation of regular movement pattern (including walking), and balance activities that are based on the motor-learning principle.

During the experimental treatment period (EP), for two weeks, while the NDT was continued to use in the control group, mCIMT was conducted for the paretic lower extremity in the study group. The EP included five sessions per week, with each session lasting 120 minutes for both groups (13). The CIMT contained three main elements: the intensive practice of the functional activities, restricted use of the nonparetic extremity, and transferring the gains from the training session to the patient's real environment with "transfer package" (23). The intensive practice was applied with the selection of appropriate functional activities following the "shaping" principles by the feedback, coaching, modeling, and encouragement of the physiotherapist. The functional activities are walking (forward, backward, sidewards), weight-bearing activities to different directions, climbing up and down stairs and ramp, balance activities, stepping over obstacles, working with a bicycle ergometer, and gait training on the treadmill, over 20 minutes, repetitively. After each 20-minute activity period, a rest period of 5 minutes was given. A combination of two different methods fulfilled the constraint of nonparetic lower extremity; immobilization of the knee of the nonparetic extremity with a whole-leg orthosis at the fullest extension position and use of a shoe insert with a 1 cm lift and 5° lateral wedge on the nonparetic lower extremity (Figure 1) (9,11). Training on the use of the orthosis and shoe insert was provided for patients and their relatives. The restriction was used during treatment sessions and 90% of the participants' waking hours. The functional activities used during therapy session were set as a home program, and participants were strongly encouraged to use their paretic extremity (13).

Statistical Analysis

The data were analyzed with SPSS 20.0 (IBM Corp, Chicago, IL, USA). The Kolmogorov-Smirnov test was used to determine the distribution. Variables were presented as mean±standard deviation. The comparisons of within-group were performed using repeated measures ANOVA, and post hoc tested via the paired sample t-test. The comparisons of the changes after treatment periods between groups were performed using Student t-test. The changes in outcome measures after the BP were evaluated with the difference between the baseline scores and post-baseline treatment scores. The changes in outcome measures during the EP were evaluated with the difference between the post-baseline treatment scores and the post-experimental treatment scores. The changes in outcome measures over the total treatment period (TTP) were evaluated with the difference between the baseline scores and post-experimental treatment scores. In addition, the changes in outcome measures were also evaluated based on minimal detectable change (MDC) values, which was determined by previous studies of Lin et al. (24,25). According to these studies, the total MDC value of strength and mobility domain of SIS was 39.1, and the MDC values in the mobility, self-care, and upper extremity function subdomains of SS-QoL were 5.9, 4.0, and 5.3, respectively (25). The proportions of patients with a change score greater than these MDC values were calculated. The correlation coefficient was calculated using Pearson's test to determine the developments in strength and QoL that is associated with the changes in which treatment period. The significance level was set at $p<0.05$.

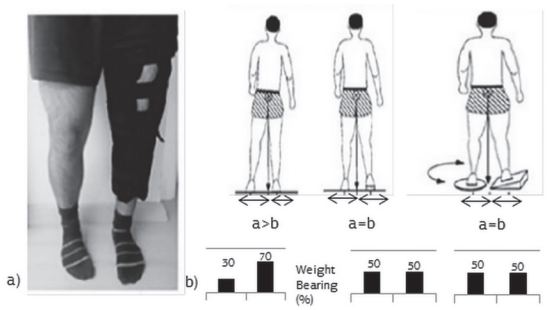

Figure 1: Constraint Method of the Nonparetic Lower Extremity: (a) Whole Leg Orthosis and (b) Addition of a Shoe Insert on the Non-Paretic Lower Extremity (9). Section "b" of this figure was used with the permission of Aruin's.

RESULTS

The 30 participants were 16 females and 14 males, with a mean age of 56.40±13.45 years and the mean time post-stroke of 6.70±2.94 months. Figure 2 demonstrates the flowchart of the study. The clinical characteristics of the participants are summarized in Table 1. Both groups were similar regarding physical characteristics at baseline

Table 1: Participant Characteristics.

Characteristics	mCIMT Group (n=15) Mean±SD	Control Group (n=15) Mean±SD	p
Age (years)	55.13±14.70	57.67±12.20	0.612[a]
Poststroke (months)	6.80±2.70	6.63±3.18	0.878[a]
BMI (kg/m²)	26.26±3.49	29.71±7.56	0.124[a]
Gender, n (%) **Male** **Female**	 8 (53.3) 7 (46.7)	 6 (40) 9 (60)	0.464[b]
Affected Side, n (%) **Left** **Right**	 10 (66.7) 5 (33.3)	 10 (66.7) 5 (33.3)	1.000[b]
Type of Stroke, n (%) **Ischemia** **Hemorrhage**	 11 (73.3) 4 (26.7)	 12 (80) 3 (20)	0.666[b]
Brunnstrom Recovery Stage, n (%) **III** **IV**	 12 (80) 3 (20)	 11 (73.3) 4 (26.7)	0.666[b]

[a]Student's t-Test, [b]Chi Square Test. BMI: Body Mass Index.

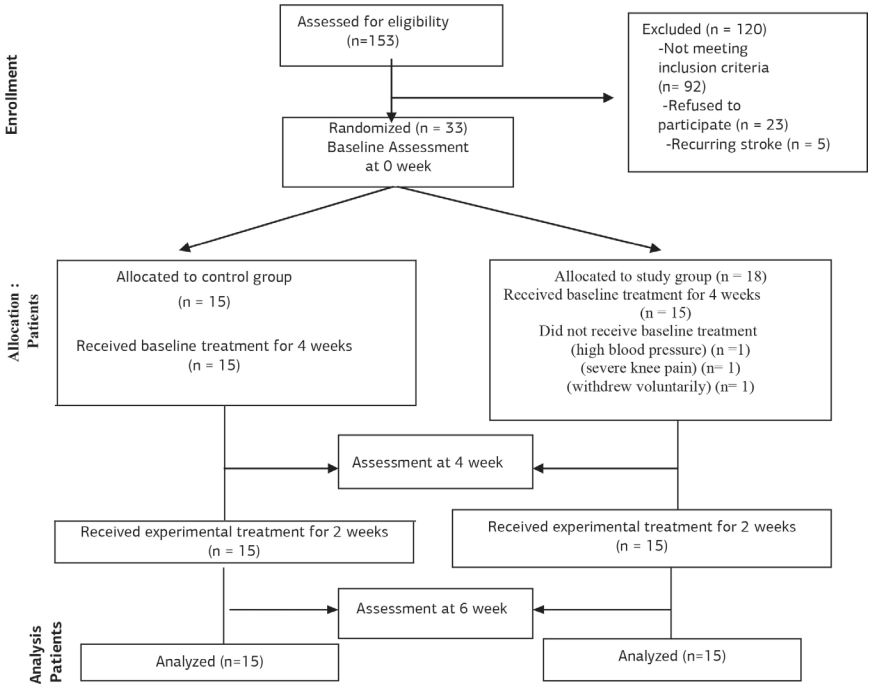

Figure 2: Study Design and Sample Flowchart.

(p>0.05).

The Motricity Index score increased for BP, EP, and TTP in both groups (p<0.01, Table 2). The score increased 19.8 and 13.2 points in the study and control group, after the TTP, respectively. A significant difference of changes in lower extremity strength was seen for the TTP in favor of the mCIMT group (p=0.029), but the changes in BP and EP were found similar among groups (p=0.161 and p=0.129, Table 3).

The outcomes of the QoL improved in both groups for all treatment periods (p<0.01, Table 2). Comparison of the changes in the SS-QoL total score and subdomain scores among groups are also detailed in Table 3. Regarding the SS-QoL total score and their subdomains, the study group showed significant improvement after the EP, in total score (p=0.003), mobility (p=0.004), self care (p=0.002), thinking (p=0.026), mood (p=0.012), family (p=0.01), and social roles (p=0.004) when compared with the control group. The thinking (p=0.043), mood (p=0.002), and personality (p=0.040) scores in the mCIMT group also changed meaningfully over the TTP. After the BP only the mood subdomain improved significantly in the mCIMT group (p=0.009). The subdomains of energy, vision, language, work/productivity scores, and upper extremity function were similar among groups (p>0.05).

Figure 3 demonstrates that the proportions of patients exceeded the MDC values. At the BP a similar proportion of patients exceeded the

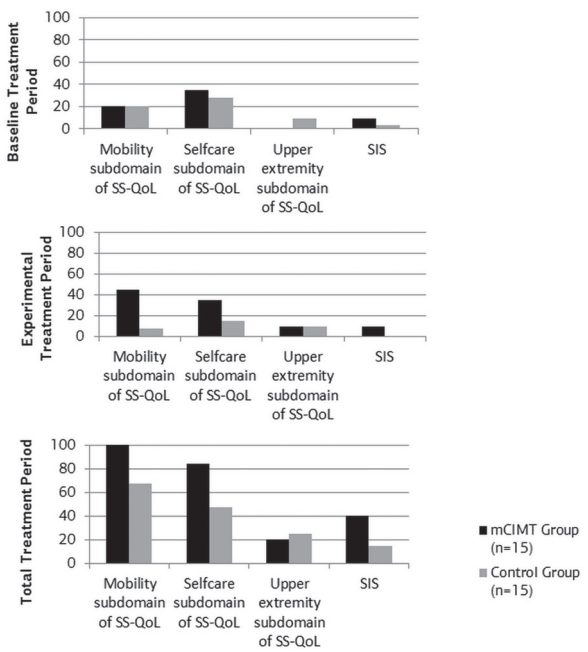

Figure 3: Comparison of the Proportions of the Patient Reached or Exceeded the Minimal Detectable Change Values between the Groups. SIS: Stroke Impact Scale, SS-QoL: Stroke Specific Quality of Life.

Table 2: The Comparison of the Means of the Motricity Index, Stroke Specific Quality of Life Scale, and Stroke Impact Scale Scores within the Group.

Outcome Measures	mCIMT Group			Control Group		
	Baseline	Post-4 weeks	Post-6 weeks	Baseline	Post-4 weeks	Post-6 weeks
Motricity Index	42.13±10.27	50.47±11.13[a]	61.93±12.53[b,c]	44.87±12.89	50.13±14.86[a]	58.07±14.35[b,c]
SSQoLS Total	128.40±29.36	148.60±27.95[a]	177.40±23.85[b,c]	128.87±26.95	152.13±26.25[a]	166.53±25.47[b,c]
Mobility	14.80±4.65	18.87±4.03[a]	24.87±3.74[b,c]	12.87±3.62	19.40±3.70[a]	22.60±3.09[b,c]
Energy	8.33±2.92	9.73±2.69[a]	11.07±2.58[b,c]	7.60±2.69	8.87±3.16[a]	9.60±3.27[b,c]
Self Care	11.53±3.52	14.40±3.48[a]	17.60±3.58[b,c]	11.67±3.66	14.47±3.29[a]	15.80±3.65[b,c]
Vision	13.40±2.16	14.13±1.60 [a]	14.93±0.26[b,c]	13.33±1.76	14.20±1.01 [a]	14.53±0.64[b,c]
Language	19.27±7.33	19.73±7.01 [a]	21.27±6.27[b,c]	20.87±6.01	22.07±5.39[a]	22.67±5.04[b,c]
Work/ Productivity	6.60±2.72	8.20±2.76[a]	9.80±2.81[b,c]	6.07±1.83	7.67±2.19[a]	8.53±2.36 [b,c]
Upper Extremity Function	11.60±4.82	13.27±5.13[a]	15.93±5.51 [b,c]	11.00±3.98	13.67±3.81[a]	15.60±4.27[b,c]
Thinking	9.73±2.12	11.13±1.60[a]	12.73±1.62[b,c]	9.67±2.41	10.73±2.12[a]	11.27±1.75[b,c]
Personality	7.13±3.16	8.67±2.53[a]	10.40±2.77[b,c]	8.60±4.03	9.60±3.70[a]	10.60±3.04[b,c]
Mood	10.47±3.80	13.93±3.79[a]	17.07±3.49[b,c]	11.60±3.04	13.80±2.83[a]	15.87±2.83[b,c]
Family	6.20±3.14	7.87±3.11[a]	10.00±3.25[b,c]	6.67±2.16	8.33±2.61[a]	9.33±2.74[b,c]
Social Rolles	8.87±3.46	11.40±4.37[a]	14.13±5.21[b,c]	8.67±2.13	11.47±3.16[a]	12.80±3.55[b,c]
SIS[d]	31.21±19.12	53.05±19.45[a]	70.91±15.54[b,c]	37.88±21.17	53.64±17.71[a]	64.83±17.13[b,c]
Perceived Recovery	21.33±14.07	42.67±12.23[a]	72.67±15.80[b,c]	24.67±11.87	41.33±12.46[a]	57.33±15.34[b,c]

[a]Means that the scores changed significantly between the baseline and post 4 weeks assessment. p<0.01.
[b]Means that the scores changed significantly between the post 4 weeks and post 6 weeks assessment. p<0.01.
[c]Means that the scores changed significantly between the baseline and post 6 weeks assessment. p<0.01.
[d]SIS: Stroke Impact Scale, the domain of strength of lower extremity and mobility.
SSQoLS: Stroke Specific Quality of Life Scale. mCIMT: Constraint Induced Movement Therapy.

MDC value in both groups for mobility and upper extremity function subdomains. At the EP and TTP, these proportions increased for mobility and self-care subdomains in both groups, but in the mCIMT group 2-fold more patients obtained these values. The proportion of patients exceeded the MDC values of upper extremity function was the lowest level for both groups.

As shown in Table 2, SIS score changed more over TTP in the study group compared with the control group (p=0.017), but the improvement in the BP and EP did not differ between groups (p=0.118 and p=0.051). In the mCIMT group, the SIS subdomain of the amount of perceived recovery improved significantly more than the control group after the TTP (p<0.001) and EP (p<0.001).

The change at the end of the TTP for the SIS score exceeded the MDC value in the 40% proportions of the mCIMT group and 13.3% of the control group. The changes of SIS score in the BP and EP exceeded the MDC value less than 10% of patients for both groups (Figure 3).

For the improvements in strength and QoL of both groups, the correlations between total change and change in BP and between total change and change in EP are shown in Figure 4. Correlations were found to be significantly strong on the following items: strength (correlation coefficient of BP vs. EP, r=0.660 vs r=0.709, respectively), and QoL of EP (r=0.769). The correlation between total score change and BP in QoL was moderate (r=0.505, p<0.010).

DISCUSSION

This study revealed that mCIMT for the paretic lower extremity improves muscle strength and health-

Table 3: Comparison of Therapy Effects on Motricity Index, Stroke Specific Quality of Life Scale and Stroke Impact Scale Scores between Two Intervention Groups.[a]

Parameters	Baseline Treatment Period				Experimental Treatment Period				Total Treatment Period			
	mCIMT	Control	95% CI	p	mCIMT	Control	95% CI	p	mCIMT	Control	95% CI	p
Motricity Index	8.33±6.54	5.27±5.04	N/A	0.161	11.47±7.00	7.93±5.24	N/A	0.129	19.80±8.97	13.20±6.56	0.72-12.48	**0.029***
SSQoLS Total	20.20±7.93	23.27±12.38	N/A	0.426	28.80±16.38	14.40±4.85	5.36-23.44	**0.003****	49.00±16.96	37.67±13.04	N/A	0.050
Mobility	4.07±1.98	4.53±2.90	N/A	0.611	6.00±3.12	3.20±1.47	0.98-4.62	**0.004****	10.07±3.73	7.73±3.13	N/A	0.074
Energy	1.40±1.12	1.27±1.28	N/A	0.764	1.33±1.23	0.73±0.80	N/A	0.125	2.73±1.62	2.00±1.73	N/A	0.242
Self Care	2.87±1.64	2.80±1.70	N/A	0.914	3.20±1.42	1.33±1.50	0.77-2.96	**0.002****	6.07±2.52	4.13±2.64	N/A	0.050
Vision	0.73±0.80	0.87±1.06	N/A	0.700	0.80±1.57	0.33±0.62	N/A	0.292	1.53±2.13	1.20±1.42	N/A	0.619
Language	0.47±0.92	1.20±1.97	N/A	0.202	1.53±3.31	0.60±1.12	N/A	0.310	2.00±3.34	1.80±2.37	N/A	0.851
Work/ Productivity	1.60±1.06	1.60±1.06	N/A	1.000	1.60±1.30	0.87±0.83	N/A	0.076	3.20±1.32	2.47±1.30	N/A	0.137
Upper Extremity Function	1.67±1.68	2.67±2.61	N/A	0.222	2.67±2.53	1.93±1.95	N/A	0.381	4.33±3.54	4.60±2.95	N/A	0.824
Thinking	1.40±1.30	1.07±1.22	N/A	0.475	1.60±1.59	0.53±0.74	0.14-2.00	**0.026***	3.00±2.24	1.60±1.24	0.05-2.75	**0.043***
Personality	1.53±1.36	1.00±0.93	N/A	0.219	1.73±1.75	1.00±0.85	N/A	0.155	3.27±1.83	2.00±1.36	0.06-2.47	**0.040***
Mood	3.47±1.36	2.20±1.08	0.35-2.18	**0.009****	3.13±1.06	2.07±1.10	0.26-1.87	**0.012***	6.60±1.99	4.27±1.62	0.97-3.69	**0.002****
Family	1.67±1.18	1.67±0.82	N/A	1.000	2.13±1.41	1.00±0.76	0.29-1.98	**0.010***	3.80±1.93	2.67±1.05	N/A	0.056
Social Roles	2.53±1.41	2.80±1.42	N/A	0.610	2.73±1.33	1.33±1.11	0.48-2.32	**0.004****	5.27±2.19	4.13±1.92	N/A	0.143
SIS[b]	21.84±11.42	15.76±9.07	N/A	0.118	17.86±9.80	11.19±8.00	N/A	0.051	39.70±13.19	26.95±14.35	2.44-23.05	**0.017***
Perceived Recovery	21.33±9.15	16.67±4.88	N/A	0.092	30.00±8.45	16.00±9.86	7.13-20.87	**<0.001****	51.33±13.56	32.67±10.33	9.65-27.68	**<0.001****

*p<0.05, **p<0.01. CI: Confidence Interval, N/A: not applied since p>0.05, SIS: Stroke Impact Scale, SSQoLS: Stroke Specific Quality of Life Scale.
[a]Statistics are presented in mean±SD.
[b]SIS: Stroke Impact Scale, domain of strength of lower extremity and mobility.

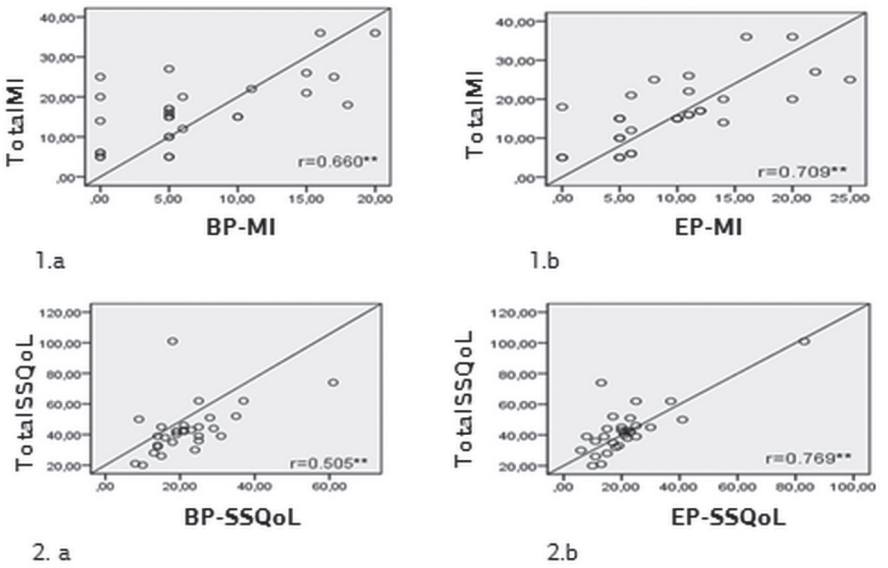

Figure 4: This figure illustrates correlations (1.a) among total strength change and strength change of baseline treatment, (1.b) among total strength change and strength change of experimental treatment, (2.a) among total change of QoL score and change of QoL score in baseline treatment, and (2.b) among total change of QoL score and change of QoL score in experimental treatment. BP: change in baseline treatment period, EP: change in experimental treatment period, MI: Motricity Index, SSQoL: Stroke Specific Quality of Life. **p<0.01, r: Pearson's correlation coefficient.

related QoL in patients with stroke, particularly the mobility, self-care, thinking, mood, family, and social roles subdomains. mCIMT can be used as a supportive treatment method to improve the QoL and increase the muscle strength, as a result of the development of paretic lower extremity function, following the stroke.

After the stroke, many approaches consisting of exercise are recommended to improve motor function and health-related QoL (5). Modified CIMT is another method that has been used recently to improve functional performance, particularly concerning gait and balance outcomes (10,12-14,26). We also published a paper, as a primary result of this study, which demonstrated that mCIMT enhanced the motor function (10). However, outcomes of QoL and strength, as well as motor function, are essential in evaluating the success of an approach.

The assessment and development of muscle strength are essential following a stroke, as muscle weakness probable cause to chronic disability. In this study, in which we examined the effect of mCIMT on muscle strength, we showed that strength improvement in the study group was higher than the control group after the TTP. Moreover, the improvement after the TTP was correlated more highly with the EP, in particularly mCIMT. Our finding is consistent with the previous studies in which reported that task-oriented rehabilitation methods, such as mCIMT, are beneficial for increasing muscle strength (15,27). We thought that the strength development after TTP in the study group is explained by the right, intensive practice of the paretic lower extremity in weight-bearing positions due to the restriction of non-paretic extremity. Therefore, the muscles in the paretic lower extremity may have been extensively activated, and inconsequently the strengthening has occurred.

Gokkaya et al. (28) reported that QoL is poorer in Turkish stroke survivor than in healthy individuals. One of the significant aims of rehabilitation is to improve QoL. The QoL is closely related to ensuring independence in activities of daily living, especially in the successful continuation of mobility. Therefore, the rehabilitation approaches should target to achieve the lower-extremity functions to an optimal level, which are known in the linear relationship with QoL (4,28,29). Yu et al. have reported that there were superior effects of forced-use training for the affected lower extremity on gait,

but it did not result in better QoL (30). In contrast, we showed that mCIMT had positive effects on QoL, particularly total score, mobility, self-care, social roles, family, mood, thinking subdomains of SS-QoL. In addition, sometimes these changes may not be enough to make a clinical decision. At this point, the MDC values may help the clinician to interpret the outcomes. Thus, the physiotherapist could decide whether to proceed or needs to change the treatment. MDC values of the SS-QoL scale was reported just mobility, self-care and upper extremity function subdomains (25). The present study showed that the highest proportions of the patients in study groups had an actual improvement in mobility and self-care subdomains of SS-QoL. We attributed this finding that mCIMT for lower extremity involved the intensive practice of the paretic extremity and increased weight-bearing on the paretic lower extremity (10), and following the mobility, transfer activities and participation improved due to treatment. Consequently, these changes have reflected the QoL.

The patient's thoughts dealing with the treatment methods should be considered, which will help to ensure that the treatment is successful. The SIS includes a domain that evaluates perceived recovery by the patient. Participants have reported that mCIMT contributes more to recovery from the stroke after both the EP and TTP when compared with NDT. When QoL is evaluated using the SIS, QoL has been seen to develop further in the mCIMT group by the effect of total treatment. In this study, only the mobility and lower extremity strength domains of the SIS were used. Therefore, the impact of stroke recovered after six weeks due to the development of strength.

Similarly, at the BP and EP, only one patient exceeded the MDC value of the SIS in both groups, and after the TTP, 40% and 13.3% of the patients in the mCIMT group and the control group, respectively, exceeded the MDC value. This finding suggested that enhancement of SIS after TTP was relating to the strength development. The increased QoL is desired due to the strengthening effect of mCIMT. The mCIMT for 2-weeks can be used interchangeably with other treatment modalities which support motor learning such as NDT. This combined approach may facilitate neural plasticity and accelerate recovery. For instance, mCIMT for lower extremity can be performed for 2-weeks following NDT with four weeks to improve QoL in stroke.

This study was a preliminary study which was used to a double restriction method by knee immobilizer and shoe insert, and we did not predict the patient adherence to the restricting method. Since our patients did not attend any rehabilitation programme, four weeks of baseline treatment was conducted to prepare for intensive EP. Consequently, we applied mCIMT for two weeks that is more effective than four and six weeks of treatment for task-oriented training as it has been shown in a previous study (27). The patient adherence to treatment, and orthosis was observed well. Therefore double restriction method can be confidently used to improve muscle strength and QoL.

Patients in both groups were encouraged to pursue their daily life and home program. However, adherence to the home program and the wear time of the restriction orthosis out of the session was not monitored. We thought that this was one limitation of the present study. Although both groups received the same intensity treatment, the mCIMT group arguably received more "treatment" due to restriction orthosis and transfer package. This point is regarded as a common limitation of all CIMT studies. Another limitation was the lack of proportions of patients who exceeded the MDC value of Motricity Index, SS-QoL total score, and its other subdomains. There was no study relating to these MDC values in the literature. The other limitations of our study include the findings could only be generalized to patients who met the inclusion criteria and the lack of evaluations of the participants' activity levels before treatment. The physical activity level may be a predictive factor. The effect of mCIMT according to the activity levels of the patients can be investigated with further studies. Besides these limitations, this study also had several strengths. The main strengths of this study were being a randomized controlled study, being the first study to show the effects of mCIMT, as applied to the lower extremities on QoL and strength, and last QoL had been considered comprehensively.

In conclusion, mCIMT for paretic lower extremity resulted in improvements in QoL after the EP and TTP, and in strength after the TTP. Furthermore, the improvements in TTP were correlated strongly with the EP.

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Conflict of Interest: The authors have no conflict of interest to declare.

Ethical Approval: Hacettepe University Ethics Committee approved this study protocol (Approval no: GO 14/22-15).

Informed Consent: Written informed consent was obtained from all study participants.

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BALANCE AND GAIT PERFORMANCE AFTER PARTICLE REPOSITIONING MANEUVER IN BENIGN PAROXYSMAL POSITIONAL VERTIGO PATIENTS

ORIGINAL ARTICLE

ABSTRACT

Purpose: The purpose of this study was to examine subjective complaints, recurrence of benign paroxysmal positional vertigo (BPPV), balance and gait with a particle repositioning maneuver (PRM), and to investigate the effects of Brandt Daroff (BD) exercises and comorbid factors as migraine on recovery in BPPV patients.

Methods: Fifty-seven patients were treated with a PRM for posterior canal BPPV. The perception of vertigo was estimated with Visual Analogue Scale (VAS), gait with Dynamic Gait Index (DGI), balance with the modified Clinical Test of Sensory Integration and Balance (mCTSIB). If the Dix-Hallpike test was still positive one week after the PRM, the maneuver was repeated. When remission was confirmed, patients were called back after one month to repeat all tests. If the patient suffered only from residual dizziness after one week, BD exercises were recommended for one month.

Results: The VAS scores for all patients improved significantly one month after a PRM ($p<0.001$). The abnormal balance on foam stance before a PRM improved significantly ($p<0.05$). The DGI scores improved without a statistical difference ($p>0.05$). It was found that patients with migraine had complaints of more severe imbalance.

Conclusion: Subjective complaints, balance and gait abilities improved in all patients after PRM. BPPV patients with migraine have a greater risk of recurrence and lower improvement in balance and gait ability after PRM. BD exercises did not prevent recurrence and residual dizziness.

Key Words: Benign Paroxysmal Positional Vertigo; Particle Repositioning Maneuver; Balance; Gait; Recurrence.

BENİGN PAROKSİSMAL POZİSYONEL VERTİGO HASTALARINDA PARTİKÜL YERLEŞTİRME MANEVRASI SONRASINDA DENGE VE YÜRÜME PERFORMANSI

ARAŞTIRMA MAKALESİ

ÖZ

Amaç: Benign paroksismal pozisyonel vertigo (BBPV) hastalarında partikül yerleştirme manevrasından (PYM) önce ve sonra subjektif yakınmalar, rekürrens, denge ve yürüme yeteneklerini incelemek; Brandt Daroff (BD) egzersizleri ile migren gibi komorbit faktörlerin tekrarlama üzerine etkisini belirlemekti.

Yöntem: Posterior kanal BPPV'si sebebiyle 57 hastaya PYM uygulandı. Vertigo algısı, Vizüel Analog Skalası (VAS) ile; yürüme, Dinamik Yürüme İndeksi (DYI) ile; denge, duyusal integrasyon ve dengenin kliniğe uyarlanmış testi (DİDKT) ile değerlendirildi. Eğer hastada Dix-Hallpike testi manevradan bir hafta sonra pozitif ise manevra tekrarlandı. Remisyon onaylandığında manevra tekrar edilmedi ve hasta bir ay sonra testlerin tekrarı için kontrole çağrıldı. Hastanın bir hafta sonraki konrolünde sadece baş dönmesi yakınması varsa bir ay boyunca BD egzersizleri yapması önerildi.

Sonuçlar: VAS değerleri tüm hastalarda manevradan bir ay sonra anlamlı olarak iyileşti ($p<0,001$). Manevra öncesinde kötü olan sünger zeminde duruş dengesi anlamlı olarak iyileşti ($p<0,05$). DYİ skorları iyileşti fakat anlamlı fark bulunmadı ($p>0,05$). Migrenli hastalarda daha şiddetli denge bozukluğu yakınmaları tespit edildi.

Tartışma: Subjektif yakınmalar, denge ve yürüme yetenekleri tüm hastalarda iyileşme gösterdi. Migrenli BPPV hastalarının tekrarlama riskinin daha fazla olduğu ve yürüme ve denge yeteneklerinde daha az iyileşme olduğu görüldü. BD egzersizlerinin tekrarlama ve baş dönmesi yakınmalarını önlemediği tespit edildi.

Anahtar Kelimeler: Benign Paroksismal Pozisyonel Vertigo; Partikül Yerleştirme Manevrası: Denge; Yürüme; Tekrarlama.

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INTRODUCTION

Benign paroxysmal positional vertigo (BPPV) is a common cause of recurrent vertigo with a high recurrence and prevalence rate (1). The mainstay of therapy is to perform a particle-repositioning maneuver (PRM), and one of the most commonly used PRM is the Epley Maneuver, with a success rate of 75-89% (2). During bouts of BPPV, most patients complain of disequilibrium and unstable gait (3).

The BPPV is a common vestibular symptom in migraine patients who visit neurology clinics. It is discussed that genetic factors and vascular damage of the labyrinth may be responsible for the underlying pathogenetic mechanism of these two conditions (4). Patients with migraine had increased risk of developing BPPV (5).

There is a higher incidence of vertigo attacks between BPPV episodes in migraineurs, but no direct physiological link between migraine and BPPV has yet been established (6).

In this study, we aimed to determine the change of balance and gait functions and to explore the effects of comorbidities as migraine on recovery after a PRM. We also intended to research the efficacy of Brandt-Daroff (BD) exercises in reducing dizziness and preventing the recurrence of BPPV.

METHODS

The study was approved by the local ethics committee (Institutional Ethical Board of Dokuz Eylül University, (2013/01-12), and each subject gave written informed consent to participate in the study. Additionally, required permissions for all tests.

A total of 57 patients (41 females and 16 males) with the unilateral posterior canal (PC) BPPV were examined before, one week after, and one month after a PRM (Epley Maneuver) in this cross-sectional study.

Patients who had just suffered their first attack of BPPV involving unilateral PC and had been diagnosed by a neurologist were recruited from the Dokuz Eylül University, Faculty of Medicine, Balance Clinic. The diagnosis of BPPV was based on standard clinical criteria: paroxysmal attacks of vertigo and torsional-upbeat nystagmus provoked by Dix-Hallpike Test (DHT) (1). Additionally, the third edition of the International Classification of Headache Disorders (ICHD-3) (7) was used for the migraine diagnosis to make further subgroup analyze by neurologists, who were volunteers recruited for the study from the staff of the hospital.

Patients with central nervous system involvement defined by magnetic resonance imaging (MRI) or neurologic examination were excluded, or patients with Meniere's disease or other inner ear disease were diagnosed with secondary BPPV (8). Patients who had with the involvement of lateral or anterior canals or bilateral BPPV and also previously BPPV history were excluded.

All patients had full neurological and neuro-otological examinations including tests for spontaneous, gaze-evoked, head-shaking and positioning nystagmus. The examination was done using Visual Eyes 4 Channel Videonystagmography (VNG) (Micromedical Technologies, Chatham, USA).

Pre-and Post-treatment Assessments:

The subjective intensity of vertigo was evaluated using Visual Analogue Scale (VAS) on a continuum from 0 (no symptom) to 100 mm (the worst symptom) (9).

The Dynamic Gait Index (DGI) was used to assess gait performance during the observation of the patient with varying walking demands (ordinary walking, walking at different speeds, walking with vertical and horizontal head turns, walking over and around objects, making a 180° turn, and stair climbing). The total scores range from the 0 (severe impairment) to 24 points (normal performance) (10). The reliability of DGI was examined and found to have good intra-rater reliability in patients with BPPV (11).

The modified Clinical Test of Sensory Integration and Balance (mCTSIB) which consists of four conditions; stance on firm eyes and foam surface (40x40x15 cm, medium density foam), each stance condition was also performed with eyes open and then closed. Postural stability was clinically observed and assigned a Sway Index. The Sway Index is assessed by observing the postural stability to complete the mCTSIB stance in 30 seconds without falling and is assigned to

characterize sway. It was assigned a value of 1 to 4 to characterize this sway (1=minimal sway, 2=mild sway, 3=moderate sway, 4=a fall) (12). Patients were also evaluated while standing on foam with their head in an extended position and their eyes open and then closed. These positions were added to challenge neck proprioception in the study design (13). Regarding the mCTSIB performance, the patients were divided to subgroups as "fall" when the Sway Index was 4 and "no-fall" when it was 1, 2 or 3. The number of patients who had fallen during the test was recorded.

Treatment Methods

All patients underwent the DHT before the PRM through videonystagmography (VNG) testing. The first and the second authors initially evaluated each patient with the DHT (#1) and the first author treated each patient with PRM after the DHT (2). The second author was diagnosed with a migraine according to the ICHD-3.

The patients were reviewed one week after the PRM, and the DHT (#2) was repeated.

The absence of both nystagmus and vertigo during the DHT (#2) was considered to indicate procedural success. If the DHT (#2) was still positive for vertigo, asymmetrical dizziness or nausea with or without nystagmus, the PRM was repeated. If the DHT (#2) was negative for nystagmus and vertigo, but the patient described of residual dizziness in daily activities, the BD exercises were recommended until the next visit one month later (14).

The third DHT (#3) was administered one month after the second DHT in all patients. If the DHT (#3) was still positive for nystagmus and vertigo, then a third PRM was given (Figure 1) and defined as "recurrence of BPPV" (15).

Subjective complaints measured using VAS, with "residual daily dizziness" defined as the sensation of unsteadiness or lightheadedness without rotational and/or positional vertigo. All balance and gait tests were performed before the DHT (#1) and after the DHT (#3) (Figure 1).

Statistical Analysis

Data are shown as the mean and standard deviation, and categorical variables are expressed in percentages. The Wilcoxon signed-ranks test was used to compare the results for DGI and VAS before and after the maneuver. The Mann-Whitney U and Fisher exact tests were applied to test the postural sway differences between groups related to historically characteristics after the maneuver. SPSS for Windows Release 22.0 (Statistical Package for Social Sciences Inc. Chicago, IL, USA) was used in the calculations, and a 5% significance level was adopted. Prior to the study, the power analysis was performed using G Power 3.0.10 program for Windows (G*Power 3 Heinrich Heine University Düsseldorf, Düsseldorf, Germany) based on the results of the study of Celebisoy et al. (3) and 37 subjects were found adequate considering 95% (5% Type I error level) confidence interval and 80% power.

RESULTS

The study sample consisted of 57 patients diagnosed with unilateral PC BPPV. The mean age was 51.45±13.29 years, between 23 and 78 years. Twenty of 57 patients had migraine history. Forty-one patients were female, and all of them had a migraine history.

Initially, 62 patients underwent the DHT and PRM. One week after the PRM, five patients still had a positive DHT (#2), underwent a PRM again and

Table 1: Subjective Complaints and Gait Outcomes of Patients Related to Migraine History.

Variables	Migraineurs (n=20) Mean±SD	Non-Migraineurs (n=37) Mean±SD	p
VAS			
Pre- PRM	92.45±9.20	89.71±13.92	0.756
Post-PRM	32.52±24.89	15.42±20.13	**0.007***
DGI			
Pre- PRM	18.60±4.52	17.43±4.70	0.300
Post-PRM	20.11±3.30	20.60±3.31	0.460

*p<0.05. Wilcoxon-Signed Rank test. VAS: Visual Analogue Scale, PRM: particle repositioning maneuver, DGI: Dynamic Gait Index.

Table 2: Subjective Complaints and Gait Outcomes of Patients Related to Recurrence of Benign Paroxysmal Positional Vertigo.

Variables	BPPV-Recurrence (n=14) Mean±SD	BPPV-No recurrence (n=43) Mean±SD	p
VAS			0.497
Pre- PRM	92.38±11.40	90.03±12.89	
Post-PRM	43.12±20.50	11.92±17.21	**<0.001***
DGI			0.249
Pre- PRM	17.44±3.62	18.03±5.12	
Post-PRM	19.34±3.27	20.91±3.18	**0.026***

*p<0.05. Wilcoxon-Signed Rank test. VAS: Visual Analogue Scale, PRM: particle repositioning maneuver, DGI: Dynamic Gait Index.

excluded from the study. Forty patients had a negative DHT (#2) and were asked to come back in a month; 17 patients had a negative DHT (#2) but had residual daily dizziness, and they were given daily BD exercises.

One month later the 57 patients were reviewed: in four of the 17 patients, who performed the BD exercises, DHT was positive for nystagmus and vertigo. They were accepted as recurrence, and a PRM was repeated. Thirteen of the 17 patients were accepted as recovery because DHT was negative for nystagmus and vertigo. During the examination of 40 patients, who were not performing BD exercises, the DHT was positive for nystagmus and vertigo in 10 patients, and a PRM was repeated. Thirty of the 40 patients were accepted as recovery because DHT was negative for nystagmus and vertigo. The

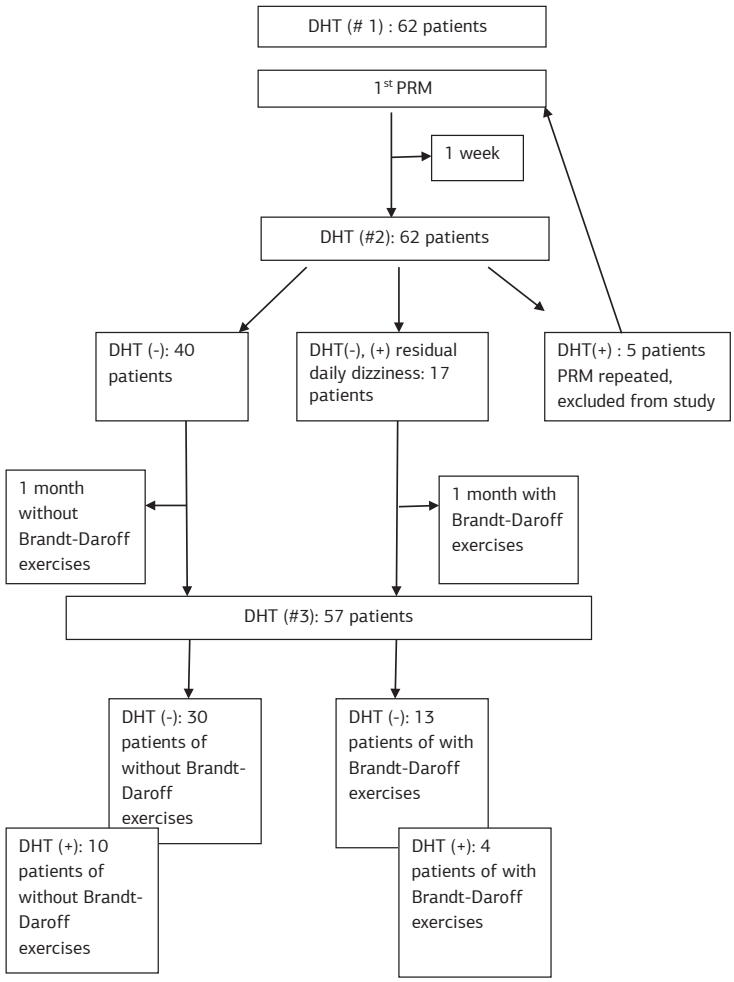

Figure 1: Flow chart of the study design. DHT: Dix-Hallpike Test, PRM: Particle-repositioning maneuvre.

Table 3: Number of Patients Falling in the Modified Clinical Test of Sensory Integration and Balance Test Pre and Post Particle Repositioning Maneuver.

Variables		Non-migraineur n (%)	Migraineur n (%)	p
FIEO	**Pre-PRM**	0 (0)	0 (0)	NT
	Post-PRM	0 (0)	0 (0)	NT
FIEC	**Pre-PRM**	0 (0)	1 (5)	NT
	Post-PRM	0 (0)	0 (0)	NT
FOEO	**Pre- PRM**	0 (0)	1 (5)	NT
	Post- PRM	0 (0)	0 (0)	NT
FOEC	**Pre- PRM$^{\phi}$**	6 (16.2)	10 (50)	0.091
	Post- PRM	1 (2.7)	0 (0)	NT
FOHEEO	**Pre-PRM$^{\phi}$**	5 (13.5)	8 (40)	**0.039***
	Post-PRM	0 (0)	1 (5.0)	NT
FOHEEC	**Pre-PRM$^{\phi}$**	21 (56.7)	13 (65.0)	0.356
	Post-PRM	0 (0)	1 (5.0)	NT

*p<0.05. $^{\phi}$Chi-square test, NT: Not tested. FIEO: Stance on Firm, Eyes Open, FIEC: Stance on Firm, Eyes Closed, FOEO: Stance on Foam, Eyes Open, FOEC: Stance on Foam, Eyes Closed, FOHEEO: Stance on Foam, Head Extended, Eyes Open, FOHEEC: Stance on Foam, Head Extended, Eyes Closed. PRM: Particle Repositioning Maneuver, MCTSIB: Modified Clinical Test of Sensory Integration and Balance.

total number of recurred patients was 14 out of 57 patients.

Subjective complaints of all patients, estimated by mean scores of VAS improved significantly from 90.67±12.41 to 21.45±22.73 after PRM (p<0.001). The DGI score were increased from 17.78±4.61 to 20.43±3.20 (p>0.05).

According to migraine history, there was no statistical difference between migraineurs and non-migraineurs in pre-PRM VAS scores (Table 1). The post-PRM VAS scores of migraineurs were significantly higher than that of non-migraineurs (mean scores of VAS 32.52 vs 15.42). The residual dizziness rate was 50% (10 of 20 patients) of migraineurs after one month.

Patients with recurrence of BPPV after one month from the PRM had significantly higher VAS scores and lower DGI than patients without recurrence of BPPV (Table 2).

Regarding the mCTSIB performance, more than half of the patients had difficulty on foam with eyes closed and head extended before the first PRM. The number of patients who had fallen during the test decreased after one month during the last examination (Table 3). The mCTSIB performance before and after the maneuver was not statistically different between migraineurs and non-migraineurs (p>0.05). Even in the most challenging position, foam stance-eyes closed with head extended, there was no significant difference between the patients (χ^2=0.854, p=0.544) (Table 3).

There was no significant difference regarding recurrence of BPPV in patients who were given BD exercises and who were not (χ^2=0.014, p=0.595).

DISCUSSION

Our results showed that subjective complaints, balance and gait performance of PC BPPV patients improved one month after PRM. The recurrence rate was 24.5% after a month. Nearly 35% of our patients had a migraine.

Recovery after maneuvers has been discussed in different studies without an exact conclusion. The recurrence of BPPV and residual dizziness indicate poor recovery and is shown with VAS outcomes (16). Recurrence rate and residual dizziness percentages in our study were consistent with previous studies (16,17). Residual dizziness after a successful PRM varies from 37 to 75% (16,18). The current relationship between a migraine and vertigo (19) was also demonstrated in our data: 35.1% of

our patients had a migraine. Residual dizziness was prominent in the migraineurs who made up more than 1/3 of our patients. Migraineurs had worse balance and gait performance than non-migraineurs in our study. Since there are not enough data regarding the impact of having a migraine on the recovery of BPPV, Teixido et al. pointed out that patients with a migraine seem more likely to have BPPV (20). Similarly, our results might show this essential underlying relationship (19). On the other hand, there is a correlation between residual dizziness and anxiety (16,18). The recurrence of BPPV caused higher VAS scores and lower DGI scores after a month in our study, which resulted in balance and gait impairments. The DGI values improved more in patients who did not experience residual dizziness.

Our results confirmed the recovery of balance dysfunction after a PRM (3). The patients' balance performance was normal mainly in conditions measured by mCTSIB after a PRM. Patients had trouble in the foam stance with eyes closed and the foam stance with eyes open/closed in head extended position before the maneuver. Besides the balance difficulties, the performance of these positions improved after the maneuver.

The recognized association between a migraine and BPPV is poorly understood (4,16). It has been speculated that a migraine could cause vasospasm of the labyrinthine arteries, leading to the detachment of the otoconia from the utricular macula (4). In our study, migraineurs suffered more from residual dizziness than non-migraineurs, and the recurrence rate was higher in migraineurs. Subjective complaints after a month, measured by VAS, significantly improved in migraineurs but the post-treatment VAS scores were still higher in migraineurs. Poor subjective recovery in migraineurs might be the result of high VAS scores. Our study also confirmed a female preponderance among BPPV patients. All migraineur patients were female in our sample (19).

The balance performance of non-migraineurs was better than of migraineurs on foam with eyes closed and head extended before a PRM, but all patients improved after a PRM in this condition. The foam stance with eyes closed and the head extended position was used to provoke unsteadiness in migraineurs in our previous studies, investigating balance in migraineurs without a history of a migraine. It showed that migraineurs performance were worse in this condition than controls (21,22). The stance ability was disturbed because of the modification of the cervical proprioception and vestibular-otolithic inputs with the head extended position. Migraineurs in our study also had more trouble in this position. On the other hand, the migraine history did not affect the change of DGI values after a month; DGI values of all patients improved markedly.

We have also investigated the effect of the BD exercises on the recurrence of BPPV and residual dizziness. These had little to no effect on the recurrence rate or symptom resolution (2,17,23). The recurrence rate was lower in patients followed with BD exercises without a statistical difference, but there was no significant protective effect of the exercises on residual dizziness and recurrence. The recurrence rate was insignificantly higher in patients who were not followed with BD exercises.

In this study, we did not use specific assessment methods for perception dizziness and anxiety. In further studies, the main focus should be the residual dizziness, which could be shown more objectively and treated with specific exercises or behavioral perspectives in the long term with a larger sample size.

In conclusion, the effects of comorbid factors on recovery after PRM in BPPV patients were consistent with the literature. The BPPV patients with a migraine still experience more difficulties in balance and gait functions. The persistent problem of migraineurs mainly was residual dizziness. The BD exercises given for residual dizziness did not have a protective effect on residual dizziness or BPPV recurrence.

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Conflict of Interest: None.

Ethical Approval: This study was approved by the Institutional Ethical Board of Dokuz Eylul University (2013/01-12).

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ROTATOR MANŞET LEZYONU OLAN OLGULARDA ÜST EKSTREMİTE VE SKAPULAR PROPRİOSEPTİF NÖROMUSKÜLER FASİLİTASYON TEKNİĞİNİN ETKİSİ

ARAŞTIRMA MAKALESİ

ÖZ

Amaç: Bu çalışma rotator manşet lezyonu tanısı alan olgularda proprioseptif nöromusküler fasilitasyon (PNF) tekniğinin ağrı, fonksiyonellik ve yaşam kalitesi üzerindeki etkisini incelemek amacıyla yapıldı.

Yöntem: Çalışmaya rotator manşet lezyonu tanısı alan 40 olgu dahil edildi. Olgular randomize olarak iki gruba ayrıldı. PNF grubuna konservatif tedaviye ek olarak üst ekstremite ve skapular PNF tekniği, Kontrol grubuna ise, sadece konservatif tedavi uygulandı. Hastalar haftada üç gün altı hafta süre ile tedaviye alındı. Olguların ağrı değerlendirmesi için Vizüel Analog Skalası (VAS), normal eklem hareketi değerlendirmesi için gonyometre, fonksiyonellik ve aktivite düzeyinin değerlendirmesi için Kol, Omuz ve El Sorunları Anketi ve Constant Skoru (CS), yaşam kalitesinin değerlendirmesi için ise, SF-36 anketi kullanıldı. Değerlendirmeler başlangıçta ve altıncı haftada yapıldı.

Sonuçlar: Her iki grupta da anlamlı düzeyde ağrının azaldığı ve eklem hareket açıklığının arttığı belirlendi ($p<0,05$). PNF grubunun aktivite ($p<0,001$) ve gece ($p=0,013$) VAS skoru ve omuz eksternal rotasyon eklem açıklığı ($p=0,003$) sonuçlarında, kontrol grubuna göre daha fazla iyileşme görüldü. Fonksiyonellik ve genel sağlık durumu değerlendirme sonuçlarında her iki grupta da anlamlı gelişme gözlendi ($p<0,05$). CS ($p=0,046$) ile SF-36 enerji ($p=0,016$) ve mental sağlık ($p=0,014$) alt parametreleri PNF grubu lehine anlamlıydı.

Tartışma: Rotator manşet lezyonunda PNF tekniğinin ağrıyı azaltmak, fonksiyonelliği ve yaşam kalitesini iyileştirmek açısından klinikte etkin şekilde kullanılabilecek bir yöntem olduğu saptandı. Omuz rehabilitasyonunda özellikle skapular PNF patern ve tekniklerinin ihmal edilmemesi gerektiği sonucuna ulaşıldı.

Anahtar Kelimeler: Ağrı; Günlük Yaşam Aktiviteleri; Proprioseptif Nöromusküler Fasilitasyon; Rotator Manşet; Yaşam Kalitesi.

EFFICACY OF UPPER EXTREMITY AND SCAPULAR PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION TECHNIQUE IN PATIENTS WITH ROTATOR CUFF LESIONS

ORIGINAL ARTICLE

ABSTRACT

Purpose: This study was conducted to investigate the effect of proprioceptive neuromuscular facilitation (PNF) technique on pain, functionality, and quality of life in patients with rotator cuff lesions.

Methods: Forty cases with rotator cuff lesion were included in the study. The cases were randomly divided into two groups. In addition to conservative treatment, upper extremity and scapular PNF technique was applied to PNF group, and conservative treatment only was applied to control group. Patients were treated three days per week for six weeks. Visual Analogue Scale for pain assessment, goniometer for the normal range of motion evaluation, Disabilities of the Arm, Shoulder and Hand Score and Constant Criterion (CC) for evaluating functionality and activity level, and SF-36 for evaluating the quality of life were used. The evaluations were performed at the beginning and the 6th week.

Results: It was determined that pain decreased and range of motion increased significantly ($p<0.05$). Activity ($p<0.001$) and night ($p=0.013$) VAS scores and shoulder external rotation joint motion in both groups ($p=0.003$) results showed more significant improvement in the PNF group than those of the control group. According to the results of functionality and general health evaluation, significant improvements were observed in both groups ($p<0.05$). The CC score ($p=0.046$), SF-36 energy ($p=0.016$), and mental health ($p=0.014$) sub-parameters were significantly improved in the PNF group.

Conclusion: It was found that the PNF technique is a clinically effective method in reducing pain, improving functioning and quality of life in rotator cuff lesion. It was concluded that especially scapular PNF patterns and techniques should not be neglected in shoulder rehabilitation.

Key Words: Activities of Daily Living; Pain; Proprioceptive Neuromuscular Facilitation; Rotator Cuff; Quality of Life.

GİRİŞ

Omuz ağrısı genel popülasyonun büyük bir kısmını etkileyen ve yaygın görülen kas-iskelet sistemi problemidir. Prevalansı % 6 ile % 26 arasında değişmekle birlikte, üç kişiden birinin yaşamların en az bir döneminde omuz ağrısı yaşadığı tahmin edilmektedir. Omuz ağrısı ile ilişkili en sık bildirilen klinik patolojiler, rotator manşet lezyonları, adeziv kapsülit ve glenohumeral osteoartrittir (1,2). Rotator manşet patolojileri sonucu oluşan ağrı ve disabilite, günlük yaşam aktivitelerindeki performansı ve yaşam kalitesini önemli derecede etkilemektedir (3).

Konservatif tedavinin rotator manşet problemlerinde tercih edilen etkili bir yöntem olduğu bilinmektedir. Konservatif tedavi aktivite modifikasyonu, nonsteroid antiinflamatuar ilaçlar, kortikosteroid enjeksiyonları ve fizyoterapiyi kapsar. Konservatif tedavi programında rotator manşet ve skapular kas güçsüzlüğünü giderme, posterior kapsül ve diğer yumuşak dokuları germe, ağrı ve fonksiyon bozukluğunu düzelterek postüral anormalliklere olumlu katkıda bulunma hedeflenmektedir (4).

Rotator manşet tedavisinde optimal tedavi protokolü oluşturmak için, daha fazla klinik çalışma yapılmasının gerekli olduğu bildirilmiştir (5). Tedavi programlarında propriosepsiyon ve nöromusküler kontrolü ve skapular fonksiyonları hedefleyen, skapular bölgeyi içine alan yaklaşımların önemi belirtilmiştir (6,7).

Kabat ve Knott tarafından geliştirilen ve proprioseptörlerin uyarılması ile nöromusküler mekanizma cevaplarını kolaylaştırmak olarak tanımlanan proprioseptif nöromusküler fasilitasyon (PNF) tekniği ise, nörofizyolojik yaklaşımlar içerisindedir. PNF tekniği pozitif fonksiyonel bir yaklaşım olmakla birlikte, tedavide hastanın fonksiyonel kapasitesine uygun optimum katılım sağlaması hedeflenir. Bununla birlikte günlük yaşamdaki aktiviteler tekrarlı ve taklitlerle yaptırılarak motor öğrenme sürecine katkı sağlanır. PNF kas gruplarının fasilitasyonu ve inhibisyonu ile fonksiyonel hareketleri geliştirir. PNF'te kullanılan teknikler ile eklem stabilitesinde artış, fleksibilite, kuvvet dengesinde gelişme, kan dolaşımında artış ve tüm hareket boyunca paternlerin koordineli olarak yapılması sağlanır. PNF tekniklerinin konservatif tedavi programına dahil edilmesi ile birlikte daha etkili ve fonksiyonel bir egzersiz programı oluşturulur (8,9).

Omuz rehabilitasyonunda tedavi programında yer alan PNF uygulamasının etkinliğini inceleyen araştırmalarda ağrı inhibisyonunda, omuz eklem hareket açıklığında, fonksiyonellikte anlamlı iyileşmeler kaydedilmiştir (10,11). Skapula omuz fonksiyonunun kuvveti, hızı ve enerjisinde, proksimal-distal sıralamada bir bağlantı olarak önemli bir rol oynar. Normal omuz fonksiyonlarının restorasyonu için omuz rehabilitasyonunda özellikle skapular bölgeyi hedef alan uygulamalar yer almaktadır. PNF tekniğinde ise, üst ekstremite paternlerine skapular paternlerin eklenmesi ile skapulatorasik mobilizasyon ve skapulatorasik ritim sağlanmaktadır. Ancak son yıllarda özellikle skapular PNF patern ve tekniğinin etkinliği ile ilgili yapılan çalışmaların yeterli olmadığı görülmektedir (10-12). Bu nedenle çalışma, rotator manşet lezyonlu olgularda konservatif tedavinin yanında uygulanan üst ekstremite ve skapular PNF tekniğinin ağrı, fonksiyonellik ve yaşam kalitesi üzerindeki etkisini incelemek amacıyla planlandı.

YÖNTEM

Çalışmaya Ocak 2015- Aralık 2016 tarihleri arasında İstanbul Medipol Üniversitesi Sefaköy Sağlık Uygulama Merkezi Hastanesinde Fizik Tedavi ve Rehabilitasyon kliniğine başvuran doktor tarafından fizik muayenesi yapılmış "rotator manşet lezyonu" tanısı alan 40 hasta (29 kadın, 11 erkek) alındı. 18-65 yaş aralığında, yakınmaları en az üç aydır devam eden ve Vizüel Analog Skalası (VAS) aktivite değeri >4 olan olgular çalışmaya dahil edildi. Son üç ay içerisinde lokal kortikosteroid enjeksiyonu veya kortikosteroid tedavisi alan, nöromusküler hastalık, stabil olmayan anjina, malignite, pulmoner veya vasküler problem, enflamatuar artrit tanısı alan ve iletişim problemi olan hastalar çalışmaya dahil edilmedi.

Çalışma, İstanbul Medipol Üniversitesi Etik Kurulu'nun 25.06.2015 tarihli toplantısında değerlendirildi ve 108400987-359 dosya numarası ile onaylandı. Hastalara çalışma hakkında bilgi verildi ve yapılacak işlemler anlatıldı. Kişilere aydınlatılmış onam formu okutuldu ve imzaları ile onayları alındı.

Olgular randomize olarak iki gruba ayrıldı. Her iki grupta 20 kişiden oluşmaktaydı. İlk gruba konser-

vatif tedavinin yanında üst ekstremite ve skapular PNF tekniği, ikinci gruba ise, konservatif tedavi uygulandı. Her iki gruptaki hastalar haftada üç gün altı hafta süre ile tedaviye alındı.

Tüm olgulara sıcak hot pack (20 dakika), TENS (COMPEX Rehab 400, Chattanoga, ABD) (20 dakika) ve ultrason (Chattanooga Intelect Ultrasound, Mouguerre, Fransa) (5 dakika) içeren tedavi programı uygulandı. Olgulara sopa, sarkaç, duvar ark ve postür egzersizlerinden oluşan ev egzersiz programı verildi. Egzersizler haftada bir kez kontrol edildi ve gerektiğinde eklemeler yapıldı.

Uygulama

PNF Tekniği: PNF grubuna konservatif tedavi ve ev egzersiz programına ilave olarak PNF patern ve teknikleri uygulandı. Üst ekstremiteye fleksiyon-abduksiyon-eksternal rotasyon ve fleksiyon-adduksiyon-eksternal rotasyon paternleri (dirsek düz-dirsek fleksiyona giderek) dahil edildi. Bu pozisyonlarda PNF tekniklerinden ritmik başlatma, tekrarlı germeler, ritmik stabilizasyon ve tut-gevşe kullanıldı.

Ritmik başlatma tekniği ile hareketi öğretmek, hareket hissi ve koordinasyonunu geliştirmek, gevşemeye yardımcı olmak amaçlandı. Ritmik başlatma ile istenen hareket genişliği içinde hastanın hareketi, hareketin yönünü ve ritmini anlaması için başlangıçta pasif daha sonra aktif katılımı istendi. Hasta aktif katılım sağladıktan sonra aktif eklem hareketini ve kuvveti artırmak için tekrarlı germeler tekniği ile agonist kaslar en uzamış pozisyonda olacak şekilde antagonist pozisyonda iken, hareketin başlangıcında kısa ve ani bir germe yapıldıktan hemen sonra harekete başlanılması istendi. Hareket boyunca dirence karşı izotonik kontraksiyonlar ile birlikte hareketin zayıfladığı yerde ani kısa süreli germeler 3-4 kez tekrar edildi.

Ritmik stabilizasyon tekniği ile hareketin tamamlandığı pozisyonda veya paternin istenen noktasında agonist ve antagonist yönde ritmik şekilde direnç uygulandı. Hastadan hareket açığa çıkmadan pozisyonu koruması istendi. Bu teknikle beraber ağrıyı azaltmak ve omuz stabilitesini geliştirmek hedeflendi.

Tut-gevşe tekniğinde, ilgili kısmın agonist paterni boyunca limitasyon noktasına gelindi ve limitasyon noktasında rotasyon dahil tüm antagonist kaslarda hiçbir harekete izin vermeyecek şekilde maksimum dirence karşı 8 saniye süreli izometrik kontraksiyon yaptırıldı. Maksimum izometrik kontraksiyonu takiben hastanın aktif gevşemesi istendi ve agonist yönde hareket artışı olup olmadığı aktif veya pasif olarak kontrol edildi. Harekette ilerlendikçe yeni limitasyon noktasında birkaç kez tekrar edildi. Bu teknik pasif eklem hareket açıklığını artırmak ve ağrı inhibisyonunu sağlamak için kullanıldı.

Skapulanın hareketliliğini ve stabilizasyonunu artırmak amacıyla, skapula paternlerinden anterior elevasyon-posterior depresyon paterninde ritmik başlatma ve tekrarlı germeler tekniği uygulandı. Ani ve kısa süreli germenin ardından hastanın harekete başlaması istendi. Patern boyunca dirence karşı izotonik kontraksiyonlar ile ilerlenerek hareketin zayıfladığı yerde ani ve kısa süreli germeler yapıldı. 3-4 kez tekrarlanan germenin arkasından, hastadan istemli hareket istendi (13).

Konservatif Tedavi: Kontrol grubuna aktif yardımlı ve aktif eklem hareket açıklığı (EHA), germe, kuvvetlendirme ve postür egzersizlerini içeren kombine egzersiz programı oluşturuldu. Olgulara ilk hafta aktif yardımlı, aktif EHA ve postür egzersizleri verilerek başlandı. Ağrı sınırında germe egzersizlerine devam edildi. Ağrı azaldıktan sonra subskapularis,

Tablo 1: Olguların Demografik Bilgileri.

Fiziksel Özellikler	**PNF Grubu (n=20)** $\bar{X}$±SD	**Kontrol Grubu (n=20)** $\bar{X}$±SD	**p**
Yaş (yıl)	53,50±1,91	52,05±2,25	0,626
Boy (cm)	165,65±1,95	162,00±1,92	0,189
Vücut Ağırlığı (kg)	80,00±3,40	77,05±3,04	0,521
Vücut Kütle İndeksi (kg/m²)	29,10±1,03	29,31±1,02	0,886

Tablo 2: Olguların Tedavi Öncesi ve Sonrası Değerleri.

Değerlendirme Parametreleri	PNF Grubu			Kontrol Grubu			Gruplar Arası p[2]
	TÖ	TS	p[1]	TÖ	TS	p[1]	
VAS Aktivite	6,90±0,20	1,85±0,17	**<0,001***	5,95±0,29	2,85±0,22	**<0,001***	**<0,001***
VAS İstirahat	3,05±0,33	0,05±0,05	**<0,001***	3,10±0,24	0,20±0,12	**<0,001***	0,988
VAS Gece	6,65±0,41	1,35±1,04	**<0,001***	6,70±0,43	2,50±0,36	**<0,001***	**0,013***
DASH	42,26±1,97	15,26±1,24	**<0,001***	48,33±2,10	18,63±1,51	**<0,001***	0,401
Constant Skoru	43,65±1,44	74,35±0,72	**<0,001***	40,90±1,04	67,40±1,38	**<0,001***	**0,046***
Omuz Eklem Hareket Açıklığı							
Fleksiyon	145,50±3,18	178,75±0,80	**<0,001***	142,5±4,25	172,75±2,39	**<0,001***	0,250
Ekstansiyon	44,25±0,41	45,00±0,00	0,083	45,00±0,00	45,00±0,00	1,000	0,075
Abduksiyon	134,25±6,85	180,00±0,00	**<0,001***	114,50±6,22	172,75±4,22	**<0,001***	0,178
Adduksiyon	44,75±0,25	45,00±0,00	0,317	45,00±0,00	45,00±0,00	1,000	0,317
İnternal Rotasyon	69,75±3,78	89,50±0,50	**<0,001***	64,10±4,91	84,50±1,88	**<0,001***	1,000
Eksternal Rotasyon	50,50±3,59	85,50±1,88	**<0,001***	54,40±5,70	75,50±4,28	**<0,001***	**0,003***

*p<0,05. [1]Wilcoxon Signed–Rank Testi, [2]Mann Whitney U Test. VAS: Vizüel Analog Skalası, DASH: Kol, Omuz, TÖ: Tedavi öncesi, TS: Tedavi Sonrası.

infraspinatus, supraspinatus, teres minör, deltoid ve skapulatorasik kaslara yönelik kuvvetlendirme egzersizleri verildi. Kuvvetlendirme egzersizleri elastik bantlarla hastanın ağrı şiddetine göre direnci artacak şekilde renklere göre ilerlenerek uygulandı.

Değerlendirme

Olgular başlangıçta ve altıncı haftada değerlendirildi. İstirahat, aktivite ve gece ağrı şiddeti değerlendirmesi için 0'dan 10'a kadar numaralandırılmış 10 cm'lik VAS kullanıldı. Sıfır değerinin hiç ağrı olmamasını, 10 değerinin ise, dayanılmaz ağrıyı gösterdiğini belirterek ölçek üzerinde puan verilmesi istendi (14). Olguların aktif omuz fleksiyon, omuz ekstansiyon, omuz abduksiyon, omuz adduksiyon, omuz eksternal rotasyon ve omuz internal rotasyon eklem hareket açıklığı sırtüstü pozisyonda universal gonyometre kullanılarak değerlendirildi.

Fonksiyonellik düzeyinin değerlendirmesinde Kol, Omuz ve El Sorunları Anketi (DASH) ve Constant Skoru (CS) kullanıldı. DASH anketi üç bölüme ayrılır ve ilk bölüm 30 sorudan oluşur. Yirmi bir soru hastanın günlük aktivitelerde zorlanma derecesini, beş soru ağrının semptomatik özelliklerini, dört soru ise sosyal fonksiyon, iş, kendine güven ve uykuyu değerlendirir. Bu ilk bölüm hastanın fonksiyon/semptom skorunu belirler. İsteğe bağlı olarak cevaplandırılan ve dört sorudan oluşan ikinci bölüm ise, iş modelidir. Üçüncü bölüm ise, spor veya müzikle uğraşanların özür derecesini değerlendiren yüksek performans isteyen spor-müzisyen modelidir ve dört sorudan oluşur. Tüm sorular Likert skalasına göre (1=zorluk yok, 2=hafif derecede zorluk, 3=orta derecede zorluk, 4=aşırı derecede zorluk, 5=hiç yapamama) değerlendirilerek 0-100 arasında bir skor elde edilir (0=hiç özürlülük yok, 100=maksimum özür) (15).

CS'de ise ağrı, günlük yaşam aktiviteleri, öne yana elevasyon, eksternal rotasyon, internal rotasyon ve güç değerlendirilir. Ağrı (15 puan), günlük yaşam aktiviteleri (20 puan), aktif eklem hareket açıklığı (40 puan) ve kuvvet (25 puan) parametrelerini içeren toplam 100 puanlık bir sistemdir. Toplam CS, mükemmel (90-100), iyi (80-89), orta (70-79) ve zayıf (<70) şeklinde sınıflandırılır (16).

Yaşam kalitesinin değerlendirmesinde SF-36 kullanıldı. SF-36'da fiziksel fonksiyon (10 madde), sosyal fonksiyon (2 madde), fiziksel fonksiyonlara bağlı rol kısıtlılıkları (4 madde), emosyonel sorunlara bağlı rol kısıtlılıkları (3 madde), mental sağlık (5 madde),

Tablo 3: SF-36 Yaşam Kalitesi Değerlendirmesinin Grup İçi ve Gruplar Arası Analizi.

SF-36	PNF grubu			Kontrol Grubu			Gruplar Arası p^{δ}
	TÖ	TS	p^{Φ}	TÖ	TS	p^{1}	
Fiziksel Fonksiyon	72,25±2,70	83,75±2,29	**<0,001***	68,50±3,10	80,50±2,78	**<0,001***	0,824
Fiziksel Rol Güçlüğü	10,00±4,21	42,50±5,76	**<0,001***	17,50±5,47	53,75±6,09	**<0,001***	0,696
Ağrı	32,80±2,17	47,60±1,55	**<0,001***	33,25±2,32	48,75±2,02	**<0,001***	0,945
Genel Sağlık	51,70±3,15	65,70±3,62	**<0,001***	46,95±5,23	55,5±4,16	**0,003***	0,311
Enerji	45,50±3,73	61,50±3,94	**<0,001***	51,50±4,41	58,25±3,89	**0,024***	**0,016***
Sosyal Fonksiyon	86,88±3,57	98,13±1,02	**0,007***	66,25±4,54	82,50±3,19	**0,001***	0,278
Emosyonel Rol Güçlüğü	60,01±5,19	65,03±1,67	**0,043***	58,33±6,79	66,68±4,84	0,108	0,941
Mental Sağlık	66,00±2,50	80,20±2,38	**<0,001***	66,20±4,45	72,80±3,57	**0,015***	**0,014***
Fiziksel Toplam Skor	34,14±1,05	41,54±1,15	**<0,001***	33,86±1,25	41,81±1,35	**<0,001***	0,675
Mental Toplam Skor	49,20±1,30	53,64±1,08	**<0,001***	47,38±1,93	49,73±1,24	0,156	0,152

*p<0,05. $^{\Phi}$Wilcoxon Signed–Rank Testi, $^{\delta}$Mann Whitney U Test.

enerji/vitalite (4 madde), ağrı (2 madde) ve genel sağlık algılamasını (5 madde) içeren sekiz parametre değerlendirilir. Her bir alt parametreye ayrı ayrı toplam puan verilir ve puanlar 0-100 arası değişim gösterir (17).

İstatistiksel Analiz

Araştırmanın gücü G*Power yazılımı (18), versiyon 3.1.9 (G*Power, Universität Düsseldorf, Düsseldorf, Almanya) kullanılarak belirlendi. Toplam örneklem büyüklüğü iki grup için 40 olduğunda, post-hoc analizine göre sayı gruplara eşit olarak dağıldığında Wilcoxon Signed-Rank test yöntemi için 0,05 yanılma olasılığı düzeyinde Cohen d 0,5 olarak belirlendi, araştırmanın gücü % 91 bulundu. Çalışmanın veri analizinde Statistical Package for Social Sciences (SPSS) Versiyon 21 (SPSS Inc, Chicago, IL, ABD) istatistiksel analiz programı kullanıldı. Tüm analizlerde istatistiksel yanılma olasılığı p<0,05 düzeyinde değerlendirildi. Çalışmanın veri analizinde, uygun olan ileri istatistik analizlerin seçilmesi amacı ile veri grubunun dağılımlarının normal olup olmadığı Kolmogorov–Smirnov testi ile belirlendi. Bu testin analiz sonuçlarına göre verilerin normal dağılım göstermediği sonucu çıkarıldı ve parametrik olmayan testler tercih edildi. Çalışmada yer alan olguların başlangıçtaki demografik özellikleri (yaş, boy, vücut ağırlığı, vücut kütle indeksi), ağrı düzeyi, fonksiyonellik düzeyi ve yaşam kalitesi değerlerinin karşılaştırılması Student t testi ile yapıldı. Hastaların tüm tedavi öncesi ve sonrası karşılaştırmaları için Wilcoxon Signed–Rank testi kullanıldı.

SONUÇLAR

Olguların demografik özellikleri Tablo 1'de gösterildi. Olguların 29'u (% 72,5) kadın, 11'i (% 27,5) erkek idi. Hastaların fiziksel özelikleri karşılaştırıldığında yaş, boy uzunluğu, vücut ağırlığı ve vücut kütle indeksi ölçümleri açısından gruplar arasında istatiksel olarak anlamlı farklılık yoktu (p>0,05).

Her iki grupta da tedavi sonrasında VAS aktivite (p<0,001), istirahat (p<0,001) ve gece (p<0,001) durumlarında hissedilen ağrı düzeyinde istatiksel olarak anlamlı azalma vardı. Gruplar arasında VAS aktivite (p<0,001) ve gece (p=0,013) düzeyinin istatistiksel olarak anlamlı düzeyde PNF grubunda daha fazla azaldığı görüldü. VAS istirahat (p=0,988) durumunda ise gruplar arasında anlamlı farklılık saptanmadı (p>0.05, Tablo 2).

Olguların fonksiyonellikleri açısından DASH (p<0,001) ve CS (p<0,001) ölçütleri ile değerlendirilmelerinin grup içi analizinde, her iki grupta tedavi

sonunda istatistiksel olarak anlamlı gelişme gözlendi. Gruplar arası analizde ise, CS sonucunda PNF grubu lehine anlamlı iyileşme saptandı (p=0,046, Tablo 2).

İstatistiksel analizler her iki grupta da omuz fleksiyon, abduksiyon, internal rotasyon ve eksternal rotasyon eklem hareket açıklıklarının tedavi sonunda anlamlı olarak arttığını ortaya koydu (p<0,001). Gruplar arası eklem hareket açıklığı sonuçları incelendiğinde PNF grubu lehine eksternal rotasyon eklem hareket açıklığında anlamlı farklılık gözlendi (p=0,003, Tablo 2).

Tedavi sonunda SF-36 yaşam kalitesi sonuçlarında her iki grupta da fiziksel fonksiyon, fiziksel rol güçlüğü, ağrı, genel sağlık, enerji, sosyal fonksiyon, mental sağlık ve fiziksel toplam skor alt gruplarında istatistiksel olarak anlamlı artış vardı (p<0,05). Emosyonel rol güçlüğü (p=0,043) ve mental toplam alt skoru (p<0,001) ise, sadece PNF grubunda anlamlı iyileşme gösterdi. Gruplar arası karşılaştırmada ise, enerji (p=0,016) ve mental sağlık (p=0,014) alt skorunda PNF grubunda anlamlı iyileşme tespit edildi (Tablo 3).

TARTIŞMA

Bu çalışma rotator manşet lezyonlu olgularda konservatif tedavinin yanında uygulanan üst ekstremite ile skapular PNF tekniğinin kontrol grubuna göre aktivite ve gece ağrısı, eksternal rotasyon eklem hareket açıklığı, CS, SF-36 enerji ve mental sağlık alt parametreleri sonuçlarında daha anlamlı iyileşme sağladığını ortaya koydu.

Rotator manşet lezyonunun etyolojisi mikrotravma, makrotravma ve yaşla ilişkili dejenerasyon olmak üzere multifaktöryeldir. Rotator manşet patolojisinin epidemiyolojisinin incelendiği çalışmada insidansının 87/100.000 kişi-yıl olduğunu ve kadınlarda erkeklere oranla daha fazla görüldüğü belirtilmiştir (19). Yapılan diğer çalışmalarda da kadın oranının daha fazla görüldüğü gözlenmiştir (20,21). Çalışmamızda da literatürde olduğu gibi kadın oranının fazla olduğu görüldü.

Konservatif tedavinin erken dönemde tanı konulan olgular için etkili bir tedavi yöntemi olduğu belirtilmiştir (22). Rotator manşet lezyonlarında konservatif tedavi programında yer alan yüzeyel ısı ajanları, terapatik ultrason, düşük seviyeli lazer tedavisi, TENS ve manyetik alan, araştırmalarda etkinliği ortaya konulan ve sıklıkla tercih edilen elektroterapi modalitelerindendir (23). Bu nedenle araştırmamızda benzer konservatif tedavi yöntemleri kullanıldı.

Tedavi programlarında germe, kuvvetlendirme, postür, stabilizasyon egzersizleri ile PNF tekniği yer almakta ve olumlu etkileri çalışmalarda gösterilmektedir. Omuz rehabilitasyonunda konservatif tedavi programları ile birlikte uygulanan PNF tekniğinin eklem hareket açıklığı, ağrı ve fonksiyonellik yönünden klasik konservatif tedaviden daha etkili olduğu belirtilmiştir (10,24). Sekonder omuz impingement sendromu tanılı 30 hastada (15 kadın, 15 erkek) PNF uygulamasının omuz fonksiyonları üzerindeki etkinliğinin incelendiği çalışmada; çalışma grubuna üç hafta boyunca soğuk paket, izometrik, fleksibilite ve kuvvetlendirme egzersizlerini içeren konvansiyonel tedavi programına ek olarak fleksiyon-abduksiyon-eksternal rotasyon paterninde PNF tekniği uygulanmıştır. Araştırmanın sonucunda konvansiyonel tedaviye PNF tekniğinin eklendiği grupta sadece konvansiyonel tedavi alan gruba göre omuz fonksiyonlarında daha anlamlı iyileşme olduğu kaydedilmiştir (25). Çalışmamızda da üst ekstremite ile skapular PNF patern ve tekniklerinin konservatif tedaviye eklenmesi ile skapular hareket bozukluğunun normalize edilmesi ve omuz eklemi stabilizasyonunun sağlanması hedeflendi.

Adeziv kapsülitli olgularda, standart tedaviye eklenen skapula ve üst ekstremite PNF uygulamalarının gece ağrısı ile omuz fleksiyon ve abduksiyon hareket açıklığı parametrelerine anlamlı katkı sağladığı saptanmıştır (10). Kim ve ark.'nın supraspinatus kas rüptürü tanılı olgularda, PNF tekniği ve egzersiz programının ağrı, kan akış hızı ve fonksiyonellik üzerine etkinliğini araştırmak amacıyla yaptığı çalışmanın sonucunda ağrı parametresinde iki grup arasında anlamlı farklılık bulunmamıştır. Fakat fonksiyonellik açısından PNF tekniğinin daha etkili olduğu sonucuna ulaşılmıştır (11). Çalışmamızda da tedavi sonrasında VAS aktivite, istirahat ve gece durumlarında hissedilen ağrı düzeyinde her iki grupta da anlamlı azalma bulundu. VAS aktivite ve gece ağrı düzeyi ve CS sonuçlarının PNF grubunun lehine daha anlamlı olduğu görüldü. PNF uygulamasında kullanılan paternlerin fonksiyonel aktivitelere benzemesi ve PNF'in teorik temelinde belirtilen agonist ve antagonist kaslar arasında resiprokal in-

nervasyonun sağlanmasıyla, tedavi sonunda ağrıda ve fonksiyonellikte daha anlamlı gelişme sağlandığı düşünüldü.

Bagheri ve ark. donuk omuz tanılı hastalarda ağrı, disabilite ve yaşam kalitesi arasındaki ilişkiyi incelediği araştırmada, normal popülasyona göre donuk omuzlu hastalarda yaşam kalitesinin azaldığını belirtmiştir (26). Karakuş ve ark.'nın subakromiyal sıkışma sendromunda Mulligan ile PNF yöntemlerinin omuz ağrısı, üst ekstremite fonksiyonelliği ve yaşam kalitesi üzerindeki etkinliğini incelediği çalışmada; SF-36 yaşam kalitesi değerlendirme sonuçlarında, PNF grubunda hem fiziksel hem mental sağlık parametrelerinde iyileşme görülürken, Mulligan grubunda sadece fiziksel komponentte artış sağlanmıştır (27). Araştırmamızda, yaşam kalitesi değerlendirmelerinde tedavi öncesine göre her iki grupta da iyileşme tespit edildi. SF-36 yaşam kalitesi anketi enerji ve mental sağlık alt grubu sonuçları PNF grubu lehine sonuçlandı. PNF uygulamasında fizyoterapist ile hastanın kooperasyonunun iyi şekilde sağlanması ve hastanın istemli olarak daha fazla çaba harcamasının, fonksiyonel durum ve genel sağlığı olumlu yönde etkilediği düşünüldü.

Skapular diskinezi ve omuz ağrısı arasındaki ilişki incelendiğinde, skapulanın omuz fonksiyonunun kuvveti, hızı ve enerjisinde, proksimal-distal sıralamada bir bağlantı olarak rol oynadığı belirtilmiştir. Dinamik stabilizasyonda görev alan kaslarda oluşan problemlerde skapulanın normal dinamik rolünü sağlamada sorun yaşadığı ve normal omuz fonksiyonlarında önemli bir rol oynadığı vurgulanmıştır (28). Omuz patolojilerinde skapulatorasik egzersizlerin tedavi programında yer almasının ağrı, EHA ve fonksiyonellik yönünden daha etkili olacağı ve rehabilitasyondaki gerekliliği araştırmalarda gösterilmiştir (29,30).

Omuz problemlerinde PNF tekniği uygulamalarında skapular paternleri içine alan çalışmaların yetersiz olduğu gözlenmektedir. Demirdel'in yaptığı bir çalışmada, konvansiyonel fizyoterapi programları ile birlikte farklı PNF patern uygulamalarının egzersiz programına eklenmesinin subakromiyal sıkışma sendromu tedavisinde ağrıyı azaltmada, omuz eklem pozisyon hissini ve fonksiyonelliği artırmada olumlu olacağı sonucuna varılmıştır (24). Çalışmamızda PNF üst ekstremite paternlerine skapular patern uygulamalarının eklenmesi ile skapulatorasik mobilizasyon sağlamak ve skapulatorasik ritmi düzenlemek hedeflendi.

Adeziv kapsülit tanısı alan hastalarda skapular PNF tekniği, klasik egzersiz programı ile fizyoterapi modalitelerin ağrı, skapular diskinezi, EHA ve fonksiyonlar üzerindeki ilk etkilerinin karşılaştırıldığı çalışmada, fizyoterapi modalitelerine eklenen egzersizlerin tek seansta ek faydası olmadığı ve adeziv kapsülitli hastalarda etkili rehabilitasyon için skapular egzersizlerin tedaviye eklenmesi gerekliliği sonucuna varılmıştır (12).

Skapular PNF ile yapılan çalışmaların az olması çalışmamızın güçlü yanıdır. Araştırmamızda bazı limitasyonlar vardı. Altı haftalık sürede tedavi sonrası kısa dönem etkiler incelendi. Tedavi bitiminden sonra uzun dönem etkileri incelemek için takip yapılabilirdi.

Çalışma sonunda elde edilen bulgulara göre rotator manşet lezyonu olan olgularda konservatif tedaviye eklenen üst ekstremite ve skapular PNF tekniğinin ağrı, EHA, günlük yaşam aktiviteleri ve yaşam kalitesi değerlendirmelerinde anlamlı düzeyde iyileşme sağladığı tespit edildi. Rotator manşet lezyonlarında skapular stabilizasyon ve ekstremitenin fonksiyonel kullanımı için fizyoterapistler tarafından kullanılan PNF tekniğinin tedaviye eklenmesi ile daha etkili sonuçlar elde edilebileceği ve özellikle omuz rehabilitasyonunda skapular PNF'in tedavi programına alınmasının faydalı olabileceği düşünüldü.

Destekleyen Kuruluş: Yok.

Çıkar Çatışması: Yok.

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A COMPARISON OF ACTIVATION EFFECTS OF THREE DIFFERENT EXERCISES ON SUPRAHYOID MUSCLES IN HEALTHY SUBJECTS

ORIGINAL ARTICLE

ABSTRACT

Purpose: The most crucial airway protection mechanism during swallowing is adequate laryngeal elevation. Suprahyoid muscles are responsible for laryngeal elevation. Our study aimed to compare the effects of three different exercises, Shaker, resistance chin tuck (CTAR) exercise, and chin tuck exercise with theraband, on suprahyoid muscles activity responsible for laryngeal elevation.

Methods: Forty-two healthy subjects with a mean age of 27.92±5.02 years (18-40 years), of which 50% were male were included. All individuals were divided into three groups with computerized randomization. Surface Electromyography (EMG) evaluation was performed to determine electrical activity of the suprahyoid muscles (geniohyoid, mylohyoid, anterior belly of digastric, thyrohyoid, stylohyoid muscles) during maximal voluntary isometric contraction and during performing CTAR, Shaker exercise and chin tuck with theraband. Normalized suprahyoid muscle activations were calculated as the recorded maximum electrical activity during exercise (mV)/recorded maximum electrical activity during maximum isometric contraction (mV).

Results: A statistically significant difference was found between three groups regarding normalized suprahyoid muscle activation ($p<0.001$). The difference between the three groups was caused by the difference between CTAR and Shaker ($p<0.001$) and between CTAR and theraband ($p=0.040$) in favor of CTAR. No difference was found between Shaker and theraband ($p=0.104$).

Conclusion: Primarily CTAR exercise should be included in rehabilitation to increase the suprahyoid muscle activation. In addition, chin tuck exercise with theraband can also be considered as an alternative to CTAR.

Key Words: Dysphagia; Electromyography; Suprahyoid Muscles.

SAĞLIKLI OLGULARDA ÜÇ FARKLI EGZERSİZİN SUPRAHYOİD KASLAR ÜZERİNE AKTİVASYON ETKİLERİNİN KARŞILAŞTIRILMASI

ARAŞTIRMA MAKALESİ

ÖZ

Amaç: Yutma esnasında en önemli havayolu koruması, yeterli laringeal elevasyondur. Laringeal elevasyondan suprahyoid kaslar sorumludur. Çalışmamızın amacı, üç farklı egzersizin; Shaker, dirençli chin tuck (CTAR) egzersizi ve theraband ile yapılan chin tuck egzersizlerin laringeal elevasyondan sorumlu olan suprahyoid kaslarının aktivasyonu üzerine etkilerini karşılaştırmaktı.

Yöntem: Yaş ortalaması 27,92±5,02 yıl (18-40 yıl), % 50'si erkek olmak üzere 42 sağlıklı gönüllü çalışmaya dahil edildi. Maksimum istemli izometrik kontraksiyon ve CTAR, Shaker ve theraband ile chin tuck egzersizleri sırasında suprahyoid kasların elektriksel aktivitelerini belirlemek için yüzeyel elektromyografi (EMG) değerlendirilmesi yapıldı. Normalize edilmiş suprahyoid kas aktivasyonları: egzersiz esnasında kaydedilen maksimum elektriksel aktivite (mV)/maksimum izometrik kontraksiyon esnasında kaydedilen maksimum elektriksel aktivite (mV) formülü ile hesaplandı.

Sonuçlar: Üç grup arasında normalize edilmiş suprahyoid kas aktivasyonları açısından istatistiksel olarak anlamlı bir fark bulundu ($p<0,001$). Bu farkın CTAR grubu lehine, CTAR ile Shaker ($p<0,001$) ve CTAR ile Theraband grupları ($p=0,040$) arasındaki farklardan kaynaklandığı görüldü. Theraband ve Shaker arasında istatistiksel olarak anlamlı bir fark bulunamadı.

Tartışma: Suprahyoid kas aktivasyonunu artırmak için CTAR egzersizi rehabilitasyona birincil olarak dahil edilmelidir. Ayrıca, theraband ile chin tuck egzersizi de CTAR egzersizine alternatif olarak düşünülebilir.

Anahtar Kelimeler: Disfaji; Elektromyografi; Suprahyoid Kaslar.

INTRODUCTION

Swallowing is a series of sequential functions starting with oral intake of food and transferring to the pharynx, esophagus, and stomach, respectively (1). Any problem during these sequential functions is defined as swallowing impairment (dysphagia).

After food is transformed into bolus formation in the mouth, it is propelled to the pharynx by tongue movements. Swallowing reflex is triggered when the bolus passes through anterior faucial pillars. When swallowing reflex is triggered, hyolaryngeal complex move up and forward to provide airway protection with the tilt of epiglottis. The upward movement of the laryngeal complex allows relaxation of the upper esophageal sphincter, and thereby bolus enters into the esophagus with the squeezing effect of pharyngeal constrictor muscles. Namely, the most critical airway protection mechanism during swallowing function is adequate laryngeal elevation. Main structures responsible for laryngeal elevation are suprahyoid muscles (2,3).

There are many treatment approaches to improve laryngeal elevation in swallowing rehabilitation. The most common methods are exercises including Shaker exercises, Chin-Tuck Against Resistance (CTAR) exercise, neuromuscular electrical stimulation of suprahyoid muscles and expiratory muscle strength training (4-7). Theraband exercises as resistance training is a commonly used technique for limb strengthening in physical therapy (8,9). Shaker and CTAR exercises have some difficulties for patients. For example, Shaker exercise is positional uncomfortable, and it causes excessive fatigue in the neck muscles. Also, patients with inadequate upper limb function have limitations to perform CTAR exercise. We thought that chin tuck exercise with theraband is a more comfortable alternative for patients. Chin tuck exercise with theraband could be used to increase suprahyoid muscle activity and to improve laryngeal elevation. Therefore, we aimed to compare the effects of Shaker exercise, CTAR exercise and chin tuck with theraband exercise on suprahyoid muscles activity.

METHODS

Subjects

Forty-two healthy subjects had a score of below three from the Turkish Eating Assessment Tool-10 (T-EAT-10), (21 males, 21 females, mean age 27.92±5.02 years, aged between 18 and 40 years) were included in the study. Having any cervical pathology such as cervical disc hernia and mechanical neck pain, neurological or systemic diseases, undergoing surgery from the head and neck region, taking radiotherapy on head and neck region, and having a swallowing disorder history were the exclusion criteria of this study. All individuals were divided into three groups with computerized randomization.

This study was carried out between May and July 2018 at Hacettepe University, Faculty of Health Sciences, Department of Physiotherapy and Rehabilitation. The ethical approval of this study has been obtained with the approval number of KA-180002 from the Hacettepe University Ethics Committee of Clinical Research. A written informed consent form was taken from all participants.

Measurements

All participants completed the T-EAT 10 questionnaire. It is a valid and reliable questionnaire, which contains 10 questions and assesses swallowing symptom severity (10).

Electromyographic Evaluation of Suprahyoid Muscles

Before surface electromyography (EMG), the skin was cleaned with alcohol. After drying the skin (30 sec), two silver/silver chloride (Ag/AgCl) self-adhesive, 1x2.5 cm size surface electrodes were placed on the midline of the submandibular area bilaterally. The distance between the two electrodes was adjusted to less than 20 mm. All participants were asked to sit upright in a chair during EMG evaluation. The grounding electrode was placed on the right clavicle to avoid signal from any contraction. Cables and electrodes were fixed with adhesive tape to prevent the pull artifacts that may occur during recording (11).

Dual channel surface EMG device integrated to a swallowing evaluation station named The Digital Swallowing Workstation 7200 (Kay Pentax Corporation, Lincoln Park, NJ, USA) was used. For surface EMG recording, a high filter pass was calculated as 20 Hz, a low filter pass was calculated

as 2 kHz, and the received signal was amplified 200 times. The signal transition range was set to 20 mV (12).

All EMG evaluation of suprahyoid muscles were performed by the principal investigator of the study in Hacettepe University, Faculty of Health Sciences, Department of Physiotherapy and Rehabilitation.

Evaluation of Maximum Isometric Suprahyoid Muscle Activity

Surface EMG evaluation was performed to determine the electrical activity of the suprahyoid muscles during maximal voluntary isometric contraction by following the procedures mentioned above. A semirigid neck orthosis was used to allow movements of the mandible. Participants were asked to push their jaws towards the cervical neck orthosis for maximum of 10 seconds (Figure 1) (13,14). This task was repeated three times with 60 seconds of intervals between contractions. The maximum electrical muscle activity (mV) values were recorded.

Figure 1: Evaluation of Maximum Isometric Suprahyoid Muscle Activity.

Suprahyoid Muscle Activity Evaluation During Exercises

For CTAR Exercise Group, participants were asked to push the ball between the jaw and the sternum for 10 sec during the surface EMG measurement (Figure 2). In Shaker Exercise Group, the participants were asked to lift their head slightly to look at the foot tips while lying on his back for 10 sec (Figure 3). For Chin Tuck Exercise with Theraband Group, the participants were asked to sit in a vertical position in the chair while a blue colored theraband was fastened to the back of their head. The resistance of therabands varies according to their color. The theraband has eight resistance levels and, blue theraband is in the 5th place. The reason we chose the blue bands of moderate resistance was not to give excessive resistance to the participants and to prevent them from being too hard and injured (15). They were asked to bring their jaw closer to their sternum against the resistance of the theraband passed through their foreheads for 10 sec (Figure 4). All tasks were repeated three times with 60 sec of rest intervals between contractions. The maximum electrical muscle activity (mV) values were recorded (5,16,17).

Figure 2: Chin Tuck Against Resistance Exercise (CTAR).

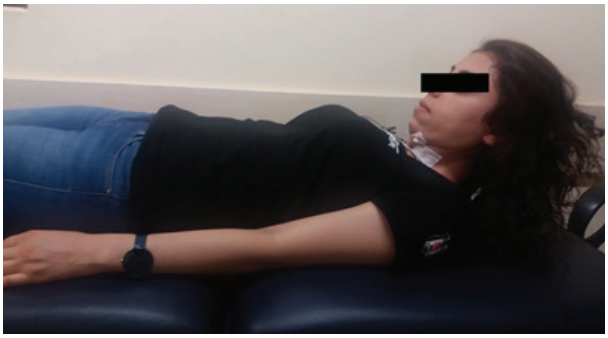

Figure 3: Shaker Exercise.

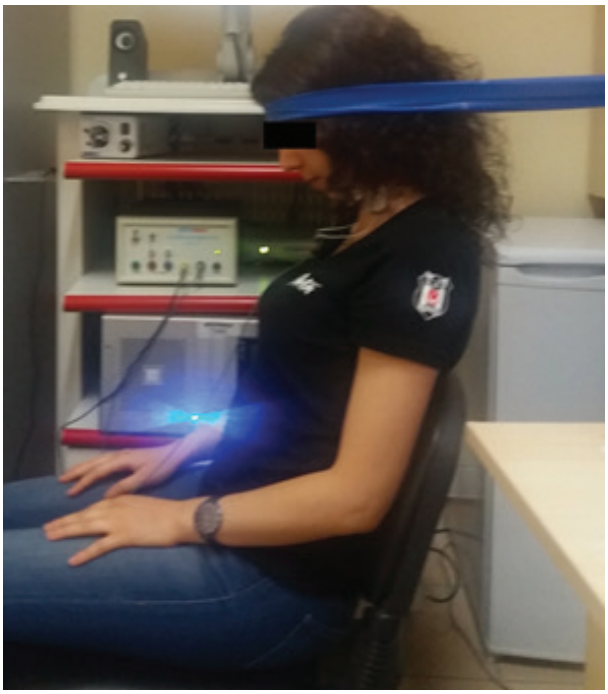

Figure 4: Chin Tuck Exercise with Theraband.

Normalization Procedure

Normalized suprahyoid muscle activations were calculated as the recorded maximum electrical activity during exercise (mV)/recorded maximum electrical activation during maximum isometric contraction (mV). This normalization process was performed to determine what percentage of the maximal suprahyoid muscle activations the exercises were activating. The results were recorded as a percentage (18,19).

Statistical Analysis

The statistical data of the study were analyzed SPSS 18.0 software package (SPSS Inc., Chicago, IL, USA). For the power of the study is at 80%, type 1 error at 5%, it was necessary to include 14 participants for each group. The Kruskal Wallis test was used to determine the difference between normalized muscle activations of the three groups participating in the study. Bonferroni correction was performed to determine which groups the statistical difference between all groups originated. A p-value of less than 0.05 was considered to be statistically significant.

RESULTS

Forty-two healthy subjects, including 14 participants from each group, were included in the study. The demographic data of the subjects are shown in Table 1. There was no statistical difference between groups in terms of age, height and body weight ($p>0.05$).

A statistically significant difference was found between the three groups in terms of normalized suprahyoid muscle activities ($p<0.05$, Table 2). It was found that the difference among three groups was caused by the differences between CTAR and Shaker ($p<0.001$) and between CTAR and Chin Tuck exercise with theraband in favor of CTAR ($p=0.040$). No statistically significant difference was found between Shaker and Chin Tuck exercise with theraband ($p=0.107$).

DISCUSSION

The CTAR exercise was found to be more effective on suprahyoid muscle activity than both Shaker and Chin Tuck exercise with theraband. Although there was no statistically significant difference between the Chin Tuck exercise with theraband and Shaker exercise, there was a clinically significant difference in favor of the theraband group.

Previous studies primarily focused on the participants' electrical suprahyoid muscle activation (7,20). It can be misleading to interpret the results according to electrical muscle activation because the same exercise modality can cause different degrees of muscle activation in different people. Therefore, we used the maximum activation potential of a muscle as percentages instead of electrical muscle activation. The normalized suprahyoid muscle activity of CTAR exercise was higher than Shaker exercise and chin tuck exercise with theraband. Although no statistical difference

Table 1: Characteristics of the Participants.

Variable	CTAR (n=14)	Shaker (n=14)	Theraband (n=14)	p
	Mean±SD	Mean±SD	Mean±SD	
Age (years)	28.75±5.17	26.72±3.95	28.25±5.78	0.678
Height (cm)	168.69±7.26	169.18±10.12	171.16±6.46	0.115
Weight (kg)	64.07±16.07	62.81±14.62	74.75±16.09	0.572

was found in the normalized suprahyoid muscle activations between Shaker exercise and chin tuck exercise with theraband, the normalized suprahyoid muscle activity of chin tuck exercise with theraband was higher than Shaker exercise which was clinically significant.

Studies on the therapeutic effects of exercises to increase suprahyoid muscle activity are very limited. In one of these studies, Gao and Zhang (21) showed that CTAR exercise is more effective in protecting the airway than Shaker exercise on patients who have/had a cerebral infarction. Similarly to our study results, previous studies reported that CTAR exercises activate suprahyoid muscles more than Shaker exercise (7,20,21). The possible reasons regarding this difference were reported that Shaker exercise is not specific to the suprahyoid muscles, and activates the superficial neck flexor muscles such as the anterior scalene and sternocleidomastoideus (7) primarily. Sze and colleagues (20) reported that Shaker exercise produces more muscular fatigue, especially on sternocleidomastoideus than CTAR exercise. Another possible reason for this difference may be this muscular fatigue.

The Shaker exercise involves raising the head against gravity in the prone position. This positional difference causes various biomechanical adjustments. In order to active deeper anterior neck muscles, such as deep cervical flexors (longus capitis and longus colli) and suprahyoid muscles, the movement should occur between the Occiput-C1-C2 segments. While this movement is called craniocervical flexion, the movements occur, and lower cervical segment, performed by sternocleidomastoideus and anterior scalene muscles are called cervical flexion (22,23). While, in Shaker exercise lifting head and looking at the toe tip have cervical flexion movement features, CTAR exercise and chin tuck exercise with theraband have craniocervical flexion features more. Less activation of Shaker exercise on suprahyoid muscles than activations of chin tuck exercise with theraband and CTAR exercise may be associated with these biomechanical differences. In addition, superficial cervical flexor muscles, which are stronger than deep cervical muscles, may be overactive to lifting the weight of the head. If an adult human head is thought to be 4-6 kg, this overactivation seems more likely. In this case, it may have caused less activation of the suprahyoid muscles that are located behind sternocleidomastoideus and anterior scalene muscles.

CTAR exercise has activated the suprahyoid muscles more than chin tuck exercise with theraband. One of the possible causes of this difference between these exercises, which have similar biomechanical features may be the direct contact of the ball with the suprahyoid muscles in CTAR exercise. This contact may provide proprioceptive input

Table 2: Comparison of Normalized Suprahyoid Muscle Activation among the Groups.

Normalized Suprahyoid Muscle Activation (%)	Mean±SD	Median (25-75% IQR)	p
CTAR	0.79±0.38	0.74 (0.44-0.89)	**<0.001***
Shaker	0.30±0.11	0.33 (0.21-0.40)	
Theraband	0.47±0.28	0.48 (0.38-0.53)	

*p<0.05, Kruskal Wallis Test. CTAR: Resistance chin tuck (CTAR) exercise.

and biofeedback. In some surface EMG studies, proprioceptive input and biofeedback increase muscle activation have been reported (24,25). However, in order to be performed CTAR exercise, a sufficient upper extremity function is needed to keep the ball under the jaw. Therefore, we believe that individuals with poor upper extremity function may prefer chin tuck exercise with theraband. In addition, in chin tuck exercise with theraband, the strength of the exercise can be increased by increasing the resistance of the band. In CTAR exercise, the ball is fixed between the jaw and the manubrium sterni, so some difficulties can be encountered when performing an exercise in patients with tracheostomy. We thought that this is one of the disadvantages of the CTAR exercise.

Although there was no statistically significant difference between Chin Tuck exercise with theraband and Shaker exercise, we believed that the 17% normalized muscle activation difference was clinically valuable. This difference was calculated as normalized suprahyoid muscle activations of theraband Group-normalized suprahyoid muscle activations of Shaker group. In addition, chin tuck exercise with theraband is more comfortable than Shaker exercise positionally, and chin tuck exercise with theraband can be preferred as the second choice for increasing suprahyoid muscle activity.

One of the limitations of the study was not performed to participant any fatigue questionnaire about exercises. Furthermore, we could not evaluate the activation of sternocleidomastoid muscle during EMG measurements due to technical requirements.

In conclusion, these study results suggest that CTAR exercise should be included in rehabilitation as a primary in order to increase the suprahyoid muscle activation. In inadequate upper extremity functioning individuals and patients with tracheostomy, we believe that chin tuck exercise with theraband can be considered as an alternative exercise to CTAR exercise.

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Conflict of Interest: The authors have no conflicts of interest to disclose.

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Informed Consent: A written informed consent was obtained from each subject.

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AN INVESTIGATION OF RELATIONSHIP BETWEEN SMOKING AND PHYSICAL ACTIVITY IN HEALTH CARE PROFESSIONALS

ORIGINAL ARTICLE

ABSTRACT

Purpose: Smoking and physical inactivity are two major health problems that concern the public. Although the relationship between physical activity level and smoking status is defined in different study groups, this relationship is not clearly defined in health care professionals who are thought to be a guide for community health. Therefore, our study aimed to examine the relationship between smoking and physical activity level in healthcare professionals.

Methods: A total of 193 healthcare professionals (median age; 38 [interquartile range-IQR; 34-45] years, body mass index; 24 [IQR; 21-27] kg/m^2), 102 smokers and 91 non-smokers, who worked in an educational research hospital, participated in the study. Physical activity was assessed using the International Physical Activity Questionnaire. Smoking history was taken in the smoker group, and the Fagerström Test for Nicotine Dependence was administered to determine the nicotine addiction level.

Results: The demographics of the groups were similar (p>0.05). Walking activity, moderate physical activity and total physical activity scores were significantly lower in smokers than non-smokers (p<0.001, p=0.021, and p=0.001, respectively). The total physical activity score in the smoking group was showed a moderate negative correlation with the nicotine dependence and the amount of cigarette consumption (r=-0.462 and r=-0.483, respectively, p<0.05).

Conclusion: The level of physical activity in smokers' health professionals was found to be low. As the amount of cigarette consumption and nicotine dependence increases, the level of physical activity decreases. In this crucial population, further studies should be undertaken to improve both smoking cessation and physical activity.

Key Words: Health Care Professionals; Physical Activity; Smoking.

SAĞLIK PROFESYONELLERİNDE SİGARA İÇİCİLİĞİ İLE FİZİKSEL AKTİVİTE ARASINDAKİ İLİŞKİNİN İNCELENMESİ

ARAŞTIRMA MAKALESİ

ÖZ

Amaç: Sigara içiciliği ve fiziksel inaktivite toplumu ilgilendiren iki büyük sağlık sorunudur. Farklı çalışma gruplarında fiziksel aktivite düzeyi ve sigara içiciliği ile ilgili ilişki tanımlanmış olsa da, toplum sağlığı için yönlendirici olduğu düşünülen sağlık profesyonellerinde bu ilişki net olarak tanımlanmamıştır. Bu nedenle çalışmamızın amacı sağlık profesyonellerinde sigara içiciliği ile fiziksel aktivite düzeyi arasındaki ilişkinin incelenmesiydi.

Yöntem: Çalışmaya bir eğitim araştırma hastanesinde görev yapmakta olan, 102 sigara içen, 91 sigara içmeyen toplam 193 sağlık çalışanı (ortanca yaş; 38 [çeyrekler arası aralık-ÇAA: 34-45] yıl, beden kitle indeksi; 24 [ÇAA: 21-27] kg/m^2) katıldı. Katılımcıların fiziksel aktivite düzeyleri Uluslararası Fiziksel Aktivite Anketi ile değerlendirildi. Sigara içen grupta sigara öyküsü alındı ve nikotin bağımlılığı düzeyini belirlemek için Fagerström Nikotin Bağımlılık Testi uygulandı.

Sonuçlar: Grupların demografik özellikleri benzerdi (p>0,05). Sigara içen grupta yürüme aktivitesi, orta şiddetli ve total fiziksel aktivite skorları sigara içmeyenlere göre anlamlı olarak düşük bulundu (sırasıyla, p<0,001, p=0,021 ve p=0,001). Sigara içen grupta total fiziksel aktivite skorunun nikotin bağımlılık test skoru ve sigara tüketim miktarı ile orta derecede zıt yönlü ilişkili olduğu görüldü (sırasıyla, r=-0,462 ve r=-0,483, p<0,05).

Tartışma: Sigara içen sağlık profesyonellerinde fiziksel aktivite düzeyi düşük bulundu. Sigara tüketim miktarı ve nikotin bağımlılığı arttıkça fiziksel aktivite düzeyi azalma yönündedir. Bu önemli populasyonda hem sigara bırakma hem de fiziksel aktiviteyi geliştirme konusunda ileri çalışmalar yapılmalıdır.

Anahtar Kelimeler: Sağlık Profesyonelleri; Fiziksel Aktivite; Sigara İçiciliği.

INTRODUCTION

Healthcare professionals are considered as a source of information for healthy-living and as role models because they affect the behaviors of individuals such as regular physical activities, dietary habits, health and stress management (1). Accordingly, along with the responsibility of preserving and improving their health, healthcare professionals play a crucial role in raising awareness, providing guidance, developing positive behavior and creating a healthy society (2).

In addition to being one of the leading preventable causes of mortality and morbidity, smoking brings about not only physiological health problems but also psychological, social and economic losses. In our country, smoking causes 120 thousand deaths per year (3). In studies conducted on healthcare professionals, a high prevalence of smoking has been noted, and these studies suggest that the smoking habits of healthcare professionals and their attitude towards quitting smoking should be known (4-6).

Physical activity has a globally increasing importance in the prevention and control of various chronic diseases such as obesity, coronary artery disease, hypertension, diabetes, depression, anxiety, and osteoporosis (7). It is indicated that the increase in regular physical activity leads to a decrease in medication use; helps preserve functional independence; and increases the quality of life (8). Thanks to its many health benefits, physical activity also plays a critical role in preventive rehabilitation among healthy individuals and in the fight against chronic diseases (9). In recent years, health improving behaviors and physical activity have remained relevant for many chronic diseases. Moreover, that shows the healthcare professionals working in this field has a huge responsibility (10).

Although the relationship between smoking and physical activity in various populations has already been investigated in many other studies (11-14), there has been no study conducted on healthcare professionals. Accordingly, the aim of this study was the investigation of the relationship between smoking and physical activity in healthcare professionals working in a training and research hospital.

METHODS

This cross-sectional study was conducted on 203 voluntary healthcare professionals (medical doctor, nurse, physiotherapist, psychologist, dietitian, social worker) working at Health Sciences University Dr. Suat Seren Chest Diseases and Surgery Training and Research Hospital between September 2013 and January 2014. The study was accepted by the ethic Committee of the Dr. Suat Seren Chest Diseases and Surgery Training and Research Hospital on 04.17.2013 with serial number 318. The participants were informed about the study, and their written consent was obtained. The inclusion criteria were to be between the ages of 18 and 65 years and be a healthcare profession and volunteer to participate in the study. The study excluded individuals with systemic diseases that might affect physical activity behaviors; individuals with a body mass index (BMI) over 35 kg/m^2 (15).

The demographic and physical features (age, sex, BMI, occupation, education), and smoking histories of the participants were recorded. Study and control groups were formed out of smokers and non-smokers. Regular smoker defined as at least one regular smoker per day (6). The physical activity levels of all participants were evaluated according to the International Physical Activity Questionnaire, and the participants were classified as physically inactive participants, minimally active and sufficiently active (16). Additionally, Fagerström Test for Nicotine Dependence was applied to the group of smokers in order to determine the level of nicotine dependence (17). In order to use the International Physical Activity Questionnaire and Fagerström Test for Nicotine Dependence, we first received approval via e-mail from the authors who developed the Turkish version. After the demographic data was investigated, the questionnaires were handed out to the participants and collected the next day, considering their busy schedules.

International Physical Activity Questionnaire

The short form of the questionnaire consisting of seven questions was used for the evaluation of physical activity. The questionnaire determines how many days in a week and how much time (minutes) in a day were spent on (a) vigorous physical

activities, (b) moderate physical activities, and (c) walking activity over the past couple of weeks. According to the questionnaire, individuals spend 8.0 MET on "vigorous physical activities," 4.0 MET on "moderate physical activities," and 3.3 MET on "walking." Minutes and days are multiplied by the MET score for each class and "MET-minute/week" score is calculated. Following the calculation, a MET score under 600 is regarded as physically inactive; a MET score between 600 and 3000 is regarded as minimally active, and over 3000 is regarded as sufficiently active. The validity and reliability study of the Turkish version of the questionnaire was conducted by Saglam et al. (18).

Fagerström Test for Nicotine Dependence

This test is a test of six questions used for determination of nicotine dependency. The test questions are as follows, respectively: "How soon after waking do you smoke your first cigarette?; Do you find it difficult to refrain from smoking in places where it is forbidden? e.g., bus, hospital, cinema, etc.; Which cigarette would you hate most to give up?; How many cigarettes a day do you smoke?; Do you smoke more frequently during the first hours after waking than during the rest of the day?; Do you smoke even if you are so ill that you are in bed most of the day?". The scoring is different for each question, and nicotine dependency is graded as low (score 0-3), moderate (score 4-6), and high (score ≥7). The validity and reliability study of the Turkish version of the test was conducted by Uysal et al. (19).

Statistical Analysis

All of the data obtained were analyzed using the 'Statistical Package for the Social Sciences (SPSS Inc., Chicago, IL, USA) 20.0 for Windows' statistics software. Shapiro Wilk Test was used for analyzing whether the data showed normal distribution or not. While categorical variables were expressed as percentages (%), continuous variables were expressed as the median and interquartile range (IQR). Correlation analyses were performed using the Spearman Correlation Test. Mann Whitney U Test was used in the comparison of ordinal variables in the groups and Fisher's Exact Test was used for nominal variables. Binary logistic regression analysis was used to predict being physically inactive adjusting variables. The statistical significance level was determined as $p<0.05$.

RESULTS

A total of 203 healthcare professionals participated in our study. The data from 10 participants, who failed to fill out the questionnaire completely, were excluded from the analysis. As a result, the data from 193 healthcare professionals (median age=38, IQR=34-35 years), 102 smokers and 91 non-smokers, were evaluated.

The age, BMI, gender and education level distributions were observed to be similar among the participants when the demographic characteristics

Table 1: Demographic and Clinical Features of All Participants.

Variables	All (n=193)	Smokers (n=102)	Non-smokers (n=91)	p
	Median (IQR)	Median (IQR)	Median (IQR)	
Age (years)	38 (34-45)	37 (34-42)	39 (34-48)	0.399
Body Mass Index (kg/m²)	24 (21-27)	24 (21-28)	24 (21-27)	0.214
	n (%)	n (%)	n (%)	
Female Gender	101 (52.3%)	54 (52.9%)	51 (56.0%)	0.665
Education				
High School	38 (19.7%)	25 (24.5%)	13 (14.3%)	0.074
University	155 (80.3%)	77 (75.6%)	78 (85.7%)	
Profession				
Medical Doctor	60 (31.4%)	32 (31.4%)	28 (30.8%)	0.092
Nurse	79 (41.0%)	43 (43.1%)	36 (39.6%)	0.714
Health Licensor	17 (8.9%)	5 (4.9%)	12 (13.2%)	**0.042***
Health Technician	36 (18.7%)	21 (20.6%)	15 (16.4%)	0.464

*p<0.05. Mann Whitney U Test, Fisher Exact Test. Data are expressed as median (interquartile range, IQR) or percentages.

Table 2: Comparison of Physical Activity Scores between the Groups.

Variables	All (n=193)	Smokers (n=102)	Non-smokers (n=91)	p
	Median (IQR)	Median (IQR)	Median (IQR)	
Total Physical Activity (MET-min/week)	1230 (716-1413)	1188 (693-1386)	1310 (772-1584)	**0.001***
Vigorous Physical Activity (MET-min/week)	0 (0-160)	0 (0-160)	0 (0-240)	0.057
Moderate Physical Activity (MET-min/week)	0 (0-320)	0 (0-320)	0 (0-360)	**0.021***
Walking Activity (MET-min/week)	990 (693-1188)	924 (594-1040)	1188 (743-1386)	**<0.001***
Sitting Duration (min)	360 (320-480)	360 (240-480)	360 (240-420)	0.325

*p<0.05. Mann Whitney U Test. Data are expressed as median (interquartile range-IQR).

of the groups were compared (p>0.05, Table 1). Although there was not much of a difference in the distribution of occupations in groups, the number of health licensors was significantly lower in the non-smoker group (p=0.042, Table 1).

When the physical activity scores were compared, the walking activity, moderate physical activity, and total physical activity scores were observed to be significantly lower in the smoker group (p<0.001, p=0.021, and p=0.001, respectively, Table 2). Even though the physical activity score was higher and sitting duration was lower in the non-smoker group, there was no significant difference between the groups (p=0.057 and p=0.325, respectively, Table 2).

As a result of the evaluation of the physical activity scores of all participants, 17% (n=32) were found physically inactive, 70% (n=136) were found minimally active, and only 13% (n=25) were found sufficiently active. The physical activity distributions within the groups are shown in Figure 1.

When the smoking histories of the participants in the smoker group were analyzed it was observed that the median age to start smoking was 20 (IQR=18-23) years; the smoking period was 15 (IQR=10-20) years; smoking consumption per year was 10 (IQR=7-8) packxyears. The median of nicotine dependence test scores was 3 (IQR=1-5), and nicotine dependence levels were found out to be low.

When the parameters related to physical activity were analyzed in the smoker group, while no correlation was found between the moderate to vigorous physical activity parameters and any other parameter (p>0.05), there was a moderate negative correlation between walking activity, and BMI and smoking consumption (r=-0.513, r=-0.416, respectively, p<0.05, Table 3). There was a moderate negative correlation between total physical activity and nicotine dependence test, smoking consumption and BMI (r=-0.462, r=-0.483, and r=-0.533, respectively, p<0.05, Table 3). In the logistic regression model, to be smoker had a risk

Table 3: Investigation of the Factors Related with Physical Activity in Smoker Group.

Variables	Total Physical Activity	Vigorous Physical Activity	Moderate Physical Activity	Walking Activity	Sitting Duration
Age	0.036	0.121	0.417	-0.290	0.533
Body Mass Index	**-0.533****	-0.413	0.011	**-0.513***	0.378
Smoking Consumption	**-0.483***	-0.021	-0.047	-0.416*	0.002
Age to Start Smoking	0.263	0.369	0.632	0.055	0.033
Smoking Period	-0.299	-0.714	0.144	-0.042	0.352
FTND	**-0.462***	0.571	-0.058	-0.413	0.017

*p<0.05. **p<0.001. Spearman Correlation Test. FTND: Fagerstrom. Test for Nicotine Dependence.

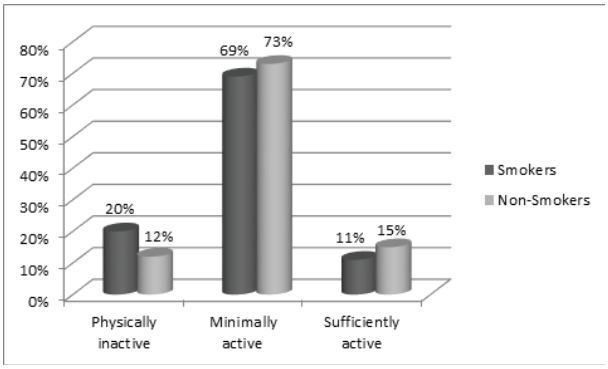

Figure 1: Physical Activity Levels of Participant in the Groups.

of being physically inactive 1.83 times more than those who did not smoke (95% CI 1.12% to 3.89%, p=0.026).

DISCUSSION

In our study, where we analyzed the relationship between smoking and physical activity levels in healthcare professionals who work at a training and research hospital. Walking activity, moderate physical activity and total physical activity scores in smokers were found to be lower than those of non-smokers. In addition, total physical activity was found to be negatively associated with cigarette consumption and nicotine dependence, while walking activity was negatively associated with cigarette consumption.

According to Disease Control and Prevention Center (2007) and World Health Organization (2008) data, smoking and physical inactivity are the leading causes of morbidity and mortality in Europe and the United States (20,21). The relationship between smoking and physical activity in various disease groups and healthy individuals has been a favorite study subject for many years. In most of the studies conducted, physical activity levels were found to be lower in smokers compared to non-smokers (11-13,22). While this relationship is at a lower level among the young population, it was higher in adults, and this was claimed to be due to the increase in smoking consumption (11). In our study, similar to the literature, walking activity was found to have a negative correlation with smoking consumption; and total physical activity was found to have a negative correlation with smoking consumption and nicotine dependence test score.

In a study conducted by Charilaou et al., a negative correlation was found between nicotine dependence and physical activity in adolescents and young adults (11). A study by Heydari et al. conducted in Tehran with 2602 participants revealed that there was a relationship between smoking and age and level of education. The study also concluded that physical inactivity was 4.88 fold higher among smokers (12). In another study from Brazil, no correlation was found between pulmonary function and physical activity evaluated using an accelerometer in smoking adults. It was, however, emphasized that smoking history should be investigated thoroughly (13). In another study that observed the changes in smoking behaviors and related factors among smoking Australian young women for 10 years, the moderate and high physical activity levels were found to be positively correlated with being an ex-smoker. The findings, emphasized the importance of the role of physical activity in relapse prevention (22).

Although the total physical activity scores, moderate physical activity scores and walking activities of the groups in our study varied, the sitting durations and vigorous physical activity scores showed similarity. This similarity, particularly regarding the sitting duration, maybe due to the fact that the smoker group included more people working in a standing position for long hours. However, this is only an assumption considering that their sitting durations in the workplace or at home were not the same. Although there was no significant difference, the vigorous physical activity score was lower in smokers. This result might be that smokers are usually more depressive, and have more isolated lives (23). Similar to the literature, in our study population, smokers group did not usually take part in team sports such as football, basketball which have been involved in the vigorous physical activity section of the questionnaire that we used.

Our study was conducted on healthcare professionals, who were expected to be informed about the importance of physical activity due to their educational background and the events they attend such as congresses, symposiums, and meetings. Healthcare professionals can play a significant role in promoting physical activity in local communities (24). Moreover, physically active healthcare professionals are more likely to do guide

their patients towards developing a habit of daily physical activity (25).

In our study, the number of physically active people was quite low in both smokers (11%) and non-smokers (15%). In the literature, physical activity levels vary in different studies with healthcare professionals. In the study by Teferi et al., physical activity levels were evaluated in healthcare professionals, medical doctors, nurses and physiotherapists, and moderate physical activity was detected in 73.7% of the participants. In the study, the occupation group with the highest physical activity level was physiotherapists. The study also revealed that physiotherapists gave more physical activity recommendations to their patients compared to medical doctors and nurses (26). Similarly, in another study, the physical activity level of medical doctors was found to be lower than that of other healthcare professionals. This study also concluded that physical activity levels were related to having a higher income and self-motivation (27).

Contrary to previous studies, it was reported in a study conducted with 50 healthcare professionals in New Zealand that the daily average step count of the participants was around 10620 and 65% of the participants reached the minimum recommended physical activity levels (28). A study conducted on 1651 health sciences students in Greece revealed that 14.2% of the participants engaged in health-improving physical activities. However, no strong negative correlation was detected between smoking and physical activity (29).

To the best of our knowledge, this is the first study in the literature that investigated the relationship between smoking and physical activity in healthcare professionals. Another important aspect of the study was that the relationship between physical activity and nicotine dependence in smoking healthcare professionals had never been defined before. Thus, our regional study focused on this particular group will contribute to the literature as behaviors related to health, such as smoking and physical activity, vary from one society to another.

In our study, we used the validated and reliable Turkish version of the International Physical Activity Questionnaire. Even though this scale is suitable for the evaluation and categorization of physical activity, not being able to use activity monitors with daily energy tracking producing more objective results due to technical shortcomings may be considered as a limitation to our study. Another limitation was not being able to conduct a subgroup analysis for different occupation groups due to the relatively small size of our sample groups.

Smoking causes 5.4 million deaths per year around the globe, and this number is estimated to be over 8.0 million by 2030 (21,30). Moreover, despite all known benefits, physical activity levels are insufficient in approximately 60% of the world population (11,21). The use of physical activity in the prevention of harmful behaviors such as smoking, alcohol consumption, unhealthy diets, and sedentary lifestyles has been attracting considerable attention in recent years (31). In light of this information, it becomes evident that both smoking and physical inactivity are important issues concerning public health that should be taken into consideration. There is still a need for further studiy on a broader scale among healthcare professionals, using subgroup analyses, detailed sociodemographic investigations, using objective evaluation methods.

In conclusion, despite its well-known benefits, the level of physical activity is low among healthcare professionals who are considered to be role models for raising awareness in society regarding healthy behaviors. Considering the relationship between smoking and low levels of physical activity, the population should be guided towards programs that would help them quit smoking and improve their physical activity levels.

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LUMBOPELVİK MOTOR KONTROL, POSTÜRAL DENGE VE FİZİKSEL PERFORMANS ARASINDAKİ İLİŞKİ

ARAŞTIRMA MAKALESİ

ÖZ

Amaç: Lumbopelvik stabilitenin zayıfladığı durumlarda postüral dengenin kötüleştiği, nötral pozisyonun ve postürün korunması için daha fazla efor sarf edildiği, bireylerin daha erken yorulduğu ve yaralanma sıklığının arttığı bilinmektedir. Literatürde lumbopelvik stabilitenin denge ve fiziksel performans için önemli olduğu vurgulanmasına rağmen, M. Transversus abdominus (mTrA) ve M. Lumbar multifidus (mLM)'nin kas kalınlıkları ile bu parametrelerin ilişkisi incelenmemiştir. Amacımız, mTrA ve mLM kas kalınlıkları ile postüral denge ile fiziksel performans arasındaki ilişkinin incelenmesiydi.

Yöntem: Çalışmaya 18 ile 25 yaş arası 64 genç yetişkin birey dahil edildi. mTrA ve mLM'nin kalınlıklarının belirlenmesi amacıyla ultrasonografik görüntüleme kullanıldı. Statik ve dinamik postüral dengenin objektif değerlendirilmesinde Biodex Denge Sistemi kullanıldı. Fiziksel performans, dikey sıçrama testi, yana adım alma testi ve mekik koşu testleri ile değerlendirildi.

Sonuçlar: mTrA kas kalınlığı ile genel stabilite indeksi (GSİ), anteroposterior stabilite indeksi (APSİ) ve yana adım alma testi arasında istatistiksel olarak anlamlı ilişki bulundu ($p<0,05$). mLM kas kalınlığı ile GSİ, APSİ, yana adım alma testi ve mekik koşu testi ile arasında istatistiksel olarak anlamlı ilişki saptandı ($p<0,05$).

Tartışma: Lumbopelvik motor kontroldeki azalma, denge ve fiziksel performanstaki kötüleşmeler ile ilişkili olduğu için, lumbopelvik motor kontrol değerlendirilmesinin akılda tutulması gereken parametreleri olduğu düşünülmektedir.

Anahtar Kelimeler: Fiziksel Uygunluk; Lumbopelvik Stabilite; Postüral Denge.

RELATIONSHIP BETWEEN LUMBOPELVIC MOTOR CONTROL AND POSTURAL BALANCE AND PHYSICAL PERFORMANCE

ORIGINAL ARTICLE

ABSTRACT

Purpose: It is known that in conditions where lumbopelvic stability is decreased, postural balance is worsened, the effort required for the neutral position and protecting posture is increased, individuals tire earlier, and the frequency of injury increases. Although it has been highlighted that lumbopelvic stability is important for balance and physical performance, the relationship between M. Transversus abdominus (mTrA) and M. Lumbar multifidus (mLM) and balance and physical performance have not been investigated. We aimed to examine the relationship between postural balance and physical performance and mTrA and mLM muscle thicknesses.

Methods: A total of 64 healthy young adults aged 18-25 years were included in the study. Ultrasonographic imaging was used to determine the thicknesses of mTrA and mLM. Biodex Balance System was used for the objective evaluation of static and dynamic postural balance. Physical performance was assessed using the vertical jump test, sidestep test, and shuttle run test.

Results: There was a statistically significant correlation between mTrA muscle thickness and general stability index (GSI), anteroposterior stability index (APSI), and side step test ($p<0.05$). A statistically significant correlation was found between mLM muscle thickness and GSI, APSI, side step test, and shuttle run test ($p<0.05$).

Conclusion: Because the decrease in the lumbopelvic motor control is associated with worsening of balance and physical performance, it is thought that balance end physical performance evaluation should be considered for the lumbopelvic motor control assessment.

Key Words: Physical Fitness; Lumbopelvic Stability; Postural Balance.

GİRİŞ

Lumbopelvik kontrolün sağlanması ve sürdürülmesinde, osteoligamentöz yapıların oluşturduğu pasif sistem, statik ve dinamik enduransın açığa çıkarılmasında lokal ve global kasların oluşturduğu aktif sistem ve nöral sistemin oluşturduğu kontrol mekanizması olmak üzere üç sistem etkilidir. Torsiyonel ve kompresif uyarılara karşı lumbopelvik bölgenin multisegmental ve intersegmental kontrolünün sağlanmasında bu sistemlerin fonksiyonunu koruması ve sürdürmesi önem taşır (1).

Global kaslar da etkili olmakla beraber özellikle lokal kasların sinerjik ko-kontraksiyonunun merkezi sinir sistemi ile sağlıklı ilişkisi, lumbopelvik motor kontrol olarak bilinmektedir (2,3). Lokal kas grubundan özellikle, M. Transversus abdominus (mTrA) ve M. Lumbar multifidus (mLM)'un lumbopelvik stabilizasyon için özelleştiği bilinmektedir (2,3). mTrA kontraksiyonu, intraabdominal basıncı artırarak torakolumbal fasyada bir gerilime sebep olur. Torakolumbal fasyanın mLM ile birlikte sıkı bağlantısı lumbopelvik motor kontrole katkı sağlar (4-7). mLM derin liflerinin vertebra rotasyon merkezine yakınlığı lumbopelvik motor kontrolün sağlanmasında avantajdır. mLM'nin diğer lumbal bölge kaslarına göre lif uzunluğunun küçük, fizyolojik kesit alanının ise, daha yüksek olduğu rapor edilmiştir (8). Bu durum yine stabilizasyon için elverişli bir ortam yaratır.

mTrA ve mLM'nin kesit alanında meydana gelen azalmaların bireyin harekete başlamadan önceki hazırlayıcı postüral düzenlemelerini geciktirdiği yapılan çalışmalarla ortaya koyulmuştur (9-12). Bu durum hareket sırasında oluşacak pertürbasyon kuvvetlerine karşı koyulmasını engelleyerek denge bozukluklarına sebep olur. Ayrıca fiziksel aktivite sırasında daha fazla efor sarf edileceğinden bireyin fiziksel performansı kötüleşebilir (13,14). Lumbopelvik stabilitenin zayıfladığı durumlarda statik ve dinamik postüral dengenin kötüleştiği, şiddetli pertürbasyonların önlenmesinde yetersiz kalındığı, nötral pozisyonun ve postürün korunmasında daha fazla efor sarf edildiği ve bu durumun yaralanma riskini artırdığı bilinmektedir (13,15,16). Denge bozukluklarına ek olarak lumbopelvik kaslardaki zayıflık, fiziksel aktivite sırasında erken yorulmaya, enduransta azalmaya ve sıklıkla yaralanmalara sebep olmaktadır (17,18). Lumbopelvik kasların ekstremiteler için oluşturduğu destekleyici güç kapasitesi, şok absorbsiyonundaki etkinliği, anormal hareketlerin minimize edilmesindeki işlevi bu durumun oluşmasında önemli rol oynamaktadır (17).

Lumbopelvik stabilitedeki azalmanın, postüral denge ve fiziksel performans üzerinde olumsuz etkiler yaratabileceği öngörülmekle birlikte, lumbopelvik motor kontrolde etkili mTrA ve mLM kalınlıklarının postüral dengeyi ve fiziksel performansı etkileyip etkilemediği ile ilgili literatürde objektif bir veriye rastlanılmadı. Bu çalışmada, mTrA ve mLM kalınlıkları ile postüral denge ve fiziksel performans arasındaki ilişkinin incelenmesi amaçlandı. Bu amaç doğrultusunda planlanan çalışmanın hipotezi olarak, azalmış postüral denge ve fiziksel performansın mTrA ve mLM kalınlıkları ile ilişkili olduğu öngörüldü.

YÖNTEM

Bireyler

Çalışmaya 18 ile 25 yaş arası 64 sağlıklı genç yetişkin birey dahil edildi. Çalışmaya dahil edilme kriterleri, çalışmaya katılmaya gönüllü olmak, 18 ile 25 yaş arası olmak, vücut kütle indeksi 18,5 ile 24,9 kg/m^2 arasında olmak olarak belirlendi. Çalışmamıza dahil edilmeme kriterleri ise, tanı almış sistemik problem varlığı (nörolojik, muskuloskeletal, endokrin, romatolojik), geçirilmiş alt ekstremite cerrahisi, alt ekstremite ve omurgayı içeren tanı almış patoloji varlığı (bel ağrısı, skolyoz, geçirilmiş cerrahiler) ve duyu kaybı olması şeklinde belirlendi (19,20).

Bu çalışmanın örneklem büyüklüğü hesaplamasında Hides ve ark.'nın ultrasonografik görüntüleme ile ilgili yapmış oldukları çalışma sonuçları referans alındı (21). % 80 güç ve % 5 tip-1 hata ile katılımcılarda beklenen ortalama mTrA kalınlığının 4,8 milimetre, standart sapmalarının 1,3 olduğu varsayılarak r=0,63 etki genişliğinde örneklem büyüklüğü elde edebilmek için 64 bireye ihtiyaç duyuldu. Katılımcıların, değerlendirmeler tamamlanmadan çalışmadan ayrılmaları ihtimaline karşı (bırakma oranı: % 10; 64/0,9=71,11) 72 birey çalışmaya dahil edildi.

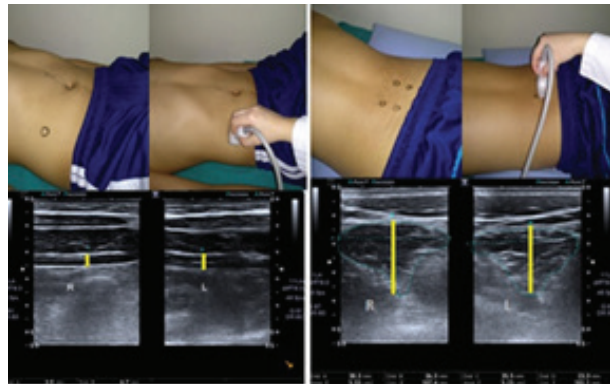
Çalışma öncesi Kırşehir Ahi Evran Üniversitesi Girişimsel Olmayan Klinik Araştırmalar Etik Kurulu'ndan 14/11/2017 tarihli ve 2017-17/200 sayılı izin

ve tüm bireylerden yazılı aydınlatılmış onamları alındı. Çalışma ayrıca Helsinki Bildirgesine uygun şekilde yapıldı.

Ölçümler

Ultrasonografik Değerlendirme

Lumbopelvik motor kontrolden primer sorumlu olan mTrA ve mLM'nin kalınlıklarının belirlenmesi amacıyla Ahi Evran Üniversitesi Eğitim ve Araştırma Hastanesi Radyoloji Kliniğinde, Radyoloji Uzmanı tarafından yapılan ultrasonografik görüntüleme yöntemi kullanıldı. Ultrasonografik görüntüleme, kas kalınlıklarının belirlenmesinde sıklıkla kullanılan geçerli ve güvenilir bir yöntemdir (21). Kas kalınlıklarının ultrasonografik görüntülemesi için 4-11 Mhz ayarlanan lineer prob (Toshiba Aplio 500, Toshiba Medical Corporation, Nasu, Japonya) kullanıldı. Test öncesinde tüm bireylere, yüzeyel abdominal kaslarda herhangi bir aşırı hareket yapılmaksızın göbeğin yukarı ve içe doğru çekilmesini içeren abdominal hallowing manevrası fizyoterapist tarafından öğretildi. Bu manevra mTrA'yı aktive ederek diğer stabilizasyondan sorumlu kasların birlikte ko-kontraksiyonunu sağlar. Abdominal hallowing manevrasının öğretilmesinde, katılımcılardan her iki ellerinin işaret parmaklarını spina iliaka anterior superiorun 1 cm anteromedialine derin basınç ile yerleştirmeleri istendi. Hareketi yaptıklarında işaret parmaklarının altında tonus artışını hissetmeleri gerektiği belirtildi ve fizyoterapist tarafından hareketi doğru yapıp yapmadıkları teyit edildi. Hareketin başarılı bir şekilde yapılabilmesi için bireylerde başarma algısının geliştirilmesi gerekir. Bu amaçla, kasın temel anatomisi bir resimle örneklenerek bireylere anlatıldı. Yüzeyel kaslardaki aşırı hareketi elimine etmelerinde ayrıca stabilizer (Stabilizer Pressure Biofeedback-Chattanooga Stabilizer, Hixson, ABD) ile de yardımcı olundu. Bu şekilde bireyin gövde hareketi ile abdominal hallowing hareketi arasındaki farkı anlaması kolaylaştırıldı. Kontraksiyon sırasında tam performans için kişinin alt abdominal parçaya konsantre olması istendi. Bireylerin hareketi doğru bir şekilde yaptıkları anlaşıldığı andan itibaren ölçümleri alındı (22). Tüm bireylerin ölçümleri, aynı radyoloji uzmanı hekim tarafından yapıldı. mTrA kas kalınlığı için öncelikle abdominal duvarın anterolateral kısmındaki torasik kafesin alt açısının iliak krista üzerine iz düşümü işaretlendi ve bu iki nokta arasındaki hayali çizginin tam ortasına ultrason probu yerleştirildi. Kas kalınlığı, birey sırt üstü dizler 45° fleksiyonda yatarken mTrA aktivasyonunu sağlayan abdominal hallowing hareketini yaparken ölçüldü (Şekil 1-a). mLM kalınlığının belirlenmesi için ultrason probu lumbal 3. ve 4. vertebra seviyesine yerleştirildi. mLM kas kalınlığı, yüzüstü pozisyonda ve abdominal hallowing hareketi sırasında kasın anteroposterior çapı ölçülerek elde edildi (Şekil 1-b) (21,23).



Şekil 1: (a) M. Transversus Abdominus ve **(b)** M. Lumbar Multifidus Kalınlıklarının Değerlendirilmesi.

Postüral Denge Değerlendirmesi

Statik ve dinamik postüral dengenin objektif değerlendirilmesinde Biodex Denge Sistemi (Biodex 945-302, Biodex Medical Systems Inc., Shirley, New York, ABD) kullanıldı. Bu cihaz, mediolateral ve anteroposterior yönlerde serbest harekete izin veren geçerlik-güvenirlik çalışması yapılmış bir cihazdır (24,25). Sekiz farklı rezistans ile platformda dengede kalmak fizyoterapist tarafından zorlaştırılabilir. Biodex Denge Sisteminde skorların artması dengenin kötüleştiğini göstermektedir. Tüm bireylerin Biodex Denge Sistemi ölçümleri, Ahi Evran Üniversitesi Fizik Tedavi ve Rehabilitasyon Yüksekokulu'nda aynı fizyoterapist tarafından yapıldı. Statik postüral denge için bireylerde n, 20 saniye deneme süresinin ardından sirküler halkayı anteroposterior ve mediolateral yönde hareket ettirerek merkezde tutmaları istendi. Dinamik postüral dengenin değerlendirilmesinde sekiz seviyeli direncin (1: en az stabil ve 8: en stabil) ikinci seviyesi kullanıldı. 20 saniyelik test süresi sonunda hem statik hem de dinamik postüral denge için tüm bireylerin genel stabilite indeksi (GSİ), anteroposterior stabilite indeksi (APSİ) ve mediolateral stabilite indeksi (MLSİ) skorları kaydedildi.

Fiziksel Performansın Değerlendirmesi

Fiziksel performansın değerlendirilmesinde dikey sıçrama testi, yana adım alma testi ve mekik koşu testi olmak üzere üç farklı test kullanıldı. Dikey sıçrama testi ve yana adım alma testi Ahi Evran Üniversitesi Fizik Tedavi ve Rehabilitasyon Kliniklerinde, mekik koşu testi de yine Yüksekokul bünyesinde hazırlanan platformda, aynı fizyoterapist tarafından tüm bireylere uygulandı.

Dikey sıçrama testi bireylerin anaerobik kapasitelerinin değerlendirilmesinde kullanıldı. Bireylerden ilk olarak standart ayakta duruşta duvar kenarında yan dönerek ulaşabildikleri maksimum mesafeye uzanmaları istendi. Daha sonra bireylerin çift ayağı ile sıçrayarak ulaşabildikleri maksimum mesafe işaretlendi. Her iki ölçüm arasındaki mesafe metre cinsinden vücut ağırlığı da dahil edilerek Lewis Nomogramından kg-m/sn olarak güç hesaplandı (26).

Yana adım alma testi, lateral hareketlilik ve çevikliğin değerlendirilmesi için kullanıldı. Ayakta dururken bulundukları konum "1 numara" olarak belirlendi. "1 numara"dan 75 cm uzaklıkta sağ ve sol olmak üzere 2. ve 3. numaralar belirlendi. Fizyoterapistin başla komutu ile beraber bireylerden önce "2 numara"ya, ardından başlangıç konumu olan "1 numara"ya, sonrasında "3 numara"ya ve tekrar "1 numara"ya sıçramaları istendi. 2-1-3-1 numara şeklinde tamamlanan bir tur, bir tekrar sayısı olarak kabul edildi. 20 saniye içinde yapılan toplam tekrar sayısı bireylerin skorları olarak kaydedildi (27).

Mekik koşu testi aerobik kapasitede bireyin yön değiştirme hızının değerlendirilmesinde kullanıldı. Yere 20 metre ara ile çizilen paralel çizgiler ve tahta bloklar kullanıldı. Bireylerden birinci tahta bloğu alıp tekrar başlangıç noktasına dönmesi ve ikinci tahta bloğa doğru koşması istendi. İkinci tahta bloğu da alıp başlangıç noktasına dönünce test bitirildi. Skor saniye cinsinden kaydedildi (27).

İstatistiksel Analiz

Verilerin istatistiksel analizinde Statistical Package for the Social Sciences (SPSS V22.0 IBM SPSS, Inc. in Chicago, Illinois, ABD) paket programı kullanıldı. Verilerin normal dağılıma uyup uymadığına Shapiro Wilk Testi ile karar verildi. Tanımlayıcı istatistikler normal dağılıma uyan veriler için ortalama±standart sapma olarak, normal dağılıma uymayan veriler için ortanca ve IQR (75 Persentil-25 Persentil, Çeyrekler Arası Aralık) olarak, kategorik veriler için de yüzde (%) değeri olarak hesaplandı. mTrA ve mLM'nin kas kalınlıkları ile postüral denge ve fiziksel performans testleri arasındaki ilişkinin değerlendirilmesinde Spearman Korelasyon Analizi kullanıldı. Yanılma olasılığı değeri $p<0,05$ olarak kabul edildi.

SONUÇLAR

Çalışmamız, dahil edilme kriterlerini sağlayan sağ tarafı dominant, yaşları ortalama 21,89±1,21 yıl olan, 26 kadın (% 40,62) ve 38 erkek (% 59,38) olmak üzere toplam 64 sağlıklı genç yetişkin bireyin katılımı ile gerçekleştirildi. Bireylerin demografik özelliklerine ait bulgular Tablo 1'de gösterilmiştir.

Sağ ve sol taraf mTrA kas kalınlığı ile statik GSİ ($p=0,041$, $p=0,032$) ve dinamik APSİ arasında ($p=0,043$ ve $p=0,041$), sağ taraf mTrA kas kalınlığı ile statik APSİ ve dinamik GSİ arasında ($p=0,040$ ve $p=0,040$) istatistiksel olarak anlamlı ilişki bulundu. Hem sağ hem de sol taraf mLM kas kalınlığı ile dinamik GSİ ($p=0,011$, $p=0,003$) ve APSİ arasında ($p=0,028$ ve $p=0,008$), sol taraf mLM kas kalınlığı ile statik GSİ arasında ($p=0,032$) istatistiksel olarak anlamlı ilişki saptandı. Biodex Denge Sisteminde skor arttıkça dengenin bozulması, mTrA ve mLM kas kalınlıkları azaldıkça postüral dengenin olumsuz

Tablo 1: Bireylerin Özellikleri.

Değişken	$\bar{X}$±SS	Minimum-Maksimum
Yaş (yıl)	21,89±1,21	18-25
Cinsiyet (E/K)	38/26	-
Boy (cm)	166,67±9,60	158-192
Vücut Ağırlığı (kg)	62,84±13,53	47-93
Vücut Kütle İndeksi (kg/m²)	22,64±3,18	18,6-24,7

Tablo 2: M. Transversus Abdominus ve M. Lumbar Multifidus Kas Kalınlıkları ile Postüral Denge Arasındaki İlişki.

Denge	mTrA (mm)				mLM (mm)			
	Sağ		Sol		Sağ		Sol	
	r_s	p	r_s	p	r_s	p	r_s	p
Statik								
GSİ	-0,252	**0,041***	-0,264	**0,032***	-0,220	0,071	-0,271	**0,032***
APSİ	-0,254	**0,040***	-0,201	0,113	-0,051	0,672	-0,063	0,631
MLSİ	-0,022	0,822	-0,034	0,765	-0,083	0,512	-0,072	0,531
Dinamik								
GSİ	-0,254	**0,040***	-0,192	0,132	-0,308	**0,011***	-0,362	**0,003***
APSİ	-0,251	**0,043***	-0,252	**0,041***	-0,281	**0,028***	-0,322	**0,008***
MLSİ	-0,196	0,135	-0,183	0,156	-0,184	0,147	-0,231	0,061

*p<0,05. r_s: Spearman Korelasyon Analizi. GSİ: Genel Stabilite İndeksi, APSİ: Anteroposterior Stabilite İndeksi, MLSİ: Mediolateral Stabilite İndeksi, mTrA: M. Transversus Abdominus, mLM: M. Lumbar Multifidus.

etkilediğini gösterdi. mTrA ve mLM kas kalınlıkları ile postüral denge arasındaki ilişki Tablo 2'de gösterilmiştir.

Lumbopelvik kontrolden primer sorumlu olan kaslar mTrA ve mLM'nin kas kalınlıkları ile fiziksel performans testleri arasında bazı parametreler açısından istatistiksel olarak anlamlı ilişki bulundu (p<0,05) (Tablo 3). Sağ ve sol taraf mTrA kas kalınlığı ile yana adım alma testi arasında pozitif kuvvetli, istatistiksel olarak anlamlı ilişki olduğu belirlendi (p=0,001 ve p=0,001). Sağ ve sol taraf mLM kas kalınlığı ile yana adım alma testi arasında pozitif çok kuvvetli (p=0,001 ve p=0,001) ve mekik koşu testi ile de negatif orta kuvvette (p=0,013 ve p=0,011) istatistiksel olarak anlamlı ilişki bulundu. mTrA ve mLM kalınlıkları azaldıkça fiziksel performansın düştüğü görüldü. mTrA ve mLM kas kalınlıkları ile fiziksel performans testleri arasındaki ilişki Tablo 3'te gösterilmiştir.

TARTIŞMA

Çalışmamızın sonuçlarına göre, lumbopelvik stabiliteden primer sorumlu olan mTrA ve mLM kalınlıkların azalması, bireylerin postüral denge ve fiziksel performanslarındaki azalma ile ilişkilidir. Bu durum, postüral dengenin sağlanması ve sürdürülmesinde; fiziksel performansın minimum eforla optimum seviyede tutulabilmesinde, lumbopelvik stabilitenin önemli bir değişken olabileceğini ortaya koydu. Çalışmamız, postüral denge ve fiziksel performans ile lumbopelvik motor kontrol arasındaki ilişkiyi değerlendirmek için mTrA ve mLM'nin kas kalınlığını ultrasonografik görüntüleme ile değerlendiren ilk çalışmadır. Bu nedenle sonuçlarımızın önemli olduğunu ve literatüre yenilik getirdiğini düşünmekteyiz.

Yapılan çalışmalar derin grup kasların, lumbopelvik bölge stabilizasyonunun sağlanmasında, yer çekimine karşı koyularak minimum eforla dengenin sürdürülmesinde ve ekstremite hareketleri sıra-

Tablo 3: M. Transversus Abdominus ve M. Lumbar Multifidus Kas Kalınlıkları ile Fiziksel Performans Testleri Arasındaki İlişki.

Fiziksel Performans Testleri	mTrA (mm)				mLM (mm)			
	Sağ		Sol		Sağ		Sol	
	r_s	p	r_s	p	r_s	p	r_s	p
Dikey Sıçrama Testi	0,071	0,532	0,043	0,742	0,051	0,664	0,006	0,960
Yana Adım Alma Testi	0,832	**0,001***	0,793	**0,001***	0,892	**0,001***	0,881	**0,001***
Mekik Koşu Testi	-0,091	0,451	-0,102	0,401	-0,302	**0,013***	-0,312	**0,011***

*p<0,05. r_s: Spearman Korelasyon Analizi. mTrA: M. Transversus Abdominus, mLM: M. Lumbar Multifidus, Spearman Korelasyon Analizi.

sında binen yüklerin karşılanabilmesinde mTrA ve mLM'nin etkinliğini ortaya koymuştur (28-30). Bu kaslarda meydana gelen herhangi bir zayıflık, aktivite sırasında hareketlerin kontrollü ve dengeli bir şekilde yapılabilmesini engeller. Bu durum sonucunda birey, yaralanmalara açık bir hale gelir. Willson ve ark. (13), yapmış oldukları çalışmada lumbopelvik stabilizasyon ile alt ekstremite fonksiyonları ve yaralanma riskleri arasındaki ilişkiyi incelemişlerdir. Lumbopelvik stabilizasyonun pertürbasyon sonrası tekrar denge durumuna dönebilmede önemli olduğunu, lumbopelvik kontrolü zayıf bireylerde dengenin ve postüral kontrolün kötüleştiğini ve bu durumun alt ekstremite yaralanma riskini artırdığını ortaya koymuşlardır. Destek yüzeyinin hızlı bir şekilde değiştiği beklenmedik durumlarda lumbopelvik hareket, postürün korunması için önemlidir. Mok ve Hodges (16), kronik bel ağrılı hastalarda postüral denge kötüleşmesinin azalmış lumbopelvik stabilite ile açıklanabileceğini; lumbopelvik kontrolün zayıfladığı veya geciktiği durumlarda, şiddetli pertürbasyonların önlenmesinde yetersiz kalındığını; çok küçük amplitüdlü lumpopelvik hareketin bile dengenin sağlanmasında önem taşıdığını ifade etmişlerdir. Kim ve ark. (15) ise, lumbal bölgeye an az yük bindiren nötral pozisyonun korunarak minimal eforla dengeli bir şekilde postürü devam ettirmek için, kuvvetli bir lumbopelvik bileşke kontrolüne ihtiyaç olduğunu ortaya koymuşlardır. Çalışmamızda, mTrA ve mLM kas kalınlıkları azaldıkça statik ve dinamik değişkenler açısından, özellikle GSİ ve APSİ skorlarında artışlar, yani dengede kötüleşmeler saptandı. Sonuçlarımız, azalmış lumbopelvik kontrolün dengedeki kötüleşme ile ilişkili olduğu yönündeki çalışmaları desteklemektedir.

Lumbopelvik motor kontrol, stabilizasyonu sağlamanın yanı sıra, alt ekstremiteler için hareketlerin kontrollü ve etkili bir şekilde yapılabilmesine de olanak sağlamaktadır. Lumbopelvik stabilitedeki azalma bireylerde yorgunluğa, enduransta azalmaya ve yaralanmalara sebep olarak fiziksel performansı etkileyebilmektedir (17). Lumbopelvik kontrolün fiziksel performansa etkisi ile ilgili çalışmalar çok az sayıdadır. Cantarero-Villanveva ve ark. (18), kolon kanseri olan bireylerde sekiz haftalık lumbopelvik stabilizasyon eğitiminin bireylerde fiziksel uygunluğu artırdığını ifade etmişlerdir. Weston ve ark. (19), milli yüzücülerde izole gövde stabilizasyon eğitiminin, fiziksel performansa etkisini incelemişlerdir. 12 haftalık izole gövde stabilizasyon eğitiminin yüzücülerin fiziksel performansını artırdığını ortaya koymuşlardır. Saeterbakken ve ark. (20) da altı farklı kapalı kinetik zincir egzersizi ile planlamış oldukları gövde stabilizasyon eğitiminin hentbolcularda topu fırlatma hızını artırdığını ifade etmişlerdir. Çalışmamızın sonuçlarına göre mTrA ve mLM kas kalınlıklarındaki azalmalar, bireylerin yana adım alma testi ve mekik koşu testi performanslarındaki kötüleşmeler ile ilişkiliydi. Sonuçlarımız literatür ile uyumlu olmasının yanında literatüre objektif bir perspektif kattı.

Çalışmamız sonuçlarına göre, mTrA ve mLM kas kalınlıklarındaki azalmalar, bireylerin postüral dengelerindeki bozulmaları ve fiziksel performanslarındaki düşüşleri ile ilişkiliydi. Lumbopelvik stabilitenin sağlanmasında önemli role sahip olan bu kasların postüral denge değişkenlerinden özellikle GSİ ve APSİ ile, fiziksel performans değişkenlerinden de özellikle lateral hareketlilik ve yön değiştirme hızı ile ilişkili olduğu görüldü. Lumbopelvik kontrol, postüral denge ve fiziksel performansı etkileyen çeşitli sistemik ve lokomotor hastalıkların rehabilitasyonu için temel teşkil edebileceğinden çalışma sonuçlarımızın önemli olduğu düşünülmektedir. Daha hızlı ve etkin bir tedavi programı oluşturmak için lumbopelvik stabilite ile ilgili kapsamlı bir muayenenin, değerlendirme programına eklenmesi önerilmektedir.

Bu çalışmanın bazı limitasyonları vardır. Birincisi, çalışmaya dahil edilen bireylerin yaşları, daha geniş değer aralığında tutulup dekatlar halinde bölünmüş olsaydı, yaşa bağlı olarak değişen sonuçların lumbopelvik motor kontrol ile ilişkisi daha etkin olarak ortaya koyulabilirdi. İkincisi, cinsiyete bağlı olarak oluşabilecek farkları da ortaya koymak adına kadın ve erkek cinsiyette ayrı çalışmalar veya karşılaştırmalar yapılabilirdi. İlerideki çalışmaların planlanmasında, bu limitasyonların akılda tutulması gerektiği düşünülmektedir.

Sonuç olarak, lumbopelvik stabilitede mTrA ve mLM kalınlıklarında azalma ile postural denge ve fiziksel performanstaki azalma ilişkilidir. Lumbopelvik instabilitede ultrasonik kas kalınlığı ölçümleri klinik değerlendirmede yön göstergesi olabilir.

Destekleyen Kuruluş: Yok.

Çıkar Çatışması: Yok.

Etik Onay: Kırşehir Ahi Evran Üniversitesi Girişimsel Olmayan Klinik Araştırmalar Etik Kurulu'ndan 14/11/2017 tarihli ve 2017-17/200 sayılı izin alındı.

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Açıklamalar: Araştırma Ahi Evran Üniversitesi, Fizik Tedavi ve Rehabilitasyon Yüksekokulu ve Ahi Evran Üniversitesi, Eğitim ve Araştırma Hastanesi, Radyoloji Kliniği'nde yapılmıştır.

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THE TURKISH VERSION OF THE CARER'S ASSESSMENT OF SATISFACTION INDEX (CASI-TR): ITS VALIDATION AND RELIABILITY

ORIGINAL ARTICLE

ABSTRACT

Purpose: Caregivers of patients with chronic diseases could experience positive as well as negative feelings as a result of caregiving. Although there are assessment tools in the literature that are used to measure the satisfaction received from caregiving, which is one of the positive feelings experienced by caregivers, there was no tool that assessed caregiver satisfaction in Turkey. This study aimed to evaluate the reliability and validity of the Turkish version of the Carer's Assessment of Satisfaction Index (CASI).

Methods: The sample included 300 caregivers. Data were collected using a demographic questionnaire and the CASI. The Cronbach's alpha value was calculated and a corrected item-total correlation and a test-retest reliability analysis were performed for reliability. Descriptive factor analyses were used to evaluate the construct validity. The forward and back-translation method was used for the linguistic validity. The retest was performed with 60 caregiving individuals.

Results: The caregivers' mean age was 49.23±13.71 years, and 76.7% were females. Their duration of caregiving was 51.99±6.33 months. The Cronbach's alpha value calculated for the CASI was 0.949. Factor analysis revealed that three factors accounted for 57.67% of the total variance, with an Eigenvalue above 1.

Conclusion: The Turkish version of CASI is found to be reliable and valid for assessing caregiver satisfaction. We find the CASI to be a useful tool that could be utilized readily by all healthcare personnel to assess caregiver satisfaction.

Key Words: Caregiver; Reliability; Satisfaction; Validity.

BAKIM VERENLERİN MEMNUNİYETİ DEĞERLENDİRME İNDEKSİ'NİN TÜRKÇE VERSİYONUNUN: GEÇERLİK VE GÜVENİRLİĞİ

ARAŞTIRMA MAKALESİ

ÖZ

Amaç: Kronik hastalığa sahip bireye bakım veren bireyler, bakım vermeleri nedeni ile olumsuz duyguların yanı sıra olumlu duygular da yaşayabilmektedir. Literatürde bakım verenlerin yaşadığı olumlu duygulardan biri olan bakım vermeden alınan doyumu ölçmek amacıyla kullanılan ölçüm araçları olmasına rağmen, ülkemizde bakım verenlerin memnuniyetini değerlendiren bir ölçüm aracına rastlanmadı. Bu çalışmanın amacı Bakım Verenlerin Memnuniyeti Değerlendirme İndeksi'nin (BMDİ) ülkemiz için geçerlik ve güvenirliğinin değerlendirilmesiydi.

Yöntem: Bu çalışma 300 bakım veren birey ile yürütüldü. Araştırmanın verileri, veri toplama formu ve BMDİ kullanılarak toplandı. Güvenirlik analizleri için Cronbach alfa değeri hesaplandı ve düzeltilmiş madde-toplam korelasyon ve test-tekrar test güvenirlik analizi yapıldı. Yapı geçerliğini değerlendirmek için tanımlayıcı faktör analizi yapıldı. Dil geçerliği için ileri ve geri çeviri yöntemi kullanıldı. Tekrar test 60 bakım veren birey ile yapıldı.

Sonuçlar: Bakım veren bireylerin yaş ortalamasının 49,23±13,71 yıl ve % 76,7'sinin kadın olduğu belirlendi. Bakım verenlerin bakım verme süresinin 51,99±6,33 ay olduğu saptandı. BMDİ için hesaplanan iç tutarlılık kat sayısı (Cronbach alfa) 0,949'du. Faktör analizi sonuçları BMDİ için Öz Değeri 1'in üzerinde olan toplam varyansın % 57,67'sini açıklayan üç alt boyut ortaya koydu.

Tartışma: BMDİ Türkçe versiyonu bakım verenlerin doyumunu değerlendirmede geçerli ve güvenilir bulunmuştur. Tüm sağlık personelinin bakım verenlerde memnuniyeti değerlendirebilmeleri açısından faydalı bir araç olduğu ve kolaylıkla kullanılabileceği düşünülmektedir.

Anahtar Kelimeler: Bakım Veren; Güvenirlik; Geçerlik; Memnuniyet.

INTRODUCTION

Chronic diseases have an increasing prevalence throughout the world due to the extended life expectancy. With this increase, the care of patients with chronic diseases is emerging as a problem, based on the duration of such diseases and the severity of symptoms, since this group's needs for care do not lessen over time. On the contrary, their needs generally continue and often increase. As a result, caregivers must adapt to new roles in order to meet those needs, and they may be affected by the care they provide, depending on its duration and the increased needs of those for whom they care (1,2).

Most of the studies in the literature on caregivers focus on the negative aspects of caregiving, such as the caregiving burden (1,2), depression (3,4), anxiety (5), a decrease in quality of life (4), and physical health impairments (6). However, some studies emphasize that caregiving may also have positive effects on caregivers (7,8). Hanyok et al. found that caregiving had both positive and negative aspects and that caregivers may experience positive and negative effects at the same time (9). The literature also reported that the positive effects on caregivers include a feeling of satisfaction, personal development, gaining caregiving experience, being able to use their experience, and a decrease in stress and depressive symptoms (10,11). Cohen et al. found that the majority of caregivers (73%) could identify at least one specific positive aspect of caregiving (12). Balducci et al. and McKee et al. reported that a good relationship between caregivers and care recipients affected caregivers in a positive manner (7,13). The literature also reported that having no negativity in the caregiving process affected caregiver satisfaction (14). Moreover, caregivers' satisfaction from the caregiving experience increased in cases where there was a good relationship between the caregiver and the care recipient, and when the caregiver volunteered for caregiving, had spare time, managed to control his/her feelings, or did not have wage-earning employment (14). Kuuppelomäki et al. found that the sources of satisfaction among caregivers were mainly related to care recipients: caregivers derived the most satisfaction from seeing that they could keep the care recipient clean and comfortable and that their care ensured good outcomes (10).

In the literature, caregiver satisfaction is measured by tools such as the Care Work Satisfaction Scale (15), the Carer Satisfaction Scale (16), and the Carer's Assessment of Satisfaction Index (CASI) (17). As such, while there are standard measurement tools for determining caregivers' care-related stress and burden in Turkey, there is, at present, no tool for assessing the positive effects of caregiving. In fact, we did not find any study that assessed the positive effects of caregiving on the caregiver. However, various studies in Turkey examined variables such as the caregiver's quality of life, life satisfaction, care burden, stress, depression, and anxiety. One study that assessed caregiver satisfaction found that this varied depending on the country and culture of the caregiver (13). Therefore, our study aimed to test the validity and reliability of the Turkish version of the CASI, which assesses caregivers from many perspectives, is not specific to any disease, is short and understandable, and is valid and reliable for many countries.

METHODS

This study was aimed to test the validity and reliability of the Turkish version of the CASI. The study was conducted between June 2016 and September 2017 at Aksaray University Training and Research Hospital with the caregiving family members of inpatients with chronic diseases. For calculating the study sample, "item number: observation number ratios" were used to calculate the sample range, which is used in studies for developing scales. For this study, the sample size was calculated as at least 10 individuals for each item (item number 30x10=300) (18). The study sample included 300 caregiving family members who had provided the primary care for at least three months to a patient (who had at least one chronic disease and received inpatient treatment in general internal medicine and palliative care units). We identified a caregiving duration of a minimum of three months, considering that it is essential to have caregivers who are experienced enough to express both the positive and negative feelings they experienced (19). The caregivers who consented to

participate in the study were 18 years old and older and had no communicative difficulties or mental deficiencies. Caregivers who had any mental or psychological diagnoses were not included in our study. We did not assess the caregivers' cognitive and psychological states with any measurement tools. Participants' verbal statements were taken as the basis for assessment. To evaluate test-retest reliability, the CASI was re-administered to 60 caregivers to patients who continued to be hospitalized in wards two weeks after the first application.

In order to test the Turkish adaption of the CASI, we first received approval from the authors who developed the index. We conducted the study in compliance with the principles of the Helsinki Declaration. Written approvals were received from the Aksaray University Human Studies Ethics Council (2016/13) and the institution where the study was conducted. Written informed consent was obtained from all study participants.

The study used an introductory information form that included 25 questions in line with the literature. There were seven questions on patients' sociodemographic and medical information (age, gender, education, marital status, chronic diseases, regular medications, existing problems); 10 questions on caregivers' sociodemographic and medical information (age, gender, education, marital status, whether having children, employment, diseases, and medications); and eight questions on caregiving conditions (affinity to the patient, caregiving duration, caregiving period in a day, caregiving location, tasks included in caregiving, presence of assisting people in caregiving, difficulties within the family due to caregiving, and whether caregiving affects daily life).

We collected the data through individual, face-to-face interviews with the caregivers who met the study criteria. Interviews took place in wards and took 10-15 minutes. We did not encounter any problems during the data collection.

Carer's Assessment of Satisfaction Index

The CASI was developed by Nolan and Grant, and is used for assessing caregiver satisfaction (20). It comprises three subscales and 30 questions, as follows: 12 questions assessing caregiver satisfaction related to the care recipient (2, 4, 5, 8, 9, 12, 13, 18, 19, 20, 22, and 24); 14 questions assessing caregiver satisfaction related to the caregiver himself or herself (1, 6, 7, 10, 11, 14, 15, 16, 23, 25, 26, 27, 28, and 30), and four questions assessing the dynamics of interpersonal relations (3, 17, 21, and 29). The replies to the questions are indicated by a three-point Likert-type scale, as follows: "This does not apply in my situation or no satisfaction (0)", "quite a lot of satisfaction (1)," and "a great deal of satisfaction (2)". Index scores are summarized in percentages, and there is no information on cut-off points (10,17). The responses to each item are added together to find the total scale score. There was no cut-point in score interpretation, and a higher total score indicates higher caregiver satisfaction (10,21).

The back-translation method was used for the linguistic validity of the CASI (22). Six experts conducted the Turkish translation of the CASI. Two experts were English philologists, and four were academicians in nursing science. The authors developed a single Turkish text using the translations provided by the experts. The text was translated back into English, and then an expert who was a native speaker of English compared it to the original text and assessed whether there was a semantic shift in statements. Opinions were received from 10 experts in the field in order to assess the final text's lucidity. We reviewed the 10 experts' suggestions, made the necessary correction in the index, and finalized the scale. As a preliminary application to assess its surface validity, the index was administered to 20 caregivers who provided their opinions on its lucidity. The caregivers included in this preliminary application were excluded from the study sample.

After applying the CASI-TR to the large sample group, the resulting data were analyzed to assess its validity and reliability.

Statistical Analysis

The outcomes were expressed as numbers and percentages for the numerical variables, and as mean±standard deviation (SD) for the measurement variables. The Cronbach's alpha value was calculated and a corrected item-total correlation, test-retest

Table 1: Descriptive Characteristics of Caregivers.

Characteristics	n	%
Sex		
Female	230	76.7
Male	70	23.3
Age		
≤65 years	268	89.3
≥66 years	32	10.7
Education		
Illiterate	60	20.0
Literate	26	8.6
Primary School	131	43.7
Secondary School and over	83	27.7
Marital Status		
Married	261	87.0
Single	39	13.0
Employment Status		
Employed Full-Time/Part-Time	42	14.0
Never Worked	258	86.0
Perceived Economic Condition (Self-assessment)		
Income and expenses are in balance	181	60.3
Income and expenses are not in balance	119	39.7
Chronic disease		
Yes	144	48.0
No	156	52.0
Relationship with Care Receiver		
Husband / Wife	95	31.7
Daughter / Son	140	46.7
Mother / Father	2	0.6
Daughter in Law	37	12.3
Others	26	8.7
Place of Care		
Patient's House	229	76.3
Home of Caregiver	71	23.7
Duration of Caregiving (months)		
3-12	109	36.3
13-48	95	31.7
>49	96	32.0
Caregiving Tasks*		
Patient's Personal Hygiene	274	91.3
Patient's Feeding	247	82.3
Help for Activity	212	70.7
Help for Elimination	148	49.3
Administering Medications	222	74.0
Help with Finances	164	54.7
Another Helper for Patient Care		
Yes	164	54.7
No	136	45.3
Strain in Care		
Yes	165	55.0
No	135	45.0
Influencing Daily Life		
Yes	181	60.3
No	119	39.7

* Individuals responded more than once.

reliability analysis performed for the reliability analyses. The Intraclass Correlation Coefficient (ICC) was calculated for test-retest reliability. Descriptive factor analyses were used to evaluate the construct validity. Mann-Whitney u Test and Kruskal Wallis Test were performed to compare caregivers' sociodemographic features and CASI-TR score. The SPSS package program for Windows

Ver. 15.00 (SPSS Inc. Chicago, IL, USA) was used in the statistical analysis of the data. A p value of <0.05 was considered statistically significant.

RESULTS

Table 1 indicates the sociodemographic features of the caregivers who participated in the study. Of those caregivers, 76.7% were females, 86.3% were 65 years old, or younger, 43.7% were primary school graduates, 87% were married, 86% were not working, 66.3% were housewives, and 60.3% defined their income status as having an income covering one's expenses. Almost half (48%) of caregivers had no chronic diseases, and the most common diseases among caregivers were hypertension (n=80), diabetes mellitus (n=57), and heart failure (n=17). Among them, 46.7% provided care for their children, and 76.3% provided the care at the patient's home. Caregivers' duration of caregiving was 51.99±6.33 (min=3, max=312) months.

The care provided by the majority of caregivers included assistance with personal hygiene, meals, and mobility. Of the caregivers, 54.7% reported that at least one person assisted with the caregiving; 55% reported having difficulty with some aspects of caregiving; and 60.3% reported that caregiving affected their daily lives.

Regarding the care recipients, the mean age was 71.38±1.37 years, 56.7% were females, 51.3% were illiterate, and 72.3% were married. The most common diseases among care recipients were hypertension (n=177), diabetes mellitus (n=124), heart failure (n=112), chronic obstructive pulmonary disease (n=83), and stroke (n=55). Care recipients often experienced problems, and thereby a need for assistance, with mobility, sleep, balance, eating, and urinary incontinence.

Reliability of the CASI-TR

The internal consistency (Cronbach's alpha) value was calculated for all index items and subscales for reliability analysis. The internal consistency coefficient calculated for CASI-TR (Cronbach's alpha) was α=0.949. Internal consistency coefficients calculated for the subscales were α=0.922 for the subscale "caregiver satisfaction related to care recipient," α=0.875 for the subscale "caregiver satisfaction related to themselves," and α=0.723 for the subscale "dynamics of interpersonal relations."

According to the correlation analysis of the total item scores, no item increased the internal consistency coefficient of the scale when excluded from the index. Correlation coefficients between the item scores and total score were between 0.382 and 0.809 (Table 2). Our study calculated the ICC value to assess CASI's test-retest reliability. In this study, the total CASI-TR score for the first application was 82.76±8.88, and the retest score was 82.54±9.30. The ICC calculated for test-retest reliability was ICC=0.742.

The Validity of the CASI-TR

According to the factor analysis performed to assess construct validity, there were three subscales, for which the Eigenvalues were above 1, similar to the original scale, and which accounted for 57.67% of the total variance. However, subscales including several items were different in our outcomes. When the items in subscales were assessed regarding meaning, we saw that the items came together meaningfully. The factor load of the items was between 0.311 and 0.874. The naming of subscales was consistent with the original scale. The first subscale, "caregiver satisfaction related to care recipient," had 11 items (items 2, 4, 5, 8, 9, 10, 11, 12, 13, 14, and 16). The second subscale, "caregiver satisfaction related to themselves," had 12 items (items 3, 17, 18, 19, 20, 21, 22, 24, 25, 26, 28, 29, and 30). The third subscale, "dynamics of interpersonal relations," had six items (items 1, 6, 7, 15, 23, and 27) (Table 3).

Table 4 indicates the distribution of the replies to the items on the CASI-TR. The items with the highest levels of satisfaction were as follows: "It's nice when something I do gives the person I care for pleasure" (93.1%), "It's nice to see the person I care for clean, comfortable, and well turned out" (93%), "It's nice to feel appreciated by those family and friends I value" (92.9%), "Caring is one way of expressing my love for the person I care for" (92.6%), and "I get pleasure from seeing the person I care for happy" (92.2%).

Our study found that the mean total score of the

Table 2: The Results of the Item Analysis.

Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Caring has allowed me to develop new skills and abilities.	82.164	68.138	0.618	0.948
The person I care for is appreciative of what I do	82.128	67.580	0.706	0.947
Caring has brought me closer to the person I care for.	82.128	67.552	0.710	0.947
It's good to use small improvements in the person I care for.	82.071	67.851	0.785	0.946
I am able to help the person I care for reach their full potential.	82.100	67.127	0.809	0.946
I am able to repay the kindness of the person I care for.	82.300	67.938	0.496	0.949
Caring provides a challenging and stimulating job.	82.221	66.634	0.703	0.947
Despite all the problems, the person I care for doesn't grumble or moan.	82.357	67.613	0.497	0.950
It's nice to see the person I care for clean, comfortable and well turned out.	82.085	67.575	0.767	0.946
Caring has enabled me to fulfil my sense of duty.	82.064	68.276	0.771	0.946
I'm the sort of person who enjoys helping people.	82.085	68.899	0.629	0.947
I get pleasure from seeing the person I care for happy.	82.078	68.620	0.723	0.947
Knowing the person I care for the way I do means I can give better care than anyone else.	82.178	67.759	0.634	0.947
It helps to stop me from feeling guilty.	82.150	67.740	0.640	0.947
Caring has made me a better, less selfish person.	82.250	67.829	0.499	0.949
It's nice to feel appreciated by those family and friends I value.	82.042	69.106	0.727	0.947
Caring has strengthened close family ties and relationships.	82.142	67.922	0.645	0.947
It's good to help the person I care for overcome difficulties and problems.	82.071	68.801	0.708	0.947
It's nice when something I do gives the person I care for pleasure.	82.071	68.700	0.686	0.947
I am able to keep the person I care for out of an institution.	82.100	69.026	0.562	0.948
I feel that if the situation were reversed the person I care for would do the same for me.	82.200	68.650	0.493	0.949
I am able to ensure the person I care for is well fed and their needs tended to.	82.085	68.784	0.647	0.947
Caring has given me the chance to widen my interest and contacts.	82.178	68.594	0.469	0.949
Maintaining the dignity of the person I care for is important to me.	82.057	69.234	0.712	0.947
I am able to test myself out and overcome difficulties.	82.071	69.275	0.667	0.947
Caring is one way of showing my faith.	82.021	70.021	0.673	0.948
Caring has provided a purpose in life that I didn't have before.	82.157	69.270	0.442	0.949
At the end of the day I know I'll have done the best I could.	82.100	70.019	0.401	0.949
Caring is one way of expressing my love for the person I care for.	82.021	70.021	0.673	0.948
Caring makes me feel needed and wanted.	82.071	70.455	0.382	0.949

CASI-TR was 80.89±11.16 (min=17, max=90). While not indicated in the table, a comparison of caregivers' sociodemographic features and their CASI-TR scores indicated that caregivers' CASI-TR scores had a statistically significant difference only for education and caregiving difficulty ($p<0.05$), and there was no statistically significant difference according to other factors ($p>0.05$). Those with educational status of being literate only ($p<0.05$) and those who expressed having no difficulty in caregiving ($p=0.027$) had significantly higher CASI-TR scores compared to others.

DISCUSSION

In this study, we tested the validity and reliability of the CASI-TR, which is a measurement tool that can be used for assessing the positive aspects of caregiving for caregivers in Turkey. The findings of this study indicated that the CASI-TR is a valid and reliable assessment tool evaluate caregiver satisfaction in Turkey.

Based on factor analysis, this study revealed three subscales, for which the Eigenvalues were above 1, similar to the original scale, and that accounted for 57.67% of the total variance. The naming of subscales was consistent with the original scale. Similar to the outcome of the study, Kuuppelomäki et al. found three subscales in the factor analysis that aimed to identify the sources of satisfaction for caregivers in Finland (10). Different from the three-factor construct of the CASI, Ekwall and Hallberg reported a five-factor construct that accounted for 62% of the total variance, and McKee et al. reported a five-factor construct that accounted for 61.4% of the total variance (23,24). While the number of factors in this study was similar to the original CASI, the distribution of items under factors differed. However, the items forming subscales came together in a significant manner. This difference in the CASI-TR subscale items can be associated with health service delivery, social support systems, cultural and religious differences, and economic differences (25).

In this study, the ICC calculated for test-retest reliability was 0.742, indicating the CASI-TR's consistency over time (26). The responses received for the first and the second applications of CASI-TR were similar, which indicated that it is a reliable assessment tool.

The confirmatory factor analysis, which is used to test the relationship between factors, whether the factors are independent of each other, and whether they explain the scale sufficiently (27), suggests that the factor load of the items is 0.30 and above (28). In our study, the results of confirmatory factor analysis indicated that the factor loads (0.311-0.874) were similar to those for the studies of Ekwall and Hallberg (0.33-0.82) and McKee et al. (0.34-0.84), and had a reasonable level of CASI-TR compliance (23,24). We calculated the Cronbach's alpha reliability coefficient in order to test whether the items were consistent with one another and to what extent the CASI-TR measured the intended feature. For internal consistency assessment, the Cronbach's alpha reliability coefficient should be at least $\alpha=0.70$ (29). In our study, the Cronbach's alpha value calculated for all items of the CASI-TR was $\alpha=0.94$. Cronbach's alpha values varied $\alpha=0.72$-0.92 for the subscales. In the study by Kuuppelomäki et al., the internal consistency coefficient was $\alpha=0.94$ for all CASI items and $\alpha=0.75$-0.88 for the subscales (10). Similarly, in the study by Ekwall and Hallberg, Cronbach's alpha value was 0.81 for all CASI items and $\alpha=0.76$-$\alpha=0.83$ for the subscales (23). The results of our study were similar to the results of other studies, and indicated that the CASI-TR is a reliable measurement tool for assessing caregiver satisfaction for the sample in this study.

The item-total correlation analysis, which is another method used for testing the reliability of a measurement tool, is one of the methods used for identifying whether the scale items measure a particular feature (30). Our study found that the correlation coefficients between item scores and total score were between 0.382 and 0.809. The literature reports that items with a total correlation value of 0.40 and above are very distinct, those with a value between 0.30 and 0.40 are good, and those with a value between 0.20 and 0.30 require correction (31). The results of our study concerning item-total scores indicated that the items in the CASI-TR were adequate and sufficient for assessing caregiver satisfaction.

The literature reports that caregiving may have not only harmful but also positive effects on

Table 3: Result of Exploratory Factor Analysis Showing the Internal Structure of Carer's Assessment of Satisfaction Index (CASI-TR).

Items	Factor 1	Factor 2	Factor 3
Item 2	0.486		
Item 4	0.544		
Item 5	0.774		
Item 8	0.448		
Item 9	0.731		
Item 10	0.783		
Item 11	0.856		
Item 12	0.874		
Item 13	0.602		
Item 14	0.724		
Item 16	0.568		
Item 3		0.584	
Item 17		0.689	
Item 18		0.719	
Item 19		0.599	
Item 20		0.746	
Item 21		0.494	
Item 22		0.608	
Item 23		0.588	
Item 25		0.594	
Item 26		0.714	
Item 28		0.509	
Item 29		0.539	
Item 30		0.369	
Item 1			0.311
Item 6			0.328
Item 7			0.469
Item 15			0.660
Item 23			0.779
Item 27			0.714
Eigenvalue	13.498	2.266	1.538
Percentage of Variance Explained (%)	44.995	7.555	5.128
Accumulative Percentage of Variance Explained (%)	44.995	52.548	57.676
Cronbach's Alpha	0.922	0.875	0.723

Table 4: Distribution of Responses to Carer's Assessment of Satisfaction Index (CASI-TR).

Items	This does not tend to apply in my situation	This applies to me		
	n (%)	0: No Real Satisfaction n (%)	1: Quite a Lot of Satisfaction n (%)	2: A Great Deal of Satisfaction n (%)
Caring has allowed me to develop new skills and abilities.	20 (6.7)	8 (2.9)	28 (10.0)	244 (87.1)
The person I care for is appreciative of what I do	45 (15.0)	15 (5.9)	23 (9.0)	217 (85.1)
Caring has brought me closer to the person I care for.	16 (5.3)	12 (4.2)	23 (8.1)	249 (87.7)
It's good to use small improvements in the person I care for.	4 (1.3)	10 (3.4)	14 (4.7)	272 (91.9)
I am able to help the person I care for reach their full potential.	8 (2.7)	7 (2.4)	24 (8.2)	261 (89.4)
I am able to repay the kindness of the person I care for.	12 (4.0)	14 (4.9)	49 (17.0)	225 (78.1)
Caring provides a challenging and stimulating job.	16 (5.3)	18 (6.3)	41 (14.4)	225 (79.2)
Despite all the problems, the person I care for doesn't grumble or moan.	22 (7.7)	21 (7.3)	55 (18.3)	202 (72.7)
It's nice to see the person I care for clean, comfortable and well turned out.	2 (0.7)	8 (2.7)	13 (4.4)	277 (93.0)
Caring has enabled me to fulfill my sense of duty.	6 (2.0)	7 (2.4)	19 (6.5)	268 (91.2)
I'm the sort of person who enjoys helping people.	-	8 (2.7)	22 (7.3)	270 (90.0)
I get pleasure from seeing the person I care for happy.	4 (1.3)	3 (1.0)	20 (6.7)	273 (92.2)
Knowing the person I care for the way I do means I can give better care than anyone else.	44 (14.7)	9 (3.0)	51 (17.0)	196 (65.3)
It helps to stop me from feeling guilty.	60 (20.0)	10 (4.2)	33 (13.8)	197 (82.1)
Caring has made me a better, less selfish person.	41 (13.7)	30 (11.6)	37 (14.3)	192 (74.1)
It's nice to feel appreciated by those family and friends I value.	6 (2.0)	5 (1.7)	16 (5.4)	273 (92.9)
Caring has strengthened close family ties and relationships.	18 (6.0)	10 (3.5)	23 (8.2)	249 (88.3)
It's good to help the person I care for overcome difficulties and problems.	5 (1.7)	4 (1.4)	19(6.4)	272 (92.2)
It's nice when something I do gives the person I care for pleasure.	9 (3.0)	4 (1.4)	16 (5.5)	271 (93.1)
I am able to keep the person I care for out of an institution.	12 (4.0)	8 (2.8)	23 (8.0)	257 (89.2)
I feel that if the situation were reversed the person I care for would do the same for me.	46 (15.3)	13 (5.1)	34 (13.3)	207 (81.2)
I am able to ensure the person I care for is well fed and their needs tended to.	1 (0.3)	11 (3.7)	20 (7.7)	268 (89.6)
Caring has given me the chance to widen my interest and contacts.	14 (4.7)	14 (4.9)	26 (9.1)	246 (86.0)
Maintaining the dignity of the person I care for is important to me.	2 (0.7)	2 (0.7)	22 (7.4)	274 (91.9)
I am able to test myself out and overcome difficulties.	3 (1.0)	5 (1.7)	32 (10.8)	260 (87.5)
Caring is one way of showing my faith.	8 (2.7)	5 (1.7)	20 (6.8)	267 (91.4)
Caring has provided a purpose in life that I didn't have before.	27 (9.0)	10 (3.7)	32 (11.7)	231 (84.6)
At the end of the day I know I'll have done the best I could.	3 (1.0)	9 (3.0)	26 (8.7)	262 (88.3)
Caring is one way of expressing my love for the person I care for.	3 (1.0)	6 (2.0)	16 (5.4)	275 (92.6)
Caring makes me feel needed and wanted.	2 (0.7)	8 (2.7)	16 (5.4)	274 (91.9)

caregivers (9–11,14). The study by Kuuppelomäki et al. found that caregiver satisfaction is affected by the positive changes in patients as a result of the care they are given (10). In addition, caregivers' sources of satisfaction includes the feeling of being needed and wanted during the caregiving process (10). Similarly, we found that caregivers' sources of satisfaction included the foll owing: works performed by caregivers give pleasure to the care recipient, the care recipient is clean, comfortable, and well turned out, family and friends appreciate the caregiver, the caregiver can express his/her love for the care recipient, and the care recipient is happy. Related to human nature, factors such as feelings of being admired for one's work, being appreciated for one's work, recognizing that one is needed, and experiencing spiritual satisfaction for one's work can be the primary sources of motivation for caregivers to continue to provide care.

This study found that the level of caregiver satisfaction was good. Studies in the literature comparing caregiver satisfaction and their sociodemographic features reported that caregivers' marital status, the country they live in (24), and caregivers' diseases (32) affected their satisfaction. By contrast, one study reported that caregiver satisfaction was not affected by the recipient's age or the caregiver's age, gender, and duration of caregiving (21). Similarly, the study by Kuuppelomäki et al. found no correlation between caregiver satisfaction and the patient's age, the tasks included in caregiving, duration of caregiving, and the number of hours caregiving provided in a day (10). Our study found that only those with educational status of being literate and those who expressed having no difficulty in caregiving had significantly higher CASI-TR scores.

When we considered all findings of the study regarding the reliability and validity, we found that CASI-TR was a reliable and valid measurement tool for the sample group to which it was applied. The CASI-TR can be used easily in clinics or home visits by healthcare professionals for assessing caregiver satisfaction. For the quality of care, it is important for all healthcare personnel providing health care to assess the caregiving family member when they assess the patient. The degree of continuity of the patient's health is dependent on the quality of care provided by the caregiver. Therefore, it is important for clinicians to assess caregivers' positive and negative feelings related to caregiving at specific periods and to conduct the necessary practices for caregivers based on these assessment results. Healthcare personnel can safely use the CASI-TR in their clinical practices and studies to assess caregiver satisfaction and monitor satisfaction level. We suggest applying the CASI-TR in larger sample groups and for caregivers of individuals with common diseases and checking whether its factor construct is preserved.

There are some limitations in the study. The first is that the study was conducted in one center, and the second is that the study was not specific to the disease. This study did not assess the criterion-related validity of the CASI because Turkish version of a similar measurement tool that assesses caregiver satisfaction was not available. While this study has some limitations, its strengths are that the sampling included 10 caregivers per item and three different methods assessed the reliability.

In conclusion, CASI is a specific tool for assessing caregiver satisfaction. As a result, we found that the Turkish version of the CASI was culturally well-adapted with acceptable validity and reliability.

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Conflict of Interest: None.

Ethical Approval: Approval was received from the Aksaray University Human Studies Ethics Council (2016/13).

Informed Consent: Written informed consent was obtained from all study participants.

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Bakım Verenlerin Memnuniyetini Değerlendirme İndeksi

Bakım verme sıklıkla zor ve stresli bir görev olmasına karşın birçok bakım veren için kişisel doyumu arttırmaktadır. Bu ankette bakım verenlerin bakım vermenin memnuniyet verici yönlerine yönelik ifadeleri bulunmaktadır. Lütfen her ifadeyi okuyunuz ve size uygun olanı işaretleyiniz. Aşağıda yer alan maddeler sizin durumunuza uyuyor ise bu durumdan ne kadar memnun olduğunuzu da size uygun şekilde işaretleyiniz. Eğer aşağıdaki maddeler sizin durumunuza uymuyor ise "benim durumuma uymuyor" seçeneğini işaretleyiniz.

	Benim durumuma uymuyor	**Benim durumuma uyuyor**		
		Memnuniyet vermiyor	**Biraz memnuniyet veriyor**	**Memnuniyet veriyor**
1. Bakım verme yeni beceri ve yetenekler geliştirmemi sağladı				
2. Bakım verdiğim kişi yaptığım işe minnet duyuyor				
3. Bakım vermek bakım verdiğim kişiye yakınlaşmamı sağladı				
4. Bakım verdiğim kişide küçük gelişmelerin olduğunu görmek iyidir.				
5. Bakım verdiğim kişiye potansiyelini tam olarak kullanabilmesi için yardım edebilirim.				
6. Baktığım kişinin benim için yaptıklarının karşılığını verebiliyorum.				
7. Bakım verme benim için mücadele etmeye ve motive olmaya neden olan bir iştir				
8. Tüm sorunlara rağmen bakım verdiğim kişi şikayetlenmiyor ya da söylenmiyor				
9. Bakım verdiğim kişinin temiz, rahat ve iyi olduğunu görmek güzeldir				
10. Bakım verme, görevimi yerine getirdiğim duygusunu yaşamamı sağlıyor.				
11. İnsanlara yardım etmekten hoşlanan biriyim.				
12. Bakım verdiğim kişinin mutlu olmasından memnuniyet duyuyorum				
13. Tanıdığım birine, bir başkasından daha iyi bakım verebilirim.				
14. Bakım vermek, kendimi suçlu hissetmemi engeller.				
15. Bakım verme beni iyi ve daha az bencil bir insan yaptı				
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17. Bakım vermek, yakın aile bağlarını ve ilişkileri güçlendirir.				
18. Bakım verdiğim kişinin zorluk ve sorunların üstesinden gelmesine yardım etmek iyidir				
19. Yaptığım işlerin bakım verdiğim kişiye memnuniyet vermesi güzeldir				
20. Baktığım kişinin yatılı bir kuruma yatmak zorunda kalmamasını sağlıyorum				
21. İşler tersine dönerse, bakımını üstlendiğim kişinin aynı şeyi benim için yapabileceğini düşünürüm.				
22. Bakım verdiğim kişinin iyi beslenmesini ve gereksinimlerinin karşılanmasını sağlayabilirim				
23. Bakım verme, ilgilerimi ve iletişimde bulunduğun kişilerin artmasına fırsat veriyor.				
24. Bakım verdiğim kişinin onurunu korumak benim için önemlidir				
25. Kendimi sınayabilirim ve zorlukların üstesinden gelebilirim				
26. Bakım verme inancımı göstermemin bir yoludur				
27. Bakım vermek, bana daha önce sahip olmadığım bir amaç kazandırdı				
28. Günün sonunda elimden gelenin en iyisini yaptığımı biliyorum				
29. Bakım vermek bakım verdiğim kişiye sevgimi göstermemim bir yoludur				
30. Bakım verme ihtiyaç duyulduğumu ve istendiğimi hissetmemi sağlıyor				

Türk Fizyoterapi ve Rehabilitasyon Dergisi 30 (1)

Turkish Journal of Physiotherapy and Rehabilitation 30 (1)

Kongre Özetleri/Congress Abstracts

3. ULUSAL FİZYOTERAPİ VE REHABİLİTASYON KONGRESİ

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Batuhan Dericioğlu

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Cemaliye Hürer
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Göktuğ Er
Gölgem Mehmetoğlu
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Necati Özler
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DÜZENLEME KURULU

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Beliz Belgen Kaygısız
Beraat Alptuğ
Ediz Necati
Ender Angın
Gölgem Mehmetoğlu
Gülbin Ergin
Münevver Özakalın
Nuray Kırdı
Nuray Elibol
Serkan Bakırhan
Sibel Karaca
Şahveren Çakartaş
Uğur Cavlak

BİLİM KURULU
(Adına göre alfabetik sıralı)

Batuhan Dericioğlu
Beliz Belgen Kaygısız
Beraat Alptuğ
Berkiye Kırmızıgil
Bilge Kara
Deniz İnal İnce
Didem Karadibak
Ediz Necati
Emine Handan Tüzün
Ender Angın
Ferhan Soyuer
Filiz Altuğ
Gülbin Ergin
İlke Keser
İnci Yüksel
Mehtap Malkoç
Münevver Özakalın
Neyran Altınkaya
Nilüfer Çetişli Korkmaz
Nuray Elibol
Nuray Kırdı
Özge Çakır
Özge Özalp
Öznur Büyükturan
Rümeysa Demirdamar
Sema Savcı
Serkan Bakırhan
Sevim Öksüz
Şahveren Çakartaş
Uğur Cavlak
Tuğçe Kalaycıoğlu
Tülin Düger

BİLİMSEL PROGRAM

6 Aralık 2018 / Perşembe

08:30-09:30 **Kayıt**
09:00-10:15 **Açılış Konuşmaları**
10:15-10:30 **Kahve Arası**
10:30-12:00 **I. Oturum**
Moderatörler: Nuray Kırdı - Rümeysa Demirdamar
Konu ve Konuşmacılar:
Ağrı Fizyolojisi/ Patolojisi/ Tanımlandırma - Ataç Sönmez
Bir Anestezist Gözünden Ağrı Değerlendirmesi - Serkan Telli
Fizyoterapist Gözüyle Ağrının Değerlendirmesİ - Uğur Cavlak
Yaşam Kalitesi ve Ağrı - Ferhan Soyuer
12:00-13:30 **Öğle Arası**
13:30-15:00 **II. Oturum**
Moderatörler: Didem Karadibak - Ferhan Soyuer
Konu ve Konuşmacılar:
Ağrı Nedenleri ve Tanımlanması
Yetişkin Nöroloji - Bilge Kara
Kardiyopulmoner Rehabilitasyon - Sema Savcı
Onkolojik Rehabilitasyon - Tülin Düger
Yoğun Bakım - Deniz İnal İnce
Hematolojik Rehabilitasyon - İlke Keser
15:00-15:30 **Kahve Arası**
15:30-16:30 **III. Oturum**
Moderatörler: Tülin Düger - Gülbin Ergin
Konu ve Konuşmacılar:
Akut & Kronik Ağrıda Medikal ve Fizyoterapi Rehabilitasyon Yaklaşımları
Ağrı Yönetiminde Farmakolojik Yaklaşımlar - Rümeysa Demirdamar
Algolojide Tedavi Yaklaşımları - Birol Balaban
Elektrofiziksel Ajanlar - Nilüfer Çetişli Korkmaz - Nuray Kırdı
Akupuntur Tedavisi - Işıl Birkan
16:30-18:00 **Sözel Sunumlar**
Moderatörler: Sema Savcı - Hilal Telli

7 Aralık 2018 / Cuma

09:00-10:30 **I. Oturum**
Moderatörler: Uğur Cavlak - Tuğçe Kalaycıoğlu
Konu ve Konuşmacılar:
Akut & Kronik Ağrıda Fizyoterapi Rehabilitasyon Yaklaşımları
Eklem Manipulasyonları - İnci Yüksel
Egzersiz Uygulamaları ve Fiziksel Aktivite - Özge Çakır
Vücut Farkındalığı - Münevver Özakalın
Su İçi Uygulamaları - Neyran Altınkaya
10:30-11:00 **Kahve Arası**

11:00-12:30 **II. Oturum**
Moderatörler: Nilüfer Çetişli Korkmaz - Beliz Belgen Kaygısız
Konu ve Konuşmacılar:
Farklı Hastalıklardaki Ağrı Durumlarında Kanıta Dayalı Güncel Literatür Taraması
Pediatrik Nörolojik Rehabilitasyon - Emine Handan Tüzün
Ortopedik Rehabilitasyon - Serkan Bakırhan
Romatolojik Rehabilitasyon - Sevim Öksüz
Kardiyopulmoner Rehabilitasyon - Özge Özalp

12:30-13:30 **Öğle Arası**

13:30-15:30 **III. Oturum**
Moderatörler: Serkan Bakırhan - Ender Angın
Konu ve Konuşmacılar:
Farklı Hastalık Gruplarında Ağrı - Vaka Sunumu
Geriatri - Öznur Büyükturan
Nöroloji - Beliz Belgen Kaygısız
Ortopedi - Nuray Elibol
Sporcu - Berkiye Kırmızıgil
Romatoloji - Beraat Alptuğ
Yutma - Ediz Necati
Erkek Sağlığı - Batuhan Dericioğlu

15:30-16:00 **Kahve Arası**

16:00-17:00 **Sözel Sunumlar**
Moderatörler: Uğur Cavlak - Nuray Elibol

17:00-18:30 **IV. Oturum**
Moderatörler: Nuray Kırdı - Gülbin Ergin - Şahveren Çakartaş
Konu ve Konuşmacılar:
İnterdisipliner Ağrı
Ağrı ve İletişim - Didem Karadibak
Sosyal Bir Olgu Olarak Ağrı - Özge Özgür Bayır
Kognitif Davranışcı Yaklaşım ve Ağrı - Sultan Okumuşoğlu
Ağrı ve Beslenme - Nazal Bardak

18:30 **Kapanış**

8 Aralık 2018 / Cumartesi

Workshop Programı

10:00-12:30 **Pediatrik Ağrı ve Fizyoterapi**
Emine Handan Tüzün - Zehra Güçhan Topcu - Ünal Aras Değer
Cerebral palside ağrı nedenleri
Ağrılı çocukta ki belirtiler nelerdir?
İletişim bozukluğu olan ve olmayan ağrılı çocuklarda ağrı davranışları nelerdir?
Çocuklarda ağrı nasıl değerlendirilir?
Ağrılı çocukta hangi fizyoterapi yöntemleri kullanılır?

09:00-11:00 **Bilimsel Makale Nasıl Yazılır?**
Deniz İnal İnce
Bilimsel makale yazımında ana ilkelerin gözden geçirilmesi
Pratik uygulama

14:00-18.00	**Geriatrik Rehabilitasyon**
	Nuray Kırdı - Öznur Büyükturan
	Yaşlanma Döneminde Meydana Gelen Değişiklikler
	Geriatrik Sendromlar
	Fizyoterapi ve Rehabilitasyon Değerlendirmeleri
	Fiziksel Aktivite ve Egzersiz
14:00-18.00	**Matriks Ritim Tedavisi**
	Uğur Cavlak - Filiz Altuğ
14:00-15:30	Teorik
15:30-15:45	Ara
15:45-17:00	Uygulama
17:00-18:00	Genel Tekrar
14:00-18.00	**Ağrılı Hastada Osteopatik Yaklaşım**
	Suat Dülger
	Visseral Muayene ve Teknikler
	Manuel Terapi Muayene ve Teknikleri
	Enerjetik Yöntemler
	Fasyal Sistem
	Beslenme ve Ağrı
	Psiko-Sosyal Yaklaşım

SÖZEL BİLDİRİLER

S001 Literatürde ağrı yönetiminde masaj uygulaması
Nuray ELİBOL, Uğur CAVLAK

S002 Türkiye'deki fizyoterapi ve rehabilitasyonla ilgili dergilerin ağrı yayınları açısından incelenmesi
Neyran ALTINKAYA, Uğur CAVLAK

S003 Vajinismus tedavisinde fizyoterapinin önemi: bir literatür derlemesi
Batuhan İ. DERİCİOĞLU, Sema ÖZDEN

S004 İdiyopatik kronik orşialji ve fizyoterapi yaklaşımları: literatür derlemesi
Batuhan İ. DERİCİOĞLU, Mehmet MİÇOOĞULLARI

S005 Postmenopozal kadınlarda torakal kifoz-lumbal lordoz açıları ve kemik mineral ölçümlerinin ağrı ile olan ilişkisinin incelenmesi
Alavuddin KURBONBOYEV, Beliz BELGEN KAYGISIZ, Gülbin ERGİN, Serkan BAKIRHAN

S006 Miyofasyal ağrı sendromunda alet yardımlı yumuşak doku mobilizasyonunun etkinliği: ön sonuçlar
Arzu ERDEN, Emre ŞENOCAK

S007 Omuz patolojilerinde ağrı şiddetinin denge, postüral stabilite ve düşmeye etkisi
Yonca EKER, Beliz BELGEN KAYGISIZ

S008 Serebral palsili çocuğa sahip annelerdeki kas iskelet sistemi ağrıları
Melis BAĞKUR, Tuba YERLİKAYA, Şahveren ÇAKARTAŞ

S009 Hastane servislerinde yatan yaşlı bireylerde ağrı ile mental, fiziksel, emosyonel ve solunum fonksiyonları arasındaki ilişki
Şahveren ÇAKARTAŞ, Ferdiye ZABİT, Gözde İYİGÜN

S010 Meme kanseri tedavisi sonrası lenfödem gelişen olgularda kompleks dekonjestif fizyoterapinin ağrı ve üst ekstremite fonksiyonelliği üzerine etkisi
Necati ÖZLER, Gülbin ERGİN, Ertan ŞAHINOĞLU, Serkan BAKIRHAN, Didem KARADİBAK

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Zehra Güçhan TOPCU, Hayriye TOMAÇ, İsra Nur ÇOKYAŞAR, Süleyman GÜZELŞEMME

S001

Literatürde ağrı yönetiminde masaj uygulaması

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Amaç: Ağrı çok boyutlu hoş olmayan bir deneyimdir. Bireyleri sadece fiziksel olarak değil, aynı zamanda sosyal ve ruhsal olarak da etkilemektedir. Ağrı yönetimi, bireyi bütünsel bir yaklaşımla (biyopsikososyal model) ele alan, ağrıyı ve ilgili disfonksiyonları tedavi eden yöntemleri içermelidir. Yumuşak dokunun manipülasyonunu içeren masaj, ağrı yönetiminde en yaygın kullanılan tekniklerden biridir. Çalışmamızın amacı ağrı yönetiminde masaj ile ilgili literatürdeki makalelerin sayısal oranın belirlenlemesiydi. **Yöntem:** Ağrı, masaj, ağrı ve masaj anahtar kelimeleri kullanılarak, Web of Science, PEDro ve PubMed veri tabanlarında, son 10 yıldaki ağrı yönetiminde masaj uygulamaları ile ilişkili makaleler tarandı. Makaleler üç gruba ayrılarak: meta-analiz çalışmaları, sistematik derlemeler ve randomize kontrollü çalışmalar olarak analiz edildi. **Sonuçlar:** Veri tabanlarında "ağrı" anahtar kelimesi ile toplam 676638 makale, "masaj" anahtar kelimesi ile toplam 10532 makale, "ağrı ve masaj" anahtar kelimeleriyle toplam 3005 makale bulundu. Ağrı-masaj ile ilgili bulunan 3005 makalenin: sırasıyla 1469'u (% 48) randomize kontrollü çalışmalar, 508'i (% 17) sistematik derlemeler ve 78'i (% 2,6) meta-analiz çalışmalarından oluşmaktaydı. İsveç masajı en yaygın kullanılan tekniklerden biriydi. **Tartışma:** Sonuç olarak incelenen makalelerde ağrı yönetiminde masaj uygulaması etkili bir tedavi yöntemidir. Diğer yöntemlerden daha az yan etkiye sahiptir.

Massage therapy in pain management in the literature

Purpose: Pain is an unpleasant multidimensional experience. It affects individuals not only physically but also socially and emotionally. Pain management should include methods that treat pain and related dysfunction with a holistic view (bio-psycho-social model). Massage therapy with soft tissue manipulation is one of the most commonly used techniques in pain management. The aim of this study was to determine the numerical ratio of articles in literature related to massage therapy in pain management. **Methods:** In the last 10 years in Web of Science, PEDro and PubMed databases, articles related to massage therapy in pain management were collected by using the following keywords: pain; massage; pain and massage. The articles are analyzed by dividing into three groups: meta-analysis studies; systematic reviews; randomized controlled studies. **Results:** A total of 676638 articles regarding "pain," a total of 10532 articles regarding "massage," and a total of 3005 articles regarding "pain and massage" were found in the relevant databases. There were 3005 articles related to the pain-massage: 1469 (48%) randomized controlled studies, 508 (17%) systematic reviews, and 78 (2.6%) meta-analysis studies, respectively. The Swedish massage was seen as the most commonly used technique. **Conclusion:** In conclusion, it was observed that the massage therapy in pain management was an effective treatment method. It has less adverse events than other methods.

S002

Türkiye'deki fizyoterapi ve rehabilitasyonla ilgili dergilerin ağrı yayınları açısından incelenmesi

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Amaç: Ağrı antik çağlardan bu yana sık karşılaşılan bir sağlık problemidir. Ağrı yönetiminde ilaç, fizyoterapi, ergoterapi, davranışsal tedavi ve cerrahi gibi pek çok seçenek bulunmaktadır. Ağrı yönetiminin ekibinde doktor, fizyoterapist, farmakolog, ergoterapist, psikolog ve hemşire gibi sağlık profesyonelleri yer alır. Bu çalışmanın amacı ağrı ile ilgili makalelerin sayısal oranını belirlemek ve kullanılan yöntemleri incelemekti. **Yöntem:** Türkiye'de son 10 yılda Fizyoterapi ve Rehabilitasyon ile ilişkili yayın yapan beş derginin tüm sayıları incelendi. Toplam 2786 makalenin 99'unun (% 3,5) akut veya kronik ağrı ile ilişkili olduğu belirlendi. Başlığında veya anahtar kelimelerinde ağrı olan makaleler değerlendirme, tedavi/müdahale ve derleme olmak üzere üç bölüme ayrılarak incelendi. **Sonuçlar:** Ağrı ile ilgili makalelerin % 34,3'ü değerlendirme, % 57,5'i tedavi/müdahale, % 8'i derleme yayınıdır. Fizyoterapi ile ilişkili değerlendirme yöntemlerinden en sık kullanılanı VAS'tı (% 55,8). Fizyoterapi yöntemleri arasında ise, birinci sırayı % 37,1 oranı ile terapatik egzersizler oluşturmaktaydı. **Tartışma:** Bu yayın inceleme araştırmasının sonuçlarına göre akut veya kronik ağrıda değerlendirmede en çok ağrı şiddetinin VAS ile ölçüldüğü, tedavi/müdahale olarak da terapatik egzersiz yaklaşımlarının tercih edildiği belirlenmiştir.

An analytic study on pain articles in physical therapy and rehabilitation journals in Turkey

Purpose: Pain is a common health problem since ancient times. There are many treatment options in pain management, including medications, physical therapy, ergotherapy, surgery, and behavioral techniques. The typical pain management team includes medical practitioners, pharmacists, physiotherapists, occupational therapists, clinical psychologists, nurses and so on. The aim of this study was to determine the numerical ratio of articles related to pain to the literature and the techniques used in pain management. **Methods:** Five journals related to physical therapy published in the last ten years in Turkey were analyzed. We collected 2786 articles related to acute or chronic pain published in Turkish literature. Ninety-nine of them (3.5%) were divided into three groups: evaluation/assessment, pain management, reviews. **Results:** The articles were 34.3% evaluation/assessment, 57.5% pain management, 8% reviews, respectively. The VAS was the most preferred scale to measure pain intensity (55.8%). Among physical therapy approaches, the most common preferred approach was therapeutic exercises (37%). **Conclusion:** The result of this analytic study of articles published in Turkish literature related to pain, including acute and chronic pain showed that therapeutic exercises and the VAS were preferred more than the others techniques or scales.

S003

Vajinismus tedavisinde fizyoterapinin önemi: bir literatür derlemesi

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Amaç: Artan fizyolojik uyarılma ile beraber cinsel birleşmeye engel olan distal vajinal kasların spazmodik kontraksiyonuna vajinismus denir. Cinsel mitler, cinsellikle ilgili olumsuz deneyimler, bireyin geçmişte yaşadığı travmatik olaylar etiyolojide büyük önemi arz eder. Vajina girişini saran kasların istemsiz olarak kasılmasıyla koitusun başarısız olması; kişide anksiyete, istemsiz pelvik taban kas aktivasyonu, ağrı ve korku-kaçınma davranışı meydana gelerek kişinin cinsel yaşam ve yaşam kalitesinde olumsuz etkilenimlere neden olmaktadır. Bu sebeple amacımız vajinismus tedavisinde fizyoterapinin rolünü ve etkinliğini araştırmaktı. **Yöntem:** Pubmed, EMBASE ve Pedro veritabanlarında 2008-2018 yılları arasında gerçekleştirilmiş olan çalışmalar; Vajinismus, Seksüel Ağrı Bozuklukları, Seksüel Disfonksiyon ve Fizyoterapi anahtar kelimeleri ile tarandı ve değerlendirildi. **Sonuçlar:** Vajinismus'ta fizyoterapi uygulamalarının amacı; in vivo maruz bırakma yoluyla dokunmaya duyarsızlaştırarak reaktif kas spazmını önlemek ve anksiyeteyi kontrolünü sağlamaktır. Vajinismus tedavisinde yapılandırılacak olan fizyoterapi programları içerisinde; Pelvik taban kassal farkındalığının ve kontrolünün arttırılması, dereceli dilatör kullanımı ile vajinal açıklığın sağlanması, pelvik ve vulvar ağrıyı azaltmak için yumuşak doku mobilizasyonu, tetik nokta tedavisi, kas enerji teknikleri, yüzeyel EMG ile pelvik taban biofeedback eğitimi, TENS, intravajinal solunumla kombine self veya terapist eşliğinde gevşeme teknikleri ve ev egzersizleri yer almaktadır. **Tartışma:** Vajinismus, bireyin ve parterinin cinsel yaşamını ve yaşam kalitesini olumsuz etkileyen, geniş etiyolojik alt yapıyla ortaya çıkan bir problemdir. Literatürdeki çalışmalar vajinismusun çok boyutlu bir problem olması sebebiyle; fizyoterapi, cinsel terapi, bilişsel-davranışsal yöntemleri de içeren multidisipliner bakış açısının benimsendiği tedavi yaklaşımlarında başarı şansının artacağı üzerinde durulmaktadır. Tedavinin önemli bir parçası olan fizyoterapinin hiçbir zaman koitusu deneyimleyememiş kadınlarda umut verici bir tedavi yaklaşımı olduğunu göstermektedir.

Importance of physiotherapy in vaginismus: a literature review

Purpose: Spasmodic contraction of distal vaginal muscles, which interfere with sexual intercourse with increasing physiological arousal, is called vaginismus. Sexual myths, negative experiences related to

sexuality, traumatic events experienced by the individual in the past have great importance in the etiology. Failure of coitus due to involuntary contraction of the muscles surrounding the vagina entrance; Anxiety, involuntary pelvic floor muscle activation, pain, and fear-avoidance behavior leads to adverse effects person's sexual life and quality of life. Thus, we aimed to research the role and effectiveness of physiotherapy in the treatment of vaginismus. **Methods:** Studies conducted Pubmed, EMBASE and Pedro databases between 2008-2018 analyzed and evaluated by Vaginismus, Sexual Pain Disorders, Sexual Dysfunction, and Physiotherapy keywords. **Results:** Physiotherapy techniques in vaginismus aimed to prevent reactive muscle spasm and provide anxiety control by desensitization in vivo exposure. Among the physiotherapy programs to be structured in the treatment of vaginismus; improving pelvic floor muscular awareness and control, providing vaginal patency with graded dilator use, soft tissue mobilization for reducing pelvic and vulvar pain, trigger point therapy, muscle energy techniques, to reduce of pelvic floor muscle tone via superficial EMG biofeedback training, TENS, intravaginal relaxation techniques combined with breathing by self or with therapist and home exercises. **Conclusion:** Vaginismus is a problem that arises with a broad etiological background, which negatively affects the sexual life and quality of life of the individual and her partner. Studies in the literature have shown that vaginismus is a multidimensional problem; physiotherapy, sexual therapy, cognitive-behavioral methods, including the multidisciplinary perspective is adopted in the treatment approaches are considered to increase the chances of success. Physiotherapy, which is an essential part of the treatment, shows that there is a hopeful treatment approach in women who have never experienced sexual intercourse.

S004

İdiyopatik kronik orşialji ve fizyoterapi yaklaşımları: literatür derlemesi

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Amaç: Üç ay ve daha uzun süren unilateral veya bilateral testiste sürekli ya da intermitant olarak ortaya çıkan idiyopatik testiküler ağrıya İdiyopatik Kronik Orşialji denir (İKO). Ortaya çıkan ağrı; günlük yaşam0a olumsuz etki etmekte, hastanın cinsel aktivitesinde ve yaşam kalitesinde azalmaya neden olmaktadır. İKO'da klinik uygulamada standart bir değerlendirme ve tedavi protokolü için henüz literatürde fikir birliğine varılamamıştır. Bu sebeple amacımız İKO'nun yönetimi için uygulanan fizyoterapi yöntemleri ile ilgili bir literatür derlemesi gerçekleştirmekti. **Yöntem:** Pubmed, Pedro ve Elseiver veri tabanlarında Kronik Skrotal Ağrı, Kronik Testiküler Ağrı, Kronik Orşialji ve Fizyoterapi ile ilgili makaleler taranarak, noninvaziv tedavi yöntemlerinden birisi olarak önerilen fizyoterapi uygulamaları ile ilgili bir literatür derlemesi oluşturuldu. **Sonuçlar:** Literatürde; Kronik Orşialji tedavisinde uygulanan tedavi protokollerinin kronik pelvik ağrı sendromunda uygulanan fizyoterapi yaklaşımları ile paralel olması gerektiği üzerinde durulmaktadır. Uygulanan fizyoterapi yaklaşımları içerisinde; torakolumbosakral bölgeye yönelik yapılan manipulasyon ve mobilizasyon uygulamaları, fasyal mobilizasyon ve yumuşak doku mobilizasyonu, paradoksal gevşeme, tetik nokta tedavisi, pelvik taban biofeedback eğitimi, TENS, core stabilizasyon eğitimi ve aerobik egzersiz eğitimi yer almaktaydı. **Tartışma:** Ürolojik semptomlarla kliniğe başvuran hastaların % 2,5-4,8'inde Kronik Orşialji görülmesine rağmen, vakaların %50'sinde etiyoloji bilinmemektedir. İKO tanısı olan erkeklerde gece görülen ağrılar, erektil disfonksiyon, düşük libido, ağrılı ejekülasyon gibi çeşitli semptomlar eşlik edebilmektedir. Noninvaziv tedavi protokolleri içerisinde yer alan fizyoterapi uygulamalarının semptomları azaltmada ve yaşam kalitesini iyileştirmede önemli bir yeri bulunmaktadır. Değerlendirme ve tedavi protokollerinin belirlenmesinde literatürde henüz bir standartizasyon bulunmamaktadır. Standart tedavi protokollerinin oluşturulması için yapılacak geniş ölçekli çalışmalara ihtiyaç duyulmaktadır.

Idiopathic chronic orchialgia and physiotherapy approaches: a review of the literature

Purpose: The idiopathic testicular pain, which occurs continuously or intermittently in the unilateral or bilateral testis, which lasts three months or longer, is called Idiopathic Chronic Orchialgia (ICO). The resulting pain, It negatively effects on the daily life of the patient and leads to a decrease in the patient's sexual activity and quality of life. A standard assessment and treatment protocol for clinical practice in ICO has not been investigated in the literature. **Methods:** Articles on Chronic Scrotal Pain, Chronic Testicular Pain, Chronic Orchialgia and Physiotherapy in Pubmed, Pedro and Elsevier databases, a literature review about the physiotherapy applications proposed as one of the noninvasive treatment methods was established. **Results:** It is emphasized in the literature that the treatment protocols used in the treatment of chronic orchialysis should be in parallel with the physiotherapy approaches applied in chronic pelvic pain syndrome. The physiotherapy techniques include; manipulation and mobilization techniques for the thoracolumbosacral region, mobilization of facial and soft tissue, paradoxical relaxation, trigger point therapy, pelvic floor biofeedback training, TENS, core stabilization training and aerobic exercise training. **Conclusion:** Although 2.5 to 4.8% of patients presenting with urological symptoms to the clinic have chronic orchialgia, 50% of cases have not been known etiology. Men with ICO may be accompanied by various symptoms such as pain in the night, erectile dysfunction, decreased libido, and painfully ejaculation. The components of physiotherapy in noninvasive treatment protocols have an essential role in reducing symptoms and improving quality of life. There is no standardization in the evaluation and treatment protocols. The literature must do wide-scale researches for the standardization of treatment protocols.

S005

Postmenopozal kadınlarda torakal kifoz-lumbal lordoz açıları ve kemik mineral ölçümlerinin ağrı ile olan ilişkisinin incelenmesi

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Amaç: Postmenopozal kadınlarında ortaya çıkan hormonal değişiklikler ve kemik mineral yapısındaki azalma başta postüral bozukluklar ve ağrı olmak üzere birtakım semptomların görülmesine neden olmaktadır. Bu çalışma postmenopozal kadınlarda torakal kifoz-lumbal lordoz açıları ile kemik mineral yoğunluğu ölçümlerinin ağrı ile olan ilişkisinin incelenmesi amacıyla planlandı. **Yöntem:** Çalışmaya yaş ortalaması 61±6 yıl olan (51-70 yıl) 34 postmenopozal dönemdeki kadın dahil edildi. Dijital inklinometre ile torakal kifoz (C7-T1 ve T12-L1) ve lumbal lordoz derecesi (T12-L1 ve L5-S1), servikal, torakal ve lumbal bölgelerinin ağrı seviyesi Vizüel Analog Skalası (VAS) ile ölçüldü. Lumbal omurga ve femur başından ölçülen kemik mineral yoğunluğu sonuçları hasta dosyalarından elde edildi. **Sonuçlar:** Lumbal bölgedeki kemik mineral yoğunluğu ile torakal bölge VAS skorları ($r=0,601$, $p<0,001$), femur başındaki kemik mineral yoğunluğu ile lumbal bölge VAS skorları arasında negatif yönde anlamlı ilişki saptandı ($r=0,362$, $p=0,036$). Torakal kifoz ($r=0,756$, $p<0,001$) ve lumbal lordoz dereceleri ile ($r=0,385$, $p=0,025$) torakal bölge VAS skorları arasında ise pozitif yönde anlamlı ilişki görüldü. **Tartışma:** Postmenopozal dönemdeki kadınlarda torakal kifoz ve lumbal lordoz derecelerindeki artış ve kemik mineral yoğunluğundaki azalma torakal ve lumbal bölge ağrılarında artışa neden olmaktadır. Bu nedenle postmenopozal dönemdeki kadınlarda erken dönemden itibaren gerekli omurga düzgünlüğü değerlendirilip postüral dizilimin korunmasına yönelik koruyucu fizyoterapi ve rehabilitasyon yaklaşımlarının verilmesi gerektiğini düşünmekteyiz.

Determination of the relationship between thoracic kyphosis-lumbal lordosis angles, bone mineral measurements, and pain in postmenopausal women

Purpose: Hormonal changes and decreasing in the bone mineral structure in postmenopausal women lead to some symptoms such as postural disorders and pain. This study was designed to determine the relationship between thoracic kyphosis-lumbal lordosis angles, bone mineral density measurement, and pain in postmenopausal women. **Methods:** The study included 34 postmenopausal women with a mean age of 61±6 years (range, 51-70 years). The angles of thoracic kyphosis (C7-Th1 and Th12-L1) and lumbar lordosis were measured (Th12-L1 and L5-S1) using a digital inclinometer. Pain intensity in the cervical, thoracic and lumbar regions were measured using a Visual Analogue Scale (VAS). Bone mineral density score was obtained from the patients' medical file. **Results:** There was a negative correlation between bone mineral density in the lumbar region and thoracic region VAS scores

(r=0.601, p<0.001), Also, there was a negative correlation between bone mineral density in femoral head and lumbar region VAS scores (r=0.362, p=0.036). The same results were seen in thoracic kyphosis (r=0.756, p<0.001) lumbar lordosis (r=0.385, p=0.025) and VAS scores in thoracic region. **Conclusion:** Increased degrees in thoracic kyphosis and lumbar lordosis in postmenopausal women and decreased bone mineral density increase pain in thoracic and lumbar regions. We suggest that postmenopausal women should be considered in terms of protective physiotherapy in order to remain the postural alignment.

S006

Miyofasyal ağrı sendromunda alet yardımlı yumuşak doku mobilizasyonunun etkinliği: ön sonuçlar

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Amaç: Çalışma miyofasyal ağrı sendromunda (MAS) alet yardımlı yumuşak doku mobilizasyonunun (IASMT) etkinliğinin incelenmesi amacıyla planlandı. **Yöntem:** Çalışma MAS tanısı olan 11 gönüllü hasta (6K/5E) ve ile gerçekleştirildi. Hastalara sekiz hafta boyunca haftada iki seans IASMT ve mattis germe egzersiz programı uygulandı. Tedavi öncesi ve sonrası değerlendirmeler yapıldı. Sosyodemografik veriler ve tetik noktadan kaynaklı sabah katılığı, parestezi, kızarıklık, şişlik, ağrı, yorgunluk, uykusuzluk şikayetleri ve için genel değerlendirme formu kullanıldı. Ağrı şiddeti için Görsel Ağrı Skalası (VAS), boyun eklem hareket açıklığı için gonyometre, basınç ağrı eşiğinin saptanması için algometre, fonksiyonel durum için Boyun Ağrı ve Dizabilite Skoru (NPDI), emosyonel durum değişikliği için Beck Depresyon Skalası, yaşam kalitesi için Hastalık Kontrol Merkezi Sağlıkla İlişkili Yaşam Kalitesi Anketi (CDC-HRQOL-4) kullanıldı. **Sonuçlar:** Katılımcıların % 55'i kadın % 45'i erkek olup yaş ortalaması 32,45±9,91 yıl idi. Yaşam kalitesi tüm boyutlarında anlamlı fark vardı (p<0,05). NPDI ve Beck depresyon puan ortalamaları anlamlı ölçüde azaldı (p<0,05). Ağrı basınç eşiği ve ağrı şiddetinde anlamlı ölçüde fark vardı (p<0,001). Karıncalanma, kızarıklık, uykusuzluk ve şişlik semptomlarında belirgin iyileşme görüldü (p<0,05). Boyun eklem hareket açıklığı bakımından lateral fleksiyonda tedavi öncesi ve sonrası anlamlı fark bulundu (p<0,05). **Tartışma:** IASMT MAS'ta etkin, kolay ve pratik bir tedavi yöntemidir.

Effect of instrument-assisted soft tissue mobilization on myofascial pain syndrome: preliminary results

Purpose: This study aimed to investigate the effect of instrument-assisted soft tissue mobilization (IASMT) on myofascial pain syndrome (MAS). **Methods:** The study was performed with 11 volunteers (6F/5M) diagnosed with MAS. The patients were applied IASMT and Mattis stretching exercises for eight weeks, twice a week. Pre and posttreatment evaluations were performed. A general evaluation form was used for sociodemographic data and morning stiffness, paresthesia, erythema, swelling, pain, fatigue, insomnia complaints. Visual Pain Scale (VAS) for pain severity, goniometer for cervical range of motion, algometer for determining the pressure pain threshold, Neck Pain and Disability Index (NPDI) for functional mobility, Beck Depression Scale for emotional state change, The Health Control-Related Quality of Life Questionnaire (CDC-HRQOL-4) were used. **Results**: The participants comprised 55% females and 45% males with a mean age of 32.45±9.91 years. There was a significant difference in the quality of life (p<0.05). The mean scores of NPDI and Beck depression significantly decreased (p<0.05). There was a significant difference in pain pressure threshold and pain intensity (p<0.001). Significant improvement was observed in the symptoms of paresthesia, erythema, insomnia, and swelling (p<0.05). A significant difference was found in the cervical range of motion for lateral flexion before and after treatment (p<0.05). **Conclusion:** The IASMT is an effective, easy, and practical treatment in MAS.

S007

Omuz patolojilerinde ağrı şiddetinin denge, postüral stabilite ve düşmeye etkisi

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Amaç: Bu çalışma, omuz patolojisi teşhisi konmuş farklı ağrı şiddetine sahip bireylerde; denge yeteneği, postüral stabilite, düşme riski ve düşme korkusu ile ağrı şiddeti ve vücut kütle indeksi (VKİ) arasındaki ilişkileri incelemek amacıyla planlandı. **Yöntem:** Çalışmaya omuz ağrısına sahip 60 birey alındı. Bireylerin, istirahat ve aktivite halinde hissettikleri ağrı Vizüel Ağrı Skalası (VAS) kullanılarak değerlendirildi ve hafif (grup 1) ve orta-şiddetli (grup 2) ağrı grubu olmak üzere iki alt grup oluşturuldu. Denge yeteneği, postüral stabilite ve düşme riski Sportkat Sistemi, Berg Denge Ölçeği (BDÖ), tek ayak gözler kapalı (GK) denge testi ile, düşme korkusu ise, Düşmenin Etkisi Ölçeği (DEÖ) ile değerlendirildi. **Sonuçlar:** Bireylerin VAS-istirahat ile çift ayak statik denge testi sağ-sol (RL) oranı arasında istatistiksel açıdan pozitif yönde, VAS-istirahat ile BDÖ arasında ve VAS-aktivite ile tek ayak (sağ) GK testi arasında negatif yönde anlamlı ilişki bulundu (p<0,05). İstirahatte hissedilen ağrı şiddetine göre tek ayak (sağ) statik denge sol skoru ve RL oranı arasında anlamlı farklılıklar bulundu (p<0,05). VKİ ile çift ve tek ayak statik denge testi arasında istatistiksel açıdan pozitif yönde, VKİ ile DEÖ arasında negatif yönde anlamlı ilişki bulundu (p<0,05). **Tartışma:** Bireylerin istirahatte hissettikleri ağrı şiddeti arttıkça medio-lateral yöndeki postüral salınımları artmakta, sağ ayak üzerinde duruşları sırasında sola doğru olan postüral salınımları ağrı şiddeti arttıkça artmaktadır. VKİ değeri arttıkça statik denge yeteneği bozulmakta, düşme riskleri artmakta ve bireyler düşme korkusu yaşamaktadırlar. Omuza yönelik fizyoterapi ve rehabilitasyon programlarının denge bozukluğu, postüral instabilite ve düşme riskine yönelik yaklaşımlar içermesi gerektiğini düşünmekteyiz.

Effect of pain severity on balance, postural stability and falls in shoulder pathologies

Purpose: The study was planned to investigate the relationship of balance ability, postural stability, fall risk, fear of falling parameters with pain severity and body mass index (BMI) in shoulder pathology with variant pain severities. **Methods:** Sixty patients included in the study, were assessed using the Visual Analogue Scale (VAS) for pain at rest and on movement, divided into two subgroups as mild and moderate-severe pain. The balance ability, postural stability, and risk of falling were assessed using Sportkat system, Berg Balance Scale (BBS), single-leg eyes closed (EC) balance test and fear of falling was assessed using the Fall Efficacy Scale (FES). **Results:** Statistically, VAS-rest's relationship with double-foot static balance test right-left (RL) ratio was significantly positive, while with BBS was found significantly negative, as it was between VAS-activity and right-foot EC test (p<0.05). Significant differences were found between right foot static balance left score and RL ratio according to pain severity felt at rest (p<0.05). The relationship of BMI was significantly positive with double and single foot static balance test, and significantly negative with FES (p<0.05). **Conclusion:** As the pain severity at rest increases, the postural sway increases, in the medio-lateral direction, and the left direction while standing on the right foot. As the BMI increases, static balance ability is impaired, the risk of falls increases and the individuals have more afraid of falling. We think that balance, postural instability and fall risk approaches should be included in physiotherapy and rehabilitation programs of shoulder pathologies.

S008

Serebral palsili çocuğa sahip annelerdeki kas iskelet sistemi ağrıları

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Amaç: Serebral Palsili çocuklara genellikle anneleri tarafından sağlanan özel bakım, annelerin kas iskelet sistemi üzerinde fiziksel yüklere neden olabilir. Çalışma serebral palsili çocukların annelerinde kronik kas-iskelet ağrılarını değerlendirmeyi ve ağrıya neden olan etkileri belirlemeyi amaçladı. **Yöntem:** Çalışmamıza 41 serebral palsili çocuk ve anneleri dahil edildi. Tüm annelerin sosyodemografik özellikleri kaydedildi. Annelerin kas iskelet sistem ağrıları standardize edilmiş İskandinav Kas-İskelet Sistemi Anketi ile değerlendirildi. Çocukların fonksiyonel düzeyleri Kaba Motor Fonksiyon Sınıflandırma Sistemi (KMFSS) kullanılarak sınıflandırıldı. Serebral palsili çocuklar KMFSS'ye göre seviye 1-2-3 "orta-hafif" (n=20), seviye 4-5 "ağır" (n=21) olarak iki gruba ayrıldı.

Sonuçlar: Ağır grubun anneleri tarafından en sık bildirilenler ağrı, bel ağrısıydı (% 66,7). Ağır grubun annelerinin bel ağrısı varlığı hafif-orta gruba göre anlamlı derecede yüksekti (p<0,05). Ağır grubun annelerinin kas-iskelet sistemi ağrı skorları ile hafif-orta grubun skorları arasında istatistiksel bir fark olmadığı görüldü (p>0,05). Annenin yaşı, serebral palsili çocuğun yaşı, kilosu ve fonksiyonel seviyesi kas-iskelet sistemi ağrısına yol açan risk faktörleri olarak belirlendi. **Tartışma:** Serebral palsili çocukların anneleri kas-iskelet sistemi ağrısı açısından daha yüksek risk altındadır. Özellikle fonksiyonel durumları daha ağır olan ve yaşı büyük serebral palsili çocuğa sahip annelerde bu daha yaygındır.

Musculoskeletal system pain in mothers of children with cerebral palsy

Purpose: Special care of cerebral palsy, which is usually provided to children by their mothers, can cause a physical burden on the musculoskeletal system of mothers. The study aimed to evaluate the chronic musculoskeletal pain in mothers of children with cerebral palsy and to determine the effects that cause pain. **Methods:** In total, 41 children and their mothers participated in this study. Sociodemographic characteristics of all subjects were recorded. Musculoskeletal system pain of mothers was evaluated using the standardized Nordic Musculoskeletal Questionnaire. Gross Motor Function Classification System (GMFCS) was used to assess the level of functionality of children. Level of GMFCS was divided into two groups being; group 1: GMFCS1-2-3 (mild- moderate) and group 2: GMFCS 4-5 (severity). **Results:** Most frequently reported by mothers in the severity group was low back pain (66.7%). The presence of low back pain was significantly higher in mothers of the severe group than in the mild-moderate group (p<0.05). There was no statistical difference between the musculoskeletal pain scores of the mothers of the severe group and the mild-moderate group scores (p>0.05). Maternal age; age, weight and functional level of the child with cerebral palsy were determined as risk factors leading to musculoskeletal pain. **Conclusion:** Mothers of children with cerebral palsy are at higher risk for musculoskeletal system pain. Especially, this is more common in mothers with older children whose functional status is more severe.

S009

Hastane servislerinde yatan yaşlı bireylerde ağrı ile mental, fiziksel, emosyonel, ve solunum fonksiyonları arasındaki ilişki

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Amaç: Bu çalışmanın amacı hastane servislerinde yatan yaşlı bireylerde ağrı ile mental, fiziksel, emosyonel ve solunum fonksiyonları arasındaki ilişkinin araştırılmasıydı. **Yöntem:** Bu çalışmaya Yakın Doğu Üniversitesi Hastanesi Servislerinde yatan 65 yaş üstü toplam 27 (kadın/erkek: 16/11) birey dahil edildi. Çalışmada bireylerin ağrı değerlendirilmesi amacıyla Kısa Ağrı Envanteri (KAE), mental düzeylerinin belirlenmesinde Mini Mental Durum Testi (MMDT), fiziksel fonksiyonları belirlemesinde [mobilite düzeyi için Yaşlı Mobilite Skalası (YMS) ve el kavrama kuvveti için el dinamometresi testi (EDT)], hastane ile ilgili kaygı ve depresyon düzeyini belirlemek için Hastane Anksiyete ve Depresyon Ölçeği (HADÖ) ve Geriatrik Depresyon Ölçeği (GDÖ) ve solunum fonksiyonlarını değerlendirmek amacıyla tepe akım hızı (PEF) ölçümü uygulandı. **Sonuçlar:** Katılımcıların yaş ortalamaları 74,70±9,57 yıl ve vücut küitle indeksi ortalamaları 27,66±4,65 kg/m^2 idi. Ortalama MMST skoru 21,37±4,82 puandı. KAE-ağrı şiddeti ile KAE-ağrı enterferansı arasında orta derecede negatif ilişki (r=0,720, p<0,001) ve KAE-ağrı şiddeti ile PEF testi sonuçları arasında orta derecede pozitif ilişki (r=0,576, p=0,002) bulundu. Ek olarak, KAE-ağrı enterferansı ile MMDT (r=0,553, p=0,003) için orta derecede negatif, YMS (r=0,398, p=0,040) için düşük negatif, EDT-sağ için düşük derecede negatif (r=0,430, p=0,025), EDT-sol için orta derecede negatif (r=0,535, p=0,004) ve, HADÖ-toplam (r=0,398, p=0,040), HADÖ-kaygı (r=0,393, p=0,042) ve GDÖ (r=0,499, p=0,008) testleri için düşük pozitif ilişki olduğu tespit edildi. **Tartışma:** Bu sonuçlar ağrı şiddetinden ziyade ağrının varlığının, bireylerin yaşamları üzerinde yarattığı etki dolayısıyla, çeşitli fonksiyonları etkileyebileceği görülmektedir.

The relationship between pain and mental, physical, emotional, and respiratory function of elderly individuals in hospital services

Purpose: The aim of this study was to investigate the relationship between pain and mental, physical, emotional, and respiratory functions of elderly individuals in hospital services. **Methods:** A total of 27 individuals (female/male: 16/11) aged ≥65 years who were hospitalized at Near East University Hospital Services were included in this study. In the study, Short Pain Inventory (SPI) was used to evaluate pain, Mini Mental State Test (MMSE) to determine the mental status, Elderly Mobility Scale (EMS) and hand dynamometer test (HDT) for the evaluation of physical functioning, including mobility level and hand grip strength, Hospital Anxiety and Depression Scale (HADS) and Geriatric Depression Scale (GDS) to assess anxiety and depression levels and peak expiratory flow rate (PEF) was measured to evaluate the pulmonary function. **Results:** The mean age of the participants was 74.70±9.57 years, and the mean BMI score was 27.66±4.65 kg/m^2. The average MMSE score was 21.37±4.82 points. There was a high positive relationship between SPI-pain intensity and SPI-pain interference (r=0.720, p<0.001) and moderate negative relationship between SPI-pain intensity and PEF test results (r=0.576, p=0.002). Additionally, the relationships between SPI-pain interference were identified as moderate negative for MMST (r=0.553, p=0.003), low negative for EMS (r=0.398, p=0.040), low negative for HDT (right; r=0.430, p=0.025), moderate negative for HDT (left; r=0.535, p=0.004), low positive for HADS-total (r=0.398, p=0.040), HADS-anxiety (r=0.393, p=0.042), and GDS (r=0.499, p=0.008). **Conclusion:** The results obtained from this study indicate that the presence of pain rather than pain severity might affect many functions of elderly individuals in hospital services.

S010

Meme kanseri tedavisi sonrası lenfödem gelişen olgularda kompleks dekonjestif fizyoterapinin ağrı ve üst ekstremite fonksiyonelliği üzerine etkisi

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Amaç: Meme kanseri kadınlar arasında en sık görülen kanser türüdür. Meme kanseri tedavileri sonrası karşılaşılan en ciddi problem ise lenfödemdir. Lenfödem, lenf kanallarının yetersiz drenajı olup, yumuşak doku sertliklerine, eklem limitasyonlarına, kas gücü kayıplarına, ağrıya neden olur. Sonuçta hastaların üst ekstremite kullanımına ait günlük yaşam aktiviteleri kısıtlanır ve yaşam kaliteleri azalır. Bu çalışmanın amacı meme kanseri tedavisi sonrası lenfödem gelişen olgularda kompleks dekonjestif fizyoterapinin (KDF) ağrı ve üst ekstremite fonksiyonelliği üzerine etkisini belirlemekti. **Yöntem:** Bu çalışmaya meme kanseri tedavileri sonrası unilateral lenfödem gelişen 10 kadın dahil edildi, Ağrı şiddeti Visuel Analog Skalası (VAS) ödem şiddeti çevre ölçümü ve üst ekstremite fonksiyonu Kol, Omuz ve El Sorunları Anketi (DASH) ile değerlendirildi. Katılımcılara manual lenf drenajı, kompresyon uygulaması, drenaj egzersizleri ve cilt bakımından oluşan KDF programı; haftada beş gün, altı hafta uygulandı. Değerlendirmeler KDF öncesi ve sonrası yapıldı. **Sonuçlar:** Kadınların yaş ortalaması 54,5±11,2 yıldı. Başlangıç DASH skoru 48,4±15,9, ağrı şiddeti 5,2±2,4 ve ödem şiddeti ortalaması 4206,1±1104,9 cm^3'tü. KDF sonrası ödem şiddeti, VAS ve DASH skorlarında istatistiksel olarak anlamlı azalma olduğu saptandı (p<0,05). **Tartışma:** KDF programı lenfödem hastalarında üst ekstremite fonksiyonlarının iyileştirlmesi, ağrı ve ödemin kontrol altına alınmasında etkili olabilir.

Effect of complex decongestive physiotherapy on pain severity and upper extremity function in patients with lymphedema after breast cancer treatment

Purpose: Breast cancer is one of the most common cancers among women. Lymphedema is the most severe problem that develops after breast cancer treatments. Lymphedema is insufficient drainage of lymph ducts and causes soft tissue stiffness, joint limitations, loss of muscle

strength and pain. This limits the daily living activities that include upper extremity movements and decreases the quality of life. The aim of this study was to determine the effects of complex decongestive physiotherapy (CDP) on pain severity and upper extremity functions in patients with lymphedema after breast cancer treatment. **Methods:** This study included 10 women developing unilateral lymphedema after breast cancer treatments. The pain intensity, the severity of edema and the upper extremity functions of participants, were assessed using Visual Analog Scale (VAS), circumference measurements and Disabilities of Arm, Shoulder and Hand questionnaire (DASH). The CDP including manual lymphatic drainage (MLD), compression applications, skin care, and drainage exercises was applied. CDP including manual lymphatic drainage (MLD), compression applications, skin care, and drainage exercises was applied. The women were taken to a 6-week therapy program once per day, five days per week. All assessment was conducted before and after the CDP. **Results:** The mean age of women was 54.5±11.2 years. The initial scores of DASH, pain severity, and edema severity were 48.4±15.9, 5.2±2.4, and 4206.1±1104.9 cm^3, respectively. There were statistically significant decreases in scores of the DASH, VAS, and edema severity after the CDP ($p<0.05$). **Conclusion:** The CDP program could be useful to improve upper extremity function, with controlling the pain and edema in patients with lymphedema.

S011

Hastanede yatarak tedavi gören geriatriklerde akut/subakut ağrı analizi: kesitsel tanımlayıcı bir çalışma

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Amaç: Geriatrik bireylerde ağrı sık karşılaşılan bir sağlık problemidir. Geriatrik rehabilitasyonda ağrı kontrolü tedavi programının önemli bir kısmını oluşturur. Bu çalışmanın amacı hastanede yatarak tedavi gören (HYTG) geriatriklerde görülen akut/subakut ağrı lokalizasyonu ve şiddetinin belirlenmesiydi. **Yöntem:** HYTG 40 (25 kadın, 15 erkek) geriatrik birey (yaş=75,6±9,3 yıl) yüzyüze görüşme yöntemi ile değerlendirildi. Katılımcıların vücut kütle indeksleri (VKİ) ve Charlson Komorbitide (CK) Skorları hesaplandı. Ağrı lokalizasyonunu belirlemek için vücut diyağramı (vücut anterior ve posterior görünümlü; 45 alana ayrılmış) kullanıldı. Ağrı şiddeti Görsel Analog Skalası (GAS) ile değerlendirildi. **Sonuçlar:** Katılıcımların hastanede kalış süreleri (min-max=1-919 gün) ort.=83,77 gündü. VKİ ortalama skoru 27,9±5,3 kg/m^2'di. CK skor ortalaması 2,3±1,9'du. 27 (% 67.5) katılımcı vücutlarının en az bir yerinde ağrı hissettiklerini ifade ettiler. Ağrılı alan dağılımları şu şekildeydi: abdomen (n=16), göğüs (n=3), baş (n=10), boyun (n=5), üst ektremite (n=5), alt ekstremite (n=19), bel (n=3). Ağrı tipine göre dağılım: % 31,2'si visseral ağrı (n=19) iken, % 68,2'si somatik ağrıydı. Ağrı şiddeti ortalama skoru (min-maks: 1,97-7) 4,6±1,6'ydı. **Tartışma:** Bu araştırmanın sonuçları HYTG geriatrik bireylerin büyük bir kısmının akut/subakut somatik ağrıdan yakındıklarını göstermiştir. Bu nedenle sağlık profesyonellerinin, özellikle fizyoterapistlerin bunun fardında olmaları gereklidir. HYTG geriatriklerin ağrı kontrol ekibi tarafından ele alınmaları uygulanan tedavinin etkiliğini arttırması açısından oldukça önemlidir.

Acute and subacute pain in hospitalized older adults: a cross-sectional descriptive study

Purpose: Pain is a common health problem in the geriatric population. Pain modulation is an important part of the geriatric rehabilitation program. The aim of this study is to describe acute/ subacute pain localization and intensity in hospitalized older adults (HOAs). **Methods:** Forty (25 females, 15 males) HOAs (mean age=75.6±9.3 yrs.) were evaluated with face to face interview method. Body mass index (BMI) and Charlson comorbidity (CC) scores were calculated. A Body chart (anterior and posterior view; 45 marked area) was used to describe localization of the presence of pain. Pain intensity was evaluated using a Visual Analogue Scale (VAS). **Results:** The mean length of stay in hospital (min-max=1-919 days) was 83.7±7 days. The mean of BMI and CC scores were 27.9±5.3 kg/m^2 and 2.3±1.9, respectively. Twenty-seven participants (67.5%) reported pain at least in one marked area on a body chart. Distributions of the painful areas are as follows: abdominal (n=16), chest (n=3), head (n=10), neck (n=5), upper extremities (n=5), lower extremities (n=19), lower back (n=3). According to the type of pain, there were 31.2% visceral pain and 68.2% somatic pain, respectively. The mean VAS score was 4.6±1.6 (min-max=1.8-7.0). **Conclusion:** This study showed that HOAs had a high occurrence of both somatic and visceral acute/subacute pain. More awareness is needed by health providers regarding this issue, especially physical therapists working with these patients. We suggest that HOAs should be considered in terms of pain by a pain modulation team to improve their health and to increase the effectiveness of the treatment.

S012

Temporomandibular eklem disfonksiyonu olan bireyde manuel terapinin etkinliği üzerine bir olgu sunumu

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Amaç: Bu çalışma, servikal bölge kasları ve çiğneme kaslarında miyofasiyal trigger noktalara uygulanan miyofasiyal terapinin temporomandibüler eklem (TME) ve çevresindeki kasların ağrı seviyesine etkisinin belirlenmesi amacıyla planlandı. **Yöntem:** Öyküsünde 12 yıldır ağır bruksisizm olan ve ortodonti bölümünde tedavi olarak botilinum toksin A önerilen 28 yaşındaki kadın hastanın, TME'de deviasyonla beraber görülen; yüz bölgesinde ise iki aydır devam eden ve giderek artan miyofasiyal ağrısı mevcuttu. Hastanın ağrılı kaslarına haftada iki seans olmak üzere toplamda üç hafta boyunca miyofasiyal terapi uygulandı. Ağrı şiddetini değerlendirmek için VAS kullanıldı. TME fonksiyonel seviyesi Steigerwald Maher Dizabilite Anketi ile, uyku kalitesi ise Pittsburgh Uyku Kalite İndeksi ile değerlendirildi. **Sonuçlar:** VAS'a göre tedavi öncesi 7 olan ağrı skoru, tedavi sonrası 1'e düştü. Steigerwald Maher Dizabilite Anketi tedavi öncesi dizabilite seviyesi % 25 iken tedavi sonrası % 15'e azaldı. Pittsburgh Uyku Kalite İndeksi tedavi skorunda ise bir değişiklik gözlenmedi (10: kötü uyku kalitesi). **Tartışma:** TME disfonksiyonunda miyofasiyal terapinin uygulandığı çalışmalar nadirdir ve çalışmalarda sadece çiğneme kaslarına uygulama yapılmıştır. Bu çalışmada servikal bölge ile beraber çiğneme kaslarına miyofasiyal terapi uygulanmış ve tedavinin sonucunda ağrı şiddetinde azalma ile beraber fonksiyonda artış meydana gelmiştir. Bu tedavi yaklaşımının klinik faydasını belirlemek için daha büyük bir popülasyonda randomize kontrollü çalışmalara ihtiyaç vardır.

A case report on the effectiveness of manual therapy in patients with temporomandibular joint dysfunction

Purpose: The aim of this study was to determine the effect of myofascial therapy applied to myofascial trigger points in the muscles of the cervical region and the muscles of the masticatory muscles, on the level of pain in the temporomandibular joint (TMJ) and surrounding muscles. **Methods:** A 28-year-old woman with a history of severe bruxism for 12 years, had increasing myofascial pain in the TMJ and facial region for two months. A botox treatment recommended to her by an orthodontic surgeon. The patient received myofascial therapy for painful muscles for three weeks, twice a week. VAS was used to evaluate the severity of pain. The functional level of TME was evaluated using the Steigerwald Maher Disability Questionnaire, and the Pittsburgh Sleep Quality Index assessed sleep quality. **Results:** When the VAS score was examined, the pre-treatment pain level was "7" while post-treatment value decreased to "1". According to the Steigerwald Maher Disability Questionnaire score, the level of disability was "25%" before treatment and reduced to "15%" after treatment. There was no change in the Pittsburgh Sleep Quality Index treatment score (10: poor sleep quality). **Conclusion:** Studies in which myofascial therapy has been performed in TME dysfunction are rare, and only masticatory muscles have been applied in the studies. As a result of the treatment, there was an increase in functionality with a decrease in pain intensity. However, randomized controlled trials are needed in larger populations to determine the clinical utility of this treatment approach.

S013

Kronik ağrılı kadınların beden farkındalık terapi deneyimleri

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Amaç: Çalışma kronik ağrılı kadınlarda Beden Farkındalık Terapisi'nin (BAT) etkinliğini incelemek amacıyla planlandı. **Yöntem:** Çalışmaya en az üç aydır kronik ağrı şikayetine sahip altı gönüllü birey dahil edildi. Nitel araştırma türlerinden durum çalışma deseni uygulandı. Ayrıca tekrarlı ölçümlerin nicel sonuçlar da incelendi. BAT haftada iki kez, toplam beş hafta boyunca grup terapisi şeklinde uygulandı. Sosyodemografik veriler kaydedildi. Bireylerin tedaviden önce ve sonraki dönemdeki BAT deneyimlerini ifade ettikleri nitel bir rapor doldurmaları istendi. Beden farkındalık düzeyi, ağrı şiddeti ve yaşam kalitesi ölçümleri de değerlendirilen nicel verilerdir. Nitel form kapsamında BAT komponenlerinden nefes, denge, yer-beden ilişkisi, kas gerilimi, günlük hayattaki etkilerini, terapi uygulanan ortamı ve terapisti içeren temalar sorgulandı. Her seans sonu yüz yüze görüşmelerle aktarılan deneyimler kaydedildi. Görsel Ağrı Skalası (VAS), Hastalık Kontrol Merkezi Sağlıkla İlişkili Yaşam Kalitesi Anketi (CDC-HRQOL-4) ve Vücut Farkındalık Anketi (VFA) kullanıldı. **Sonuçlar:** Katılımcıların yaş ortalaması 40,00±10,33 yıl idi. İkisi boyun, ikisi bel, biri diz ve biri sırt ağrısına sahipti. Doküman incelemesi ve sözlü kayıtlar incelenerek bireyler en çok doğru nefes alma, ayaktaki hareketlerde denge gelişimi, zihinsel odaklanma ve uykuya geçiş alanlarında kendilerinde olumlu etkiler olduğunu deneyimlediler. Terapiden önce ile sonrası arasında yaşam kalitesinin fiziksel sağlıkla ilişkili parametresi, vücut farkındalık düzeyi ve ağrı şiddeti bakımından anlamlı fark vardı (p<0,05). **Tartışma:** BAT kronik ağrıda nefes kontrolü sağlamada, zihinsel rahatlamada ve vücut farkındalığını geliştirmelerinde olumlu sonuçlar ortaya koydu.

Body awareness therapy experiences of women with chronic pain

Purpose: The aim of this study was to investigate the efficacy of body awareness therapy (BAT) in women with chronic pain. **Methods:** Six volunteers with chronic pain at least three months were included in the study. The case research design was applied to qualitative research types. In addition, the quantitative results of repeated measurements were also examined. BAT was applied twice a week for a total of five weeks in group therapy. Sociodemographic data were recorded. Individuals were asked to complete a qualitative report in which they expressed their BAT experience before and after treatment. Body awareness, pain severity and quality of life measures are also quantitative data. Within the context of qualitative form, the subjects including the effects of breathing, balance, ground-body relationship, muscle tension and effects in daily life, therapy area, and therapist were questioned from BAT component. Each session was recorded with face-to-face interviews. Visual Pain Scale (VAS), Health Control-Related Quality of Life Questionnaire (CDC-HRQOL-4), and Body Awareness Questionnaire (BAQ) were used. **Results:** The mean age of the participants was 40,00±10,33 years. Two women had neck, two has a waist, one has knee, and one has back pain. Document analysis and verbal recordings were examined, and individuals were found to have positive effects on correct breathing, balance in standing movements, mental focus and transition to sleep. There was a significant difference in terms of physical health-related parameters, body awareness level and severity of pain before and after therapy (p<0.05). **Conclusion:** The BAT has shown positive results in individuals with chronic pain to improve breathing control, mental relaxation and body awareness.

S014

Kronik nonspesifik bel ağrılı hastalarda Vücut Farkındalık Anketi'nin geçerlik ve güvenirlik çalışması

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Amaç: Kronik bel ağrısı gibi uzun süreli ağrı problemi yaşayan kişilerde vücut algısı bozulmaktadır ve vücut farkındalığı azalmaktadır. Bu çalışma kronik nonspesifik bel ağrılı hastalarda Vücut Farkındalık Anketinin (VFA) geçerlik ve güvenirliğini belirlemek amacıyla gerçekleştirildi. **Yöntem:** Araştırmaya 21-64 yaş aralığında kronik nonspesifik bel ağrısı olan toplam 180 (96 kadın, 84 erkek) katılımcı dahil edildi. Katılımcıların ağrı şiddeti Görsel Ağrı Skalası (GAS), bel ağrısından kaynaklanan özürlülük durumu Oswestry Özürlülük İndeksi (OÖİ), vücut farkındalık düzeyi durumu Vücut Farkındalık Anketi (VFA), benlik saygısı Rosenberg Benlik Saygısı Ölçeği (RBSÖ) ile değerlendirildi. **Sonuçlar:** Katılımcıların yaş ortalaması 42,14±13,27 yıldı. VFA'nın geçerliği güvenirliği için; VFA skorları ile OÖİ ve RBSÖ skorları karşılaştırıldı. İç tutarlılık güvenilirlik testinde Cronbach alfa katsayısı ölçeğin tamamı için 0,880 bulundu. İç tutarlılık maddelerde 0,718 ile 1,00 arasında değişmekteydi. VFA'nın eş zamanlı geçerliliğini değerlendirmek için OÖİ ve RBSÖ skorları karşılaştırıldı. Eşzamanlı geçerlilik analizleri VFA ve RBSÖ arasında pozitif yönlü bir korelasyon olduğunu göstermiştir (r=0,188, p=0,012). **Tartışma:** VFA kronik nonspesifik bel ağrılı hastalarda vücut farkındalığını değerlendirmek için kullanılabilecek geçerli ve güvenilir bir ölçektir.

Validity and reliability of the body awareness questionnaire in patients with non-specific chronic low back pain

Purpose: People with persistent pain problems such as chronic back pain (CLBP) have impaired body perception and decreased body awareness. This study was performed to determine the validity and reliability of the Body Awareness Questionnaire (BAQ) in patients with non-specific chronic low back pain**. Methods:** A total of 180 (96 females, 84 males) participants, aged 21-64 years, with chronic nonspecific back pain were included in the study. Visual Analog Scale (VAS) and Oswestry Disability Index (ODI) were used to determine pain intensity and disability level due to low back pain, respectively. The body awareness level by Body Awareness Questionnaire (BAQ) and self-esteem by Rosenberg Self-Esteem Scale (RSES) were assessed. **Results:** The mean age of the study subjects was 42.14±13.27 years. The scale was found to be reliable in patients experiencing non-specific chronic low back pain. Internal consistency reliability was found to significant for total Cronbach' alpha=0.880. The internal consistency ranged from 0.718 to 1.00 in the items. The scores of the ODI and the RSES were compared in order to assess the concurrent validity of the BAQ. The concurrent validity analyses showed that the BAQ and the RSES were significantly correlated (r=0.188, p=0.012). **Conclusion:** The BAQ is a valid and reliable scale for determining body awareness status in patients with chronic non-specific low back pain.

S015

Farklı yaş gruplarındaki diz osteoartritli bireylerin denge, fiziksel performans ve ağrı düzeylerinin karşılaştırılması

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Amaç: Farklı yaş gruplarındaki diz osteoartritli hastaların denge, fiziksel performans, ağrı düzeyleri ve yaşam kalitelerinin değerlendirilmesi ve gruplar arası farkların karşılaştırılmasıydı. **Yöntem:** Çalışmaya 40-65 ve 65 yaş üzeri diz osteoartritli 88 hasta alındı. Farklı yaş gruplarındaki diz osteoartritli bireylerin denge değerlendirilmeleri Tinetti Denge ve Yürüme Skalası ve tek ayak üstünde durma testi ile fiziksel performans değerlendirmeleri süreli kalk ve yürü testi, Fiziksel Fonksiyon ve Ağrı (WOMAC) İndeksi, 30 saniye otur ve kalk testi ve 10 metre yürüyüş testi ile ağrı değerlendirmeleri vizüel analog skalası ile, yaşam kalitesi ise Kısa Form-36 ile değerlendirildi. **Sonuçlar:** Tinetti denge ve yürüme değerlendirmesinde denge puanı gruplar arası fark anlamlı bulunurken (p<0,05), yürümenin toplam puanı anlamlı bulunmadı (p>0,05). Tek ayak üzerinde durma testi, süreli kalk ve yürü testi, 10 metre yürüme testi ve 30 saniye otur ve kalk testi gruplar arasında istatistiksel olarak anlamlı bulundu (p<0,05). WOMAC ölçeğinde gruplar arası ağrı ve fonksiyon puanlarında anlamlı bir fark bulunmadı (p>0,05). Ağrı değerlendirmesinde aktivite ve istirahat halinde gruplar arasında anlamlı bir fark bulunmadı (p>0,05). KF-36 yaşam kalitesi değerlerinde gruplar arası genel sağlık ile vücut ağrısı puanlarında anlamlı bir fark bulundu (p<0,05). **Tartışma:** Çalışmamızın sonucunda, ileriki yaşlarda olan bireylerin denge ve fiziksel fonksiyon seviyeleri genç yaşlı bireylere göre

daha düşük olduğu görüldü. Her iki grubun ağrı seviyeleri arasında bir fark bulunmazken, ağrının erken dönemlerinde de ortaya çıkabileceğini belirlendi. İleriki yaşlarda olan bireylerin genç yaşlı bireylere göre genel sağlık algı puanları arasında bir fark görülürken, ileriki yaşta olan bireylerin genç yaşlı bireylere göre genel sağlık düzeylerinin daha iyi olduğunu saptandı.

Comparison of balance, physical performance and pain levels of patients with knee osteoarthritis in different age groups

Purpose: The purpose was to evaluate balance, physical performance, pain levels and quality of life of patients with knee osteoarthritis in different age groups and to compare the differences between groups. **Methods:** Eighty-eight patients between 40 and 65 years of age were included. Tinetti Balance and Gait Scale and one leg stand time were evaluated as balance tests. Physical performance was assessed using time up and go test, Physical Performance and Pain (WOMAC) Scale, 30-sec chair sit and stand test, and 10 m gait test. Pain scores were evaluated using the Visual Analogue Scale, quality of life using Short Form 36. **Results:** While balance and gait scores between the groups were significant ($p<0.05$), the total score of gait was not significant. Single leg test, time up and go test, 10 m gait test and 30 sn chair sit and stand test were found significant ($p<0.05$). There was no significant difference between the groups in terms of activity and rest in pain assessment. The SF-36 quality of life was significantly different between the groups in terms of overall health and body pain scores ($p<0.05$). **Conclusion:** Balance, physical function levels in older ages were lower than those young elderly. While there was no difference between pain levels of both groups, we found that pain could occur in the early stages. There was a difference between general health scores in the older ages compared to younger elderly individuals. It was found that the individuals who were older had better general health perception levels than young elderly individuals.

S016

Kas yorgunluğunun kavrama kuvveti ve reaksiyon zamanı üzerine etkisi

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Amaç: Çalışmamızın amacı, sağlıklı bireyler üzerinde kas yorgunluğu sonrasında kavrama kuvveti ve reaksiyon zamanındaki değişikliklerin saptanmasıdır. **Yöntem:** Bu çalışma 61 sağlıklı kişi (21,26±2,28 yıl; 32 erkek, 29 kadın) üzerinde gerçekleştirildi. El kavrama kuvvetini değerlendirmek için; el dinamometresi; üst ekstremite reaksiyon zamanı için; Nelson El Reaksiyon Cetveli, Yorgunluk Düzeyi için Modifiye Borg Skalası kullanıldı. **Sonuçlar:** Dinlenme durumundaki reaksiyon zamanı ile yorgunluk sonrası reaksiyon zamanı karşılaştırıldığında, yorgunluk durumunda reaksiyon zamanı istatistiksel olarak anlamlı bir şekilde artmaktadır ($p=0.006$). Kavrama kuvveti dinlenme durumu ve yorgunluk sonrasında değerlendirildiği zaman yorgunluk sonrası dönemde istatistiksel açıdan anlamlı bir azalma saptanmıştır ($p<0.001$). **Tartışma:** Çalışmamızın sonunda sağlıklı bireylerdeki reaksiyon zamanının yorgunluk sonrasında uzadığı, kavrama kuvvetinin ise yorgunlukla birlikte azaldığı gözlenmiştir. Özellikle hız ve az hata gerektiren aktiviteler sırasında yaralanma riskinin azaltılması bakımından yorgunluğun olumsuz etkileri dikkate alınmalıdır.

The effect of muscle fatigue on grip strength and reaction time

Purpose: The aim of our study was to determine changes in the grip strength and reaction time after muscle fatigue on healthy individuals. **Methods**: The 61 healthy individuals (21.26±2.28 years; 32 males, 29 females) were included in this study. To evaluate hand grip strength; hand dynamometer (GRIP-D TKK5401), for upper extremity reaction time; Nelson Reaction Scale, for fatigue level; Modified Borg Scale were used. **Results**: When the reaction time in the resting state and the reaction time after fatigue were compared, the reaction time increased significantly in the case of fatigue ($p=0.006$). When the grip strength was evaluated after rest and fatigue, a statistically significant decrease was observed in the post-fatigue period ($p<0.001$). **Conclusion:** At the end of our study, it was observed that the reaction time in healthy individuals increased after fatigue and the grip strength decreased with fatigue. Particularly in the case of activities requiring speed and low error, the negative effects of fatigue should be taken into account in order to reduce the risk of injury.

S017

Kuzey Kıbrıs Türk Cumhuriyeti'nde çalışan fizyoterapistlerde iş doyumu ve iş doyumunu etkileyen faktörlerin değerlendirmesi

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Amaç: Bu araştırmada Kuzey Kıbrıs Türk Cumhuriyeti (KKTC)'nde Fizyoterapistlerin iş doyumunu ve iş doyumunu etkileyen faktörlerin incelenmesi amaçlandı. **Yöntem:** Araştırma KKTC'de farklı istihdam alanlarında çalışan fizyoterapistler üzerinde gerçekleştirildi. Tüm olguların sosyo-demografik bilgileri kaydedildi. Çalışma kapsamında fizyoterapistlerin sosyodemokrafik bilgileri kaydedildi. İş Doyumu düzeyinin belirlenmesinde "İş Doyum Anketi", kurumsal bağlılığı belirlemek içinse "Kurumsal Bağlılık Ölçeği" kullanıldı. **Sonuçlar:** Çalışmaya farklı alanlarda çalışan 97 Fizyoterapist (yaş ortalaması 31,1±10,9 yıl) dahil edildi. Fizyoterapistlerin toplam iş doyumu % 62,5±20,8 olarak belirlendi. Eğitim düzeyine göre iş doyumu alt ölçeklerinde ve genel iş doyumu ölçeği karşılaştırıldığında maaş/ücret alt ölçeği dışında puanlar açısından istatistiksel olarak anlamlı fark bulunmadı ($p>0,05$). Yaş gruplarına göre iş doyumu sonuçlarına bakıldığında liderlik ve maaş /ücret alt ölçekleri dışında diğer tüm ölçeklerdeki iş doyumu puanları yaş gruplarına göre istatistiksel olarak anlamlı düzeyde farklı olduğu görüldü ($p<0,05$). Çalışmaya katılan medeni durumlarına göre iş doyumuna bakıldığında maaş/ücret alt ölçeği dışında diğer tüm alt ölçeklerle medeni durumla iş doyumu arasında anlamlı fark bulundu ($p<0,05$). Çalışmaya katılanların meslekteki çalışma sürelerine göre puanlar açısından çalışma şartları, başarı, tanınma ve meslekte ilerleme iş doyumu alt ölçeklerinde istatistiksel olarak anlamlı fark bulundu ($p<0,05$). Günlük alınan hasta sayısına göre iş doyumu sonuçlarına bakıldığında iş doyumu alt ölçeklerinden başarı ve meslekte ilerleme puanlarında anlamlı fark görüldü ($p<0,05$). Kurumsal bağlılık puanı ile iş doyumu puanı arasında pozitif yönde ve orta düzeyde bir ilişki bulundu. **Tartışma:** KKTC'de fizyoterapistlerin iş doyumunu ve iş doyumunu etkileyen faktörleri inceleyen ilk çalışma özelliği taşıyan bu araştırmada, iş doyum oranının orta düzeyin biraz üzerinde olduğu görülürken iş doyumundayaş, medeni durum, çalışma süresi ve kurumsal bağlılığın etkin olduğu görülmektedir.

The job satisfaction and factors affecting job satisfaction among physiotherapist in the TRNC

Purpose: This study's aim is to investigate job satisfaction and the factors affecting job satisfaction among physical therapists in Northern Cyprus. **Methods:** The research was conducted on physiotherapists working in the different employment field. All sociodemographic data for physical therapists has been recorded. For job satisfaction, "Job Satisfaction Scale," for organizational commitment, "Organizational Commitment Scale" have been used for the current study. **Results:** In total, 97 physical therapists (mean age of 31.1±10.9 years) have participated in the study. The total job satisfaction was measured as 62.5±20.8% Considering education level, when the job satisfaction`s subscale and general job satisfaction scale are compared, except salary, there is no significant difference ($p>0.05$). Based on age levels, except leadership and salary, the rest subscales have a significant difference ($p<0.05$). Regarding the marital status of the participants, there is a significant difference between the subscales except for salary ($p<0.05$). When the participants' time of working in the occupation are compared, a significant difference between the subscales of working conditions, success, prestige, and career development is noted. ($p<0.05$). According to daily patients number, only success and development have a significant difference ($p<0.05$). In addition, there is a moderate positive correlation between job satisfaction and organizational commitment. **Conclusion:** The current study is the very first study that investigated the job satisfaction and factors affecting job satisfaction for physical therapists in Northern Cyprus. The study concluded that job satisfaction is a moderate level and the most important factors affecting job satisfaction are marital status, working hours and organizational commitment.

S018

Farklı mesleki deneyime sahip fizyoterapistlerde benlik saygısı, mesleki doyum ve tükenmişlik düzeylerinin incelenmesi

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Amaç: Mesleki yaşamlarında yoğun emosyonel ve fiziksel stresle başeden fizyoterapistlerde benlik saygısı, mesleki doyum ve tükenmişlik düzeylerini araştırmaktı. **Yöntem:** Türkiye'nin çeşitli illerinde enaz 1 yıldır çalışan, araştırmaya katılmaya gönüllü 168 fizyoterapist çalışmaya dahil edildi. Veriler, Maslach Tükenmişlik ölçeği, Rosenberg Benlik Saygısı Ölçeği, Mesleki Doyum Ölçeği ile toplandı. **Sonuçlar:** Yaş ortalaması 33,65±7,73 yıl, meslekte geçirilen sürenin ortalaması 120,20±91,35 aydı. Katılımcıların % 44'ü erkek, % 56'sı kadındı; % 56,5'i kamu, % 43,5'i özel sektörde, % 59,5'i genel fizyoterapi alanında % 40,5'i ise spesifik bir fizyoterapi alannda çalışmaktaydı. Kadın katılımcıların duygusal tükenmişlik ortalamaları erkeklere göre anlamlı düzeyde daha yüksekti (p=0,02). İş doyumu ile mesleki deneyim süresi ortalamaları arasında pozitif yönlü anlamlı bir ilişki vardı (p=0,02). Beş yıldan az süredir çalışanların mesleki doyum ortalaması, 15 yıldan fazla görev yapanlara göre daha yüksek (p=0,01) fakat duygusal tükenme ortalaması daha düşüktü (p=0,02). Çalışma alanı ile ne duygusal tükenme düzeyi (p=0,11) ne de mesleki doyumu ortalaması (p=0,32) arasında anlamlı bir farklılık yoktu (p>0,05). Kamuda çalışanlarda özel sektörde çalışanlara göre anlamlı, daha düşük duygusal tükenme düzeyi, daha yüksek mesleki doyum düzeyi tespit edildi (p=0,01). Benlik saygısı değişkeninin değerlendirilen tüm parametrelerle anlamlı düzeyde bir ilişkisi bulunmadı (p>0,05). Maaşının yaşam standardını karşıladığını düşünenlerin kişisel başarı ortalamaları (p=0,02) ve mesleki doyum ortalamaları anlamlı düzeyde yüksekken (p=0,01); duygusal tükenme ortalamaları düşüktü (p=0,01). **Tartışma:** Meslekte geçirilen süreye paralel duygusal tükenmişlik düzeyi artarken meslek doyum azalmaktadır. Çalışma ortamının ve kazancın iyileştirilmesi mesleki doyumun artmasına imkan verebilir.

Investigation of the self-esteem, professional satisfaction and burnout level of physiotherapists who have different professional experience

Purpose: The study tried to investigate the level of self-esteem, job satisfaction and burnout level in Physiotherapist who deal with intensive emotional and physical stress in their professional life. **Method:** The 168 subjects who have worked for at least one year around Turkey as physiotherapist have been investigated. Data have been gathered with using Maslach Burnout Inventory, Rosenberg Self-esteem Scale and Job Satisfaction Scale. **Results**: The mean age of the participants were 33.65±7.73 years and the mean of the working time was 120.20±91.35 months. 44% of the participants were males, and 56% was females, whereas 56.5% has worked in public and 43.5% in the private sector. The 59.5% of them was dealing with general physiotherapy and 40.5% in specific areas of physiotherapy. Female participants had had emotional exhaustion more than males (p=0.02). There was a positive correlation between job satisfaction and job experience (p=0.02). No correlation has been identified between workplace, emotional exhaustion (p=0.11) and job satisfaction (p<0.05). Public sector workers had had less emotional exhaustion and higher job satisfaction (p=0.01). No correlation for self-respect had been identified (p>0.05). Those who think their salaries are enough had more success rates (p=0.02), more job satisfaction (p=0.01), and less emotional exhaustion (p=0.01). **Conclusion**: The more time spends in the sector the higher the emotional exhaustion. Improvement in workspace and salaries can lead to an increase in job satisfaction.

S019

Farklı yaş gruplarında kavrama kuvveti ve reaksiyon zamanı arasındaki ilişkinin belirlenmesi

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Amaç: El fonksiyonları içerisinde kavrama kuvveti ve reaksiyon zamanı, günlük yaşam aktivitelerinin devamlılığı için önemli bir fonksiyondur ve genel vücut sağlığının bir göstergesidir. Çalışmamızın amacı, çocuk, yetişkin ve orta yaşlılarda kavrama kuvveti ve reaksiyon zamanı arasındaki ilişkinin belirlenmesiydi. **Yöntem:** Çalışmaya 40 çocuk (9,95±2,62 yıl, 21 kadın, 19 erkek), 40 yetişkin (42,63±14,34 yıl, 20 kadın, 20 erkek) ve 40 orta yaşlı birey (71,38±4,14 yıl, 19 kadın, 21 erkek) olmak üzere toplam 120 kişi katıldı. El kavrama kuvvetini değerlendirmek için, Jamar Hidrolik El Dinamometresi, üst ekstremite reaksiyon zamanı için Nelson El Reaksiyon Cetveli kullanıldı. Çocuk, yetişkin ve orta yaşlı katılımcıların kavrama kuvvetleri ve reaksiyon zamanlarının karşılaştırılmasında varyans analiz (ANOVA), korelasyonların saptanmasında Pearson korelasyon analizi kullanıldı. **Sonuçlar:** Çocuk ve yetişkin bireylerin kavrama kuvvetleri ile reaksiyon zamanları arasında istatistiksel olarak anlamlı bir korelasyon saptanmazken (p>0,05), orta yaşlı bireylerde kavrama kuvveti ve reaksiyon zamanı arasında istatistiksel olarak anlamlı, negatif yönlü ve kuvvetli bir korelasyon olduğu saptandı (r=-0,53, p<0,05). **Tartışma:** Çalışmamızın sonucunda çocuk ve yetişkin bireylerin kavrama kuvvetleri ile reaksiyon zamanları arasında bir ilişki bulunmazken, orta yaşlı bireylerin reaksiyon zamanları azaldıkça kavrama kuvveti değerlerinin arttığı görüldü. Literatürde hem kavrama kuvvetinin hem de reaksiyon zamanının ayrı ayrı yaşla birlikte nasıl değiştiği bilinmesine rağmen farklı yaş gruplarında bu iki değişken arasındaki ilişkiye dair bilgiler yeterli değildir.

Determination of the relationship between grip strength and reaction time in three different age groups

Purpose: Handgrip strength and reaction time functions are essential for the continuity of daily living activities and are indicative of general body function and health. The purpose of this study is to determine the relationship between grip strength and reaction time in three different age groups that are, children, adults and middle-aged. **Methods:** Forty children (9.95±2.62 years, 21 females, 19 males), 40 adult (42.63±14.34 years, 20 females, 20 males) and 40 middle-aged (71.38±4.14 years, 19 females, 21 males) a total of 120 individuals participated in this study. To assess hand grip strength; Jamar hydraulic hand Dynamometer, for upper limb reaction time; Nelson Reaction Scale was used. Variance analysis (ANOVA) and Pearson correlation analysis for correlations of grip strength and reaction times of children, adults, and middle-aged participants were used. **Results:** No statistically significant correlation was found between grip strength and reaction times of children and adults (p>0.05). There was a statistically significant strong negative correlation between grip strength and reaction time in middle-aged individuals (r=-0.53, p<0.05). **Conclusion:** As a result of our study, it was seen that the grip strength values of middle-aged individuals increase as the reaction times decreased. Although it is known in the literature how both the grip strength and the reaction time vary with age, the information on the relationship between these two variables in different age groups is not sufficient.

S020

Hastanede yatan yaşlı bireylerde disfaji ve malnütrisyon riskinin araştırılması

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Amaç: Yaşlılarda orofaringeal disfaji görülme sıklığı; evde yaşayanlarda % 30-40, geriatrik akut bakım kliniğine başvuranlarda % 44 ve hastanede yatanlarda % 60 olarak bildirilmiştir. Hastanede yatarak tedavi gören bireylerin % 25-50'sinde malnütrisyon görülürken hem malnütrisyon hem de disfajinin morbidite, mortalite, hastaneye tekrar başvurma, hastanede kalış süresi ve sağlık harcamaları oranlarında artışa neden olduğu ortaya konmuştur. Çalışmamızın amacı; hastanede yatarak tedavi gören yaşlılarda disfaji ve malnütrisyon prevelansını araştırmak ve potansiyel risk faktörlerini incelemekti. **Yöntem:** Prospektif ve kesitsel planlanan çalışmamıza Yakın Doğu Üniversitesi Hastanesi'nde yatarak tedavi görmekte olan (yaş ≥65 yıl) 20 yaşlı birey (10 kadın, 10 erkek) dahil edildi. Katılımcıların demografik bilgileri ve medikal öyküleri alındıktan sonra disfaji riskini araştırmak için T-EAT-10 Yutma Skalası,

malnütrisyon riski için de MNA-Kısa form kullanıldı. Ayrıca, solunum fonksiyon testlerinden tepe akım hızı (PEF), Yaşlılar için Fiziksel Aktivite Ölçeği (PASE) ve Yutma Yaşam Kalitesi Anketi (SWAL-QOL) potansiyel risk faktörlerini ortaya koymak için uygulandı. **Sonuçlar:** Yirmi katılımcının yaş ortalaması 76,5±9,9 yıl ve VKİ ortalamaları 27,8±6 kg/m^2 idi. T-EAT-10 Yutma Skalası'na göre 14 vaka (% 70) disfaji riski ve sekiz vaka (% 40) malnütrisyon riski taşırken dört vakada (% 20) malnütrisyon tespit edildi. Katılımcıların sadece 4'ünde (% 20) PEF değeri düşük çıkarken PASE skor ortalamaları 40,1±12,8 ve SWAL-QOL ise 196,7±16,3 olarak hesaplandı. **Tartışma:** Güncel literatürde disfaji geriatrik sendrom tanımının içerisinde kabul edilmekte ve yaşlılarda yüksek prevelans göstermektedir. Malnütrisyon disfajiden bağımsız olarak bu popülasyonda sıklıkla görülen bir diğer sorundur. Hayatı ve sağlık ekonomisini tehdit eden bu faktörler arasındaki ilişkinin daha geniş örneklemlerde incelenmesi, eşlik eden faktörlerin multidisipliner yaklaşımlarla ortaya çıkarılması; araştırmacılar için hedef konular olmalıdır.

The investigation of dysphagia and malnutrition risk in hospitalized older adults

Purpose: The prevalence of oropharyngeal dysphagia has been declared in older persons across different settings, with rates between 30-40% in independently home living, 44% in those admitted to geriatric acute care and 60% in institutionalized older patients. Studies have identified malnutrition in 25-50% of the hospitalized population. On the other hand; dysphagic and malnourished patients have higher rates of morbidity, mortality, hospital readmission, increased duration in living at the hospital, and costs for healthcare. The aim of this study was to investigate the prevalence of dysphagia and malnutrition and to assess the potential risk factors of hospitalized elderly. **Methods:** This prospective and cross-sectional study was conducted in NEU-Hospital including hospitalized (age ≥65 years) 20 older patients (10 females, 10 males). After recording the demographics and medical history of the participants; T-EAT-10 Swallowing Scale and MNA-Short form were used for the assessments. PEF, PASE, and SWAL-QOL were also used to describe the potential risk factors. **Results:** The mean age of 20 participants was 76.5±9.9 years and the mean BMI was 27.8±6 kg/m^2. Fourteen subjects (70%) were seen to be at dysphagia risk, eight subjects (40%) were seen at malnutrition risk. Moreover, four subjects (20%) were malnourished. Only four (20%) participants' PEF values were low. The mean score of PASE was calculated as 40.1±12.8 and SWALO-QOL was 196.7±16.3, respectively. **Conclusion:** Respect to updated relevant literature; the definition of a geriatric syndrome matches dysphagia as it is highly prevalent among the elderly. Malnutrition is another problem that seen independently in geriatrics. These factors threaten the life and healthcare economy. It would be valuable to investigate and disclose the co-factors in a larger sample size, multidisciplinary.

S021

Kuzey Kıbrıs Türk Cumhuriyeti'nde hayvancılık ve bahçecilik yapan çiftçilerde kas iskelet sistemi problemlerinin karşılaştırılması

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Amaç: Bu kesitsel çalışmada, KKTC'de hayvancılık ve bahçecilik yapmakta olan çiftçilerde kas iskelet sistemi problemlerinin karşılaştırılması amaçlandı. **Yöntem:** KKTC Çiftçiler birliğine kayıtlı olan çiftçilerden randomize olarak seçilmiş, gönüllü 1552 çiftçi dahil edildi. Katılımcılara literatürden derlenerek oluşturulan demografik ve mesleki veri formları yüz yüze görüşme yöntemi ile uygulandı. İskandinav Kas İskelet Sistemi Anketi (NORDIC) ile kas iskelet sistemi problemleri sorgulandı. Hem hayvancılık hem de bahçecilik yapan 164 çiftçi analize dahil edilmedi. **Sonuçlar:** Araştırmaya katılan çiftçilerden hayvancılıkla (n=939) ve bahçecilikle uğraşan (n=449) kişilerin yaş ortalamaları (sırasıyla 48,77±11,22 ve 48,35±12,04 yıl) benzerdi (p>0,05). Hayvancılık yapanların beden kütle indeksi (27,71±4,73 kg/m^2), bahçecilik yapanlardan (26,74±3,45 kg/m^2) anlamlı olarak yüksekti (p<0,05). Hayvancılıkla uğraşan çiftçilerin erkek yüzdesi (% 82,21), bahçecilikle uğraşan erkeklerden (% 66,59) yüksekti (p<0,05). Bahçecilik yapmakta olan çiftçilerin hayvancılık yapmakta olan çiftçilere göre ağrı prevelansı bel, boyun, omuz, dirsek, bilek, kalça ve diz bölgeleri için anlamlı olarak yüksek bulundu (p<0,05). Her iki grupta da en sık ağrı olan vücut bölgesi bahçecilerde % 65,26, hayvancılarda % 40,06 ile bel bölgesiydi. **Tartışma:** KKTC'de çiftçilik yapan bireylerde bel bölgesi başta olmak üzere kas iskelet sistemi ağrılarının yaygın olduğu görülmüştür. Kas iskelet sistemi problemlerini azaltmak amacıyla risk faktörlerine yönelik analizlerin yapılarak koruyucu yaklaşımların uygulanması toplum sağlığı için önem arz etmektedir.

The comparison of musculoskeletal problems at livestock and horticulture farmers in the TRNC

Purpose: The purpose of this cross-cultural study is to compare musculoskeletal problems among the livestock and horticulture farmers in the TRNC. **Methods:** Data have been collected from 1552 volunteer farmers chosen randomly from farmers who are registered to the farmers association in TRNC. Demographic and occupational data forms were compiled from the literature and surveys performed by participants using the face-to-face interview method. Musculoskeletal problems were questioned using the Nordic Musculoskeletal Questionnaire (NORDIC). Those 164 farmers who do both occupations in farming were not included in the analysis. **Results:** The mean age of the farmers, livestock (n=939) and horticulture (n=449) who surveyed this investigation was (48.77±11.22 and 48.35±12.04 years, respectively) was similar (p>0.05). Livestock farmers body mass index (27.71±4.73 kg/m^2) was significantly higher (p<0.05) than the horticulture farmers (26.74±3.45 kg/m^2). Male livestock farmers in percentage were (82.21%) significantly higher than male horticulture farmers (66.59%) percentage (p<0.05). The prevalence of low back pain, neck, shoulder, elbow, wrist, hip and knee regions were significantly higher in horticulture farmers in comparison to the livestock farmers (p<0.05). The most common painful body region was the lumbar region in both horticulture (65.26%) and (40.06%) livestock farmers. **Conclusion:** Musculoskeletal system pain is prevalent among farmers in TRNC, especially at the lumbar region. In order to mitigate the musculoskeletal problems, risk factors analysis for the implementation of preventive approaches is essential for the health of the community.

S022

Obez çocuklarda egzersiz ve diyet uygulamasının vücut kompozisyonu üzerine etkisi: pilot çalışma

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Amaç: Obezite her yıl en az 2,8 milyon kişinin hayatını kaybetmesine sebep olan bir hastalıktır. Araştırmamızda obez çocuklarda diyet ve egzersiz uygulamasının vücut kompozisyonu üzerine etkilerinin incelenmesi amaçlanmıştır. **Yöntem:** Araştırmaya Sağlıklı Yaşam Merkezinde diyetisyen gözetiminde beslenme programı uygulayan ailesinin onayı alınmış olan gönüllü çocuklar dahil edildi. Bireylerin demografik bilgileri kaydedildi. Vücut kompozisyonu başlangıçta ve sekizinci haftanın sonunda ölçüldü. Egzersiz programı sekiz hafta boyunca haftada iki gün fizyoterapist gözetiminde, bir gün ise ev egzersizi olarak uygulandı. Katılımcılar haftanın iki gününde aerobik egzersiz bir gününde ise aktif kuvvetlendirme egzersizleri yaptılar. **Sonuçlar:** Araştırmaya iki kız iki erkek olmak üzere dört çocuk katıldı. Çocukların yaş ortalaması 10,25±1,25 yıldı. Çocukların beden kitle indeksi ortalaması başlangıçta 25,23±5,75 kg/m^2 iken, diyet ve egzersiz sonrası 24,77±5,64 kg/m^2 olarak bulundu. Vücut yağ oranı ortalaması ise başlangıçta % 32,85±7,47 iken sekizinci hafta sonunda % 30,72±7,03 olarak bulundu. Vücut kompozisyonunun başlangıç ile sekizinci hafta değerleri arasındaki fark istatistiksel olarak anlamlı değildi (p>0,05). **Tartışma:** Sekiz haftalık egzersiz ve diyet programının obez çocuklarda beden kitle indeksi ve vücut yağ oranını azalttığı bulunmuştur. Lietratür kontrol edilerek, daha çok katılımcı ile egzersiz ve diyet kombinasyonu ile ilgili araştırmaya ihtiyaç vardır.

Effects of exercise and diet on body composition in obese children: a pilot study

Purpose: Obesity is a disease that causes at least 2.8 million people to lose their lives every year. We investigate the effect of dieting and exercise on body composition of obese children in our study. **Methods:**

The research was carried out in volunteer children who have received the consent of the family and enrolled in a nutrition program under the supervision of a dietitian in the Healthy Living Center. Participants' demographic data were recorded. Body composition was measured at baseline and the end of the eighth week. The exercise program was applied two days a week for eight weeks under physiotherapist supervision and one day for home exercise. Participants performed aerobic exercise two days a week and active strengthening exercises one day. **Results:** Four children including two girls and two boys participated in the study. The mean average age of children was 10.25±1.25 years. The average body mass index of children was 25.23±5.75 kg/m^2 at the beginning and 24.77±5.64 kg/m^2 after the diet and exercise. The body fat ratio average is initially 32.85±7.47%, and at the end of the 8th week, it was 30.72±7.03%. The difference between the baseline values of body composition and the eighth week was not statistically significant (p>0.05). **Conclusion:** At the end of the 8-week exercise and diet intervention, obese children were found to have decreased body mass index and body fat rate. There is a need for controlled studies in which diet and exercise are used together, which has a wider sample size.

S023

İlkokul ve lise öğretmenlerinin kas iskelet sistemi problemleri, fiziksel aktivite seviyeleri ve yaşam doyumlarının karşılaştırılması

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Amaç: Bu çalışmanın amacı Lise ve ilkokul öğretmenlerinin kas iskelet sistemi, fiziksel aktivite ve yaşam doyumunu karşılaştırmaktı. **Yöntem:** Çalışmaya gönüllü onam formunu imzalayan 80 lise ve 80 ilkokul öğretmeni katıldı. Yaş, cinsiyet, boy-kilo, kronik hastalık varlığı, haftalık ders saati ve meslek süreleri kaydedildi. Kas iskelet sistemi rahatsızlıkları için Genişletilmiş Nordic Kas İskelet Sistemi Anketi, fiziksel aktivite seviyesi için Uluslararası Fiziksel Aktivite Anketi (UFAA) ve yaşam doyumu için Yaşam Doyum Ölçeği (YDÖ) kullanıldı. **Sonuçlar:** Gruplar yaş, vücut kitle indeksi, kronik hastalık varlığı ve meslek yılları açısından benzerdi (p>0,05). Haftalık ders saati karşılaştırıldığında ilkokul öğretmenlerinin anlamlı olarak daha çok ders saati olduğu saptandı (p<0,001). Her iki öğretmen grubunda son 12 ayda benzer oranlarla en sık olarak bel ağrısının görüldüğü bulundu (p>0,05). UFAA sonuçlarına göre ilkokul ve lise öğretmenlerinin Şiddetli FA Puanı ve Orta Şiddetli FA Puanı arasında anlamlı bir fark bulunmadı (p>0,05). Yürüyüş FA Puanına ve FA Toplam Puanına bakıldığında ise lise öğretmenlerinin ilkokul öğretmenlerine göre daha fazla aktif olduğu belirlendi (p<0,001). YDÖ sonuçlarına göre ilkokul öğretmenlerinin lise öğretmenlerine göre yaşamdan anlamlı olarak daha fazla doyum aldıkları saptandı (p<0,05). **Tartışma:** Öğretmenlik kas-iskelet sistemini olumsuz etkileyen ve fiziksel aktivite yönünden zayıf olan bir meslektir. Bu sonuçlar düşünülerek özellikle ilkokul öğretmenlerine yönelik fiziksel aktivite seviyelerini geliştirme stratejileri konusunda eğitim programları düzenlenmelidir. Buna karşın lise öğretmenlerinin yaşamdan daha az doyum alma sebepleri ileri araştırmalarda daha kapsamlı olarak araştırılmalıdır.

A comparison of the musculoskeletal system problems, levels of physical activity, and satisfaction with life of primary and high school teachers

Purpose: The aim of this study was to compare the musculoskeletal system, physical activity, and life satisfaction of primary and high school teachers. **Methods:** Eighty high and 80 primary school teachers who signed the consent form participated in the study. Age, gender, height-weight, the existence of chronic disease, weekly lecture time, and occupation duration were recorded. Extended Nordic Musculoskeletal System Questionnaire for musculoskeletal system problems, International Physical Activity Questionnaire (IPAQ) for the level of physical activity, and Satisfaction with Life Scale (SLS) for life satisfaction were used. **Results:** Groups were similar in terms of age, body mass index, the existence of chronic disease, and occupation years (p>0.05). Primary school teachers had significantly more lecture times in a week (p<0.001). It was found that low back pain is the most frequently seen with similar proportions in both teacher groups during the last 12 months (p>0.05). According to the IPAQ results, no significant difference was found between the vigorous-intensity and moderate-intensity PA scores of primary and high school teachers (p>0.05). Looking at the walking and total PA scores, high school teachers were specified to be more active than primary school teachers (p<0.001). For SLS results, primary school teachers satisfied significantly more than high school teachers from life (p<0.05). **Conclusion:** Schoolteaching is an occupation which negatively affects the musculoskeletal system and is weak from the point of physical activity. Thinking on these results, education programs about developing strategies to increase the level of physical activity of primary school teachers, particularly. On the other hand, the causes of less life satisfaction of high school teachers should be more extensively investigated in further studies.

TELİF HAKKI DEVİR FORMU

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isimli makalenin tüm yayın haklarını **Türk Fizyoterapi ve Rehabilitasyon** dergisine devrediyoruz.

Aşağıda imzası olan yazarlar makaleyi dikkatlice okumuşlardır ve içeriği, dili ve biçimi konusunda fikir birliği içindedirler. Makalenin özgün olduğunu, başka bir dergide yayımlanmadığını ve başka bir dergiye yayımlanmak üzere gönderilmediğini beyan ederler.

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