Mehmet Akif Ersoy Üniversitesi

Sağlık Bilimleri Enstitüsü Dergisi

MAKÜ

BURDUR MEHMET AKİF ERSOY ÜNİVERSİTESİ

SBE

SAĞLIK BİLİMLERİ ENSTİTÜSÜ

ARALIK/DECEMBER **2022**
CİLT/VOLUME **10**
SAYI/ISSUE **3**

Mehmet Akif Ersoy University

Journal of Health Sciences Institute

E-ISSN: 2148-2837

ISSN: 2148-2837

MEHMET AKİF ERSOY ÜNİVERSİTESİ SAĞLIK BİLİMLERİ ENSTİTÜSÜ DERGİSİ

Mehmet Akif Ersoy University Journal of Health Sciences Institute

İletişim Adresi / Correspondence Address: Mehmet Akif Ersoy Üniversitesi Sağlık Bilimleri Enstitüsü Müdürlüğü MAKÜ Sağlık Bilimleri Enstitüsü Dergisi Sekreterliği 15030 - BURDUR
Telefon: +90 248 2133181 **Faks:** +90 248 2133190 **E-posta:** sagbild@mehmetakif.edu.tr
Web Adresi: http://dergipark.ulakbim.gov.tr/maeusabed/

Mehmet Akif Ersoy Üniversitesi Sağlık Bilimleri Enstitüsü Dergisi yılda 3 sayı olarak yayımlanır (Aralık-2019 itibariyle). Dergi, *DOAJ, Google Scholar, SciLib, Researchbib, SOBIAD, Türkiye Atıf Dizini* gibi ulusal ve uluslararası indeksler tarafından taranmaktadır.

Yıl/Year: 2022 – Cilt/Volume:10 – Sayı/Issue: 3

Yayın Kurulu / Advisory Board

Mehmet Akif Ersoy Üniversitesi Sağlık Bilimleri Enstitüsü Dergisi
YAZARLARA BİLGİ

I- Mehmet Akif Ersoy Üniversitesi Sağlık Bilimleri Enstitüsü Dergisi Genel Bilgiler

Mehmet Akif Ersoy Üniversitesi (MAKÜ) Sağlık Bilimleri Enstitüsü Dergisi, Mehmet Akif Ersoy Üniversitesi Sağlık Bilimleri Enstitüsü'nün yayın organıdır. Derginin kısaltılmış adı "MAKÜ Sag. Bil. Enst. Derg" dir. Yılda 2 kez yayınlanır. MAKÜ Sağlık Bilimleri Enstitüsü Dergisi sağlık bilimleri, (veteriner, tıp, diş hekimliği, hemşirelik ve spor bilimleri) alanlarında temel ve klinik hakemli bilim yazılarının yayınlandığı hakem-denetimli bir dergidir. Derginin dili İngilizce'dir. Dergiye gönderilen yazıların başka herhangi bir dergide yayınlanmamış, yayına kabul edilmemiş ya da yayınlanmak üzere değerlendirme aşamasında olmaması gerekir. Bu kural bilimsel toplantılarda sunulan ve özeti yayınlanan bildiriler için geçerli değildir. Ancak, bu gibi durumlarda bildirinin sunulduğu toplantının adı, tarihi ve yeri bildirilmelidir. Makalelerin formatı "Uniform Requirements for Manuscripts Submitted to Biomedical Journals: Writing and Editing for Biomedical Publication (http:/www.icmje.org/)" kurallarına göre düzenlenmelidir.

Gönderilen yazılar yayın kuruluna ulaştıktan sonra öncelikle, yazım kurallarına uygunluğu yönünden değerlendirilir; sonucu yazara dört hafta içinde bildirilir. Yazının, gerek teknik özellikleri gerekse genel kapsamı açısından derginin genel yayın ilkelerine uygun bulunmaması durumunda yazı reddedilir. Ya da, gerekirse, yazar(lar)ın yazıyı yazım kurallarına uygun biçimde yeniden göndermeleri istenebilir. Yeniden gönderilen yazılar benzer bir teknik incelemenin ardından yazım kurallarına uygun ise danışman denetimi sürecine alınır. Yazı, editör ve yardımcı editörler ile yazının başlık sayfasını görmeyen en az iki danışmana gönderilerek incelenir. Yazı, yayın kurulunun belirlediği ve bilimsel içerik ve yazım kuralları açısından değerlendirilir. Editör ve yardımcı editörler gerek gördüğünde makaleyi üçüncü bir danışmana gönderebilir. Hakem belirleme yetkisi tamamen editör ve yardımcı editörler ve yayın kuruluna aittir. Danışmanlar belirlenirken derginin uluslararası yayın danışma kurulundan isimler seçilebileceği gibi yazının konusuna göre ihtiyaç duyulduğunda yurt içinden veya yurt dışından bağımsız danışmanlar da belirlenebilir. Daha sonra, danışman raporları dikkate alınarak ve gerekirse yazar(lar)la tekrar iletişim kurularak yayın kurulunca son redaksiyon yapılır. Yazıların kabulüne editör karar verir.

Editör yayın koşullarına uymayan yazıları; düzeltmek üzere yazarına geri gönderme, biçimce düzenleme veya reddetme yetkisine sahiptir. Yazılarını geri çekmek isteyen yazarlar bunu yazılı olarak editöre bildirmek durumundadır. Editör görülen lüzum halinde bazı makaleler hakkında yayın yürütme kurulunun görüşüne başvurur. Bu değerlendirme süreci dergiye gönderilen yazı türlerinden araştırma yazılarını, olgu sunumlarını ve özgün yazıları kapsar. Diğer yazı türlerindeki yazılar doğrudan yayın kurulunca değerlendirilir. Dergiye gönderilen yazılar yayınlansın ya da yayınlanmasın geri gönderilmez. Tüm yazarlar bilimsel katkı ve sorumluluklarını ve çıkar çatışması olmadığını bildiren toplu imza ile yayına katılmalıdır. Araştırmalara yapılan kısmi de olsa nakdi ya da ayni yardımların hangi kurum, kuruluş, ilaç-gereç firmalarınca yapıldığı dip not olarak bildirilmelidir. Dergide yayınlanan yazılar için herhangi bir ücret ya da karşılık ödenmez.

Yayın kurulu yazar(lar)ın dergiye gönderdikleri yazıları değerlendirme süreci tamamlanmadan başka bir dergiye göndermeyeceklerini taahhüt ettiklerini kabul eder. İnsanlar ve hayvanlar üzerinde yapılan deneysel araştırmaların bildirildiği yazıların gereç ve yöntem bölümünde, bu araştırmanın yapıldığı gönüllü ya da hastalara uygulanan işlemler anlatıldıktan sonra kendilerinin onaylarının alındığını (informed consent) gösterir bir cümle bulunmalıdır. Yazar(lar), bu tür araştırmalarda, uluslararası alanda kabul edilen kılavuzlara (2002 yılında revize edilen 1975 Helsinki Deklarasyonu- http://www.wma.net/e/policy/b3.htm, Guide for the care and use of laboratory animals - www.nap.edu/catalog/5140.html), T.C. Sağlık Bakanlığı tarafından getirilen, 29 Ocak 1993 tarih ve 21480 sayılı Resmi gazetede yayınlanan "İlaç Araştırmaları Hakkında Yönetmelik" ve daha sonra yayınlanan diğer yönetmeliklerde belirtilen hükümlere uyulduğunu belirtmeli ve kurumdan aldıkları Etik Kurul Onayı'nın bir kopyasını göndermelidir. Metin içinde standart kısaltmalar kullanılır, bunlar ilk geçtikleri yerde açık olarak yazılır. İlaç adları kullanımında ilaçların jenerik adları Türkçe okunuşlarıyla yazılır. Ölçüm birimleri metrik sisteme uygun olarak verilir; örneğin, "mg" olarak yazılır, nokta kullanılmaz; ek alırsa („) ile ayrılır. Laboratuar ölçümleri Uluslararası Sistem (US; Systéme International: SI) birimleri ile bildirilir.

Bilimsel sorumluluk

Makalelerin tüm bilimsel sorumluluğu yazarlara aittir. Gönderilen makalede belirtilen yazarların çalışmaya belirli bir oranda katkısının olması gereklidir. Yazarların isim sıralaması ortak verilen bir karar olmalıdır. Sorumlu yazar, yazar sıralamasını "Yazar Sorumluluk ve Yayım Hakkı Devir Formu'nu" doldurarak tüm yazarlar adına kabul etmiş sayılır. Yazarların tümünün ismi makale başlığının altındaki bölümde yer almalıdır.

Yayın Ücretleri

Bu dergide yayın tamamen ücretsizdir. Yayın ücreti, başvuru ücreti, makale işleme ücreti ve bir figürün, rakamın veya tamamlayıcı verinin uzunluğuna göre ek ücret ödenmesi gerekmez. İçerik öğeleri (Editörler, Düzeltmeler, İlaveler, Geri Çekmeler, Mektuplar, Yorumlar vb.) tamamen ücretsizdir.

Etik sorumluluk

Makalelerin etik kurallara uygunluğu yazarların sorumluluğundadır. Hayvanlar üzerinde yapılan deneysel çalışmalarda, çalışma protokolünün çalışmanın yapıldığı kurumdaki hayvan deneyleri etik kurulu tarafından onaylandığı belirtilmelidir. Yazarlar etik kurul onayını makale ile birlikte göndermelidir. Eğer makalede daha önce yayımlanmış alıntı yazı, tablo, resim vs. var ise yazarlar; yayım hakkı sahibi ve yazarlarından yazılı izin alarak bu durumu makalede belirtmek zorundadır. Makalenin değerlendirilmesi aşamasında yayın kurulunun gerek görmesi halinde, makale ile ilgili araştırma verilerinin ve/veya etik kurul onayı belgesinin sunulması yazarlardan talep edilebilir.

İntihal politikası

Mehmet Akif Ersoy Üniversitesi Sağlık Bilimleri Enstitüsü Dergisi'ne (MAKÜ Sag. Bil. Enst. Derg.) Gönderilen yazılar intihal açısından değerlendirilir. Her gönderilen makale, iThenticate ve Turnitin yazılımı ile intihal için kontrol edilir. Makalenin benzerlik oranı %20'nin üzerinde ise, revize edilmesi için ilgili yazara geri gönderilir. Eğer makalenin yayınlanmasından sonra intihal kanıtlanırsa, bu makale derhal web sitesinden kaldırılır ve ilgili yazarlara makalelerinin MAKÜ Sag. Bil. Enst. Derg.'de yayınlanmasının uygun olmadığı bildirilecektir.

II- Dergiye Gönderilecek Yazı Türleri ve Özellikleri

a) Araştırma Makaleleri: Bu yazılar daha önce yayınlanmamış özgün araştırma verilerinin değerlendirildiği net anlam taşıyan bilimsel çalışmaları kapsar. Araştırma makaleleri "Öz, Giriş, Gereç ve Yöntem, Bulgular, Tartışma ve Kaynaklar" bölümlerinden oluşmalıdır. Dergide yayınlanmak üzere gönderilen araştırma makaleleri kapak sayfası hariç en fazla 20 sayfa olmalıdır. Araştırma makalelerinde kullanılacak tablo, çizim ve resim sayısı toplam 10'u geçmemelidir. Yazarlar gerek duydukları takdirde "Tartışma" bölümünden sonra "Teşekkür" bölümü açarak gerekli açıklamaları yapabilirler.

b) Derleme Makaleleri: Derleme makaleleri dergi editör/yayın kurulu tarafından "çağrılı derlemeler" başlığı altında oluşturulan alnında katkı sağlama potansiyeli olan yazıları içerir. Kaynakça bölümü en fazla 30 kaynakçadan oluşturulmalıdır. Derlemelerde kullanılacak tablo, çizim ve resim sayısı toplam 10'u geçmemelidir. Kapak sayfası hariç en fazla 20 sayfa olarak hazırlanmalıdır. Derlemelerde mutlaka "Öz, Giriş, Sonuç ve Kaynaklar" bölümleri bulunmalıdır.

c) Olgu Sunumları: Yazarların, herhangi planlanmış bir araştırmaya dayanmayan ancak karşılaştıkları yeni veya ender gözlemlenen olguların ele alındığı, bilimsel değere sahip bilgileri içeren eserlerdir. Bu eserlerde gereksiz uzatmaları önlemek amacıyla en fazla 15 kaynak kullanılmalı ve bu kaynakların güncel olmasına özen gösterilmelidir. Kapak sayfası hariç en fazla 5 sayfa olmalı; "Öz, Giriş, Olgu, Tartışma ve Kaynaklar" bölümlerinden oluşmalıdır.

d) Kısa Araştırma Raporu: Dar kapsamlı ele alınmış (sınırlı sayıda örneğin analiz edildiği çalışmalar vb.) ancak önemli ve yeni bilgiler sunan bilimsel araştırmaya dayalı makalelerdir. Kısa bildiriler araştırma makalesi formatında hazırlanmalı ve kapak sayfası hariç en fazla 10 sayfa olmalıdır. Bu eserlerde kullanılacak tablo ve şekil sayısı beşi geçmemelidir.

e) Özel Bölümler:

1. Editöre mektuplar: Dergide yayınlanan yazılara ilişkin değerlendirme ve eleştirileri içeren yazılardır. Mümkün olduğunca eleştirilen yazının yazar(lar)ınca verilen yanıtlar ile birlikte yayınlanır. Editöre mektuplar 3 sayfayı geçemez.

2. Toplantı haberleri/izlenimleri: Derginin yayın alanıyla ilgili konularda yapılmış ya da yapılacak olan bilimsel toplantıları tanıtıcı yazılardır. 1 sayfayı geçemez.

3. Dergi haberleri: Derginin yayın alanıyla ilgili konularda yayınlanmakta olan bilimsel dergileri tanıtıcı yazılardır; 1 sayfayı geçemez.

4. Web siteleri tanıtımı: Derginin yayın alanıyla ilgili konulardaki web sitelerini tanıtıcı yazılardır; 1 sayfayı geçemez.

5. Kitap/tez tanıtımı: Derginin yayın alanıyla ilgili konularda yayınlanmış bulunan kitapları/tezleri tanıtan yazılardır; 3 sayfayı geçemez.

III- Makalelerin Düzenlenmesi

Dergiye gönderilecek yazılar türlerine göre, başlık sayfası, İngilizce ve Türkçe özetler, ana metin, kaynaklar, tablo/şekil/resim bölümlerini içerir. Dergiye yayınlanması için gönderilen makalelerde aşağıdaki biçimsel esaslara uyulmalıdır: Yazı Microsoft Word programında Times New Roman yazı stilinde 12 punto büyüklüğünde, siyah renkte, 1,5 satır aralığında hazırlanmalıdır. Kenarlardan 2,5 cm boşluk bırakılmalıdır. Her sayfaya satır numarası eklenmelidir.

Anatomik terimler Latincede yazıldığı gibi kullanılmalıdır. Günlük tıp diline yerleşmiş terimler ise okundukları gibi Türkçe yazım kurallarına uygun olarak yazılmalıdır. İngilizce veya başka bir yabancı dildeki şekli ile yazılan terimler tırnak içinde belirtilmelidir. Yazının başlık sayfasında, yazının Türkçe ve İngilizce başlığı ve sayfa üstünde kullanılmak üzere boşluklar da dahil 40 karakteri aşmayacak şekilde Türkçe ve İngilizce kısa başlık önerisi bulunmalı. Çalışmaların yapıldığı klinik, anabilim dalı/bilim dalı, enstitü ve kuruluşun adı belirtilmelidir.

a) Başlık Sayfası: Gönderilen makalenin kategorisini, başlığını (Türkçe-İngilizce ve sadece ilk sözcüğün baş harfi büyük), yazarların adlarını (sadece baş harfleri büyük yazılır), çalıştıkları kurumları (rakamla dipnot olarak belirtilmeli), yazışmaların yapılacağı sorumlu yazarın adı, açık adresi, telefon ve faks numaraları ile e-posta adresini içermelidir. Sorumlu yazar yıldız (*) ile belirtilir. Makale daha önce bilimsel bir toplantıda sunulmuş ise toplantının adı, tarihi ve yeri belirtilerek yazılmalıdır.

b) Ana Metin Bölümü: Yazının ana metni Öz ve Anahtar Kelimeler, Giriş, Gereç ve Yöntem, Bulgular ve Tartışma başlıkları içinde düzenlenir. Özler ve anahtar sözcükler: Türkçe ve İngilizce olmak üzere iki dilde yazılır ve yazının başlığını da içerir.

Öz 200 kelimeyi geçmemeli, çalışmanın ana noktaları olan amacını, hayvan ve örnek popülasyonunu, metodunu ve önemli sonuçlarını, çalışmadan elde edilen çıkarımı klinik olarak uygulanabilirliğini içermelidir. Yayını okumadan okuyucular için anlaşılır olmalıdır ve özet içinde kaynaklara atıf yapılmamalıdır. Türkçe ve İngilizce özetler ayrı sayfalarda yazılmalı ve özetlerin sonunda her iki dilden en az 3, en çok 5 anahtar sözcük yer almalıdır. Anahtar kelimeler Index Medicus Medical Subject Headings (MeSH)'e uygun olmalıdır. Anahtar kelimeler için www.nlm.nih.gov/mesh/MBrowser.html adresine başvurulmalıdır.

Giriş bölümünde yazının dayandığı temel bilgilere ve gerekçelere kısaca değinildikten sonra, son paragrafında amaç açık bir anlatımla yer alır. Gereç ve yöntem bölümü gerekirse araştırma/hasta/denek grubu, araçlar, uygulama ve istatistik değerlendirme gibi alt başlıklara göre düzenlenebilir. Bu bölüm çalışmaya katılmayan birisinin de rahatlıkla anlayabileceği açıklıkta yazılmalıdır. Bulgular bölümü çalışmanın sonuçlarını özetler ve temel bulgular gerekirse tablo ve şekillerle desteklenir. Tartışma bölümünde çalışmanın bulguları ilgili yurt içi ve yurt dışı çalışmaların sonuçları bağlamında tartışılır; genel bir gözden geçirmeyi değil, özgün bulguların tartışılmasını içerir. Yayın sisteme yüklenirken ana metin bölümü ana dosya olarak yüklenmelidir.

c) Teşekkür: Yazarlar çalışmalarında vermek istedikleri ek bilgiler ile katkı sağlayan destekçi kurumlara ve/veya şahıslara teşekkür yazılarını bu bölümde belirtebilirler.

d) Kaynaklar: Kaynaklar listesi alfabetik sıraya göre yazılmalıdır. Sadece yayınlanmış veya yayına kabul edilmiş kaynaklar yer almalıdır. Kabul edilmiş ancak henüz yayınlanmamış kaynaklar için "baskıda" ifadesi kullanılmalıdır. Yazarlar kaynaklar listesinde bulunan bütün kaynakların metin içinde kullanılmış olduğunu kontrol etmelidirler.

Yayındaki bütün kaynaklar kullanılmalıdır. Makale içinde referans kullanma şekline örnekler.

Metin içinde doğrudan atıf yapılırken yazar veya yazarların soyadından sonra parantez içinde kaynağın yayın yılı belirtilmelidir.

Örnekler: Bell (2005) tarafından; Nielsen ve Engberg (2006) tarafından; Doyle ve ark. (2007) tarafından

Cümlenin sonunda atıf yapıldığında ise yazar ismi ve yayın yılı parantez içinde belirtilmelidir.

Örnekler: ...bildirilmiştir (Bell, 2005); ....bildirilmiştir (Nielsen ve Engberg, 2006); .....bildirilmiştir (Doyle ve ark., 2007).

Birden çok kaynağa atıf yapılması durumunda kronolojik sıralama yapılmalıdır.

Örnekler: ….bildirilmiştir (Bell, 2005; Nielsen ve Engberg, 2006; Doyle ve ark., 2007).

Aynı yazarın aynı yıl yayınları söz konusu ise her biri "a" harfinden başlayarak küçük harflerle işaretlenmelidir.

Örnek: …. (Bell, 2005a; Bell, 2005b; Bell, 2005c …). Atıf yapılırken aşırı kaynak kullanımından kaçınılmalıdır.

Kaynaklar listesinin düzenlenmesi:

Mendeley programı kullanan yazarlar aşağıda linki verilen dergi format stilini kullanarak çalışmalarını düzenleyebilir:
https://csl.mendeley.com/styles/529990351/makusagbilensderg

Kaynaklar listesinde yazar isimleri ve yayın yılı koyu harflerle yazılmalıdır. Kaynak listesi şu şekilde hazırlanmalıdır:

i) Kaynak makale ise

Yazarların soyadları ve adlarının ilk harfi yazılmalıdır. Devamında sırasıyla makalenin yayın yılı, makalenin adı, yayınlandığı derginin açık adı, cilt, sayı ve sayfa numaraları belirtilmelidir.

Örnekler:

Cohen, N.D., Vontur, C.A., Rakestraw, P.C., 2000. Risk factors for enterolithiasis among horses in Texas. Journal of the American Veterinary Medical Association 216, 1787-1794.

Rajmohan, S., Dodd, C.E., Waites, W.M., 2002. Enzymes from isolates of *Pseudomonas fluorescens* involved in food spoilage. Journal of Applied Microbiology 93, 205-213.

Ono, K., Yamamoto, K., 1999. Contamination of meat with *Campylobacter jejuni* in Saitama, Japan. International Journal of Food Microbiology 47, 211-219.

Yayınlanmak üzere kabul edilen ve DOI numarası bulunan, ancak henüz basılmamış makaleler için; makale künyesinin sonunda DOI numarası belirtilmelidir.

McGregor, B.A., Butler, K.L., 2014. The value of visual fleece assessment in addition to objective measurements in identifying Angora goats of greater clean mohair production. Small Ruminant Research, in press (DOI: 10.1016/j.smallrumres.2014.04.001).

ii) Kaynak kitap ise

Yazarların (veya editörün) soyadları ve adlarının ilk harfi yazılmalıdır. Devamında sırasıyla kitabın yayın yılı, adı, yayınevi veya yayınlayan kuruluş ve yayınlandığı yer belirtilmelidir. Kaynak, kitaptan bir bölüm ise bölüm yazarlarının isminden sonra sırasıyla kitabın yayın yılı, bölümün adı, editörün soy ismi ve adının ilk harfi, bölümün alındığı kitabın adı, yayınevi veya kuruluş, yayınlandığı yer, bölümün sayfa numaraları yazılmalıdır.

Örnekler:

Combs, G.F., 1992. The Vitamins: Fundamental Aspects in Nutrition and Health. Academic Press, San Diego.

Concannon, P.W., 1986. Physiology and Endocrinology of Cannine Pregnancy. In: Marrow, D.A. (Ed.), Current Therapy in Theriogenology. Philadelphia, W.B. Saunders Company, pp. 491-497.

Perkins, J.B., Pero, J., 2002. Vitamin biosynthesis. In: Sonenshein, A., Hoch, J., Losick, R. (Eds.), Bacillus subtilis and Its Closest Relatives: from Genes to Cells. ASM Press, Washington D.C., pp. 271-286.

Kramer, J.M., Gilbert, R.J., 1989. Bacillus cereus. In: Doyle, M.P. (Ed.), Foodborne Bacterial Pathogens. Marcel Dekker, New York, pp. 22-70.

iii) Kaynak bir tez ise

Tezi yazan kişinin soyadı ve adının ilk harfi koyu olarak yazılmalı, kabul edildiği yıl, tezin başlığı, tezin cinsi (yüksek lisans veya doktora), üniversitesi ve enstitüsü belirtilmelidir.

Örnek:

Bacınoğlu, S., 2002. Boğa spermasında farklı eritme süreleri ve eritme sonrasında oluşturulan soğuk şoklarının spermatolojik özelliklere etkisi. Doktora Tezi, İstanbul Üniversitesi Sağlık Bilimleri Enstitüsü, İstanbul.

iv) Kaynak internette bulunan bir web sitesi ise

Yazarların soyadları ve adının ilk harfi (Yazar adı yoksa web sitesinin veya kaynağın adı) yazılır. Daha sonra sırasıyla yılı, makalenin adı, varsa yayıncı, internet adresi ve erişim tarihi belirtilir.

Örnekler:

FDA, 2001. Effect of the use of antimicrobials in food-producing animals on pathogen load. Systematic review of the published literature. http://www.fda.gov/cvm/antimicrobial/PathRpt.pdf (Erişim 14.12.2001)

Cleveland, C.W., Peterson, D.S., Latimer, K.S., 2005. An Overview of Canine Babesiosis. Clinical Pathology. College of Veterinary Medicine, The University of Georgia: http://www.vet.uga.edu/vpp/clerk/Cleveland (Erişim 17.12.2005).

Thierry, F., 2006. Contagious equine metritis: a review. Equine Reproductive Infections: http://www.equinereproinfections.com (Erişim 07.07.2006].

FSAI, 2008. Report of the Implementation Group on Folic Acid Food Fortification to the Department of Health and Children. Food Safety Authority of Ireland: http://www.fsai.ie/assets/0/86/204/cc3c2261-7dc8-4225-bf79-9a47fbc2287b.pdf (Erişim 20.06.2008)

v) Kaynak bilimsel toplantıda sunulmuş bir bildiri ise

Yazarların soyadı ve adının baş harfinden sonra sırasıyla toplantının yılı, bildirinin başlığı, toplantının adı, toplantı yeri, bildiri kitabındaki sayfa no yazılmalıdır.

Örnekler:

Cardinali, R., Rebollar, P.G., Mugnai, C., Dal Bosco, A., Cuadrado, M., Castellini, C., 2008. Pasture availability and genotype effects in rabbits: 2. development of gastro-intestinal tract and immune function of the vermiphorm appendix. In: Proc. 9th World Rabbit Congress, Verona, Italy, 1159-1164.

Mauget, R., Legendre, X., Comizzoli, P., 1998. Assisted reproductive technology in sika deer: a program to preserve endangered deer subspecies. In: Proc. 4th Int. Deer Biology Congress, Kaspovar, 185-186.

e) Tablolar: Kullanım sırasına göre numaralandırılmalı, kısa başlıklarla ifade edilmeli ve metin içinde tablo numarası verilerek (örneğin Tablo 1) atıfta bulunulmalıdır. Tablo başlıkları tablonun üst bölümüne yazılmalıdır. Tabloda kullanılan kısaltmalar ve gerekli açıklamalar tablo altında verilmelidir.

f) Şekil ve Resimler: Metinde kullanılan fotoğraflar, grafikler ve çizimler metin içinde şekil adı ile kullanılmalıdır. Şekiller kullanım sırasına göre numaralandırmalı ve kısa başlıklarla ifade edilmeli, metin içinde şekil numarası verilerek (örneğin Şekil 1) atıfta bulunulmalıdır. Şekil başlıkları şekillerin altında yer almalıdır. Şekillerde istenilen noktaya dikkat çekmek amacıyla; üzerlerine işaret konulmalı ve başlıklardan sonra yer alacak olan şekil altı notta kullanılan işaretler belirtilerek gerekli açıklamalar yapılmalıdır.

IV- Makale Süreci (Kör hakemlik)

Makale başvurusu yalnızca online olarak http://dergipark.gov.tr/maeusabed adresi üzerinden kabul edilmektedir. Sorumlu yazar, makale ile birlikte göndereceği tüm dosyaları yukarıdaki internet adresinde bulunan yeni makale gönder ikonunu tıklayarak sisteme ekleyebilir. Yazarlar dergiye gönderi yapmadan önce kayıt olmalıdır. Kaydolduktan sonra, ana sayfadaki Mehmet Akif Ersoy Üniversitesi Sağlık Bilimleri Enstitüsü Dergisi ikonuna tıklayarak; yazım kurallarına göre düzenlenmiş bilimsel çalışmayı dergi panelindeki Makale Gönder kısmından 4 basamaklı (başlarken, yükleme, kaynaklar, önizleme&gönder) gönderi işlemini yapabilir. Gönderilen makalede ön değerlendirme aşaması sırasında yazar künyeleri, çalışmanın yapıldığı kurum, etik kurul ya da özel izin adres bilgileri gibi tanıtıcı bilgiler içermemelidir. Ön değerlendirmeden (bilimsel nitelik, dil, yazım kuralları kontrolü, İntihal kontrolü iThenticate ve Turnitin programı,) geçen bilimsel çalışmaların hakem ataması yapılır. Sorumlu yazar makalenin hangi aşamada olduğunu sistem panelindeki Süreçteki Makaleler kısmından takip edebilir. Atanan hakemlere, kör hakemlik kuralları çerçevesinde çalışmanın tam metni, şekil, tablo, grafik ve resimleri sistem üzerinden yüklenerek e-posta aracılığıyla makale değerlendirme talebi gönderilir. Hakemler e-posta aracılığıyla gönderilen linke tıklayarak talebi kabul ya da reddederler. Kabul eden hakemler, kararlarını sistem üzerinden en fazla 1 ay içinde sebeplerle birlikte yüklemelidirler. Hakemin önerdiği düzeltme var ise tekrar yazara gönderilir. İstenilen düzeltmeler 1 ay içinde tamamlanıp gönderilmediği takdirde makale otomatik olarak iptal edilecektir. Editör, makalelerin yayın değerliliği ve hakemlerin görüşlerine dayanarak yayına kabul veya red kararını verir. İstenilen düzeltmeler yapıldıktan sonra makale yazar tarafından sisteme tekrar yüklenir. Derginin gizlilik bildiriminde belirtildiği gibi, yazarların kimlik bilgileri ve e-posta adresleri hiçbir şekilde başka amaçlar için kullanılmayacaktır.

Bu dergi; bilimsel araştırmaları halka ücretsiz sunmanın bilginin küresel paylaşımını artıracağı ilkesini benimseyerek, içeriğine anında açık erişim sağlamaktadır.

Mehmet Akif Ersoy University Journal of Health Sciences Institute
INSTRUCTIONS TO AUTHORS

I- Mehmet Akif Ersoy University Journal of Health Sciences Institute General Information

Mehmet Akif Ersoy University Journal of Health Sciences Intitute (MAKU J. Health Sci. Inst.) is the publication of Mehmet Akif Ersoy University Health Sciences Institute. It is published two times annualy. The journal is a peer-reviewed scientific journal in which basic and clinical scientific articles in the field of medical sciences (veterinary, medicine, dentistry, nursing and sports sciences) are published. The language of the journal is English. Papers submitted to the journal should not have been previously published, accepted for publication or be in the process of evaluation for publication in any other journal. This rule does not apply to articles presented as bulletins in scientific meetings and whose summaries are published. In such cases, however, the name, date and place of the meeting in which the paper was presented should be notified. The format of the article should be in accordance with the rules of "Uniform Requirements for Manuscripts Submitted to Biomedical Journals: Writing and Editing for Biomedical Publication (http:/www.icmje.org/)".

On receipt of the paper by the Editorial Board, the paper is evaluated for compliance with the format rules and the authors are informed about the result in four weeks. In the event that the paper is not found to comply with the general publication principles of the journal from the standpoint of either technical characteristics or general scope, the paper is rejected. Alternatively, the author(s) may be asked to re-submit the paper in accordance with the writing requirements. Papers resubmitted are passed through a similar technical examination and, if found to comply with the rules, are passed on for peer review. The paper is sent, without the title, to two reviewers selected by the board, who then assess the paper for scientific content and format compliance. When necessary the Editorial Advisory Board can send the paper to third reviewers. The selection of reviewers is ultimately at the discretion of the editor, associate Editors and/or the editorial board. The appropriate reviewers can be selected from journal's international database of reviewers listing or, if needed; independent reviewers can be determined from inland or abroad. Thereafter the Editorial Advisory Board carries out the final editing, taking the reports of the reviewers into consideration, and, when necessary, communicating with the author(s).

The Editor gives the final decision about the acceptance of the manuscript. The Editorial Board is authorized to publish the paper, return it for correction, or reject it. The assessment process involves research articles, case reports and original articles submitted to the journal. Other types of articles are evaluated directly by the Board. Papers submitted to the journal will not be returned whether they are published or not. The Editor and the Editorial Board have the right to reject, to require additional revision or to revise the format of manuscripts which do not follow the rules. The authors should inform the editorial board if they decide to withdraw the manuscript. The editor may consult editorial executive board about a manuscript if (s) he deems necessary. All the authors should submit a collectively signed statement that there is no conflict of interest regarding scientific contribution or responsibility. The association, establishment, and medication-material supply firms which have given financial, even partial, or material support to the research should be mentioned in a footnote. No fee or compensation will be paid for articles published in the journal.

The Editorial Board assumes that the author(s) are obliged not to submit the paper to another journal before completion of the assessment process. In the "method" section of articles concerned with experimental research on humans or animals, a sentence showing that the informed consent of patients and volunteers has been obtained following a detailed explanation of the interventions carried out on them. In such studies, authors should clearly state the compliance with internationally accepted guidelines (1975 Helsinki declaration revised in 2002 http://www.wma.net/e/policy/b3.htm, Guide for the care and use of laboratory animals-www.nap.edu/catalog/5140.html) issued by the Republic of Turkey Ministry of Health and published in the Official Journal dated 29 January 1993 number 21480 "Regulations Concerning Drug Research", and other more recently published rules laid out in governing statutes. They should forward a copy of the Ethic Committee Approval received from the relevant institution. Standard abbreviations used in the text are written in full when first mentioned. In the use of drugs, the generic names should be written in their Turkish pronunciation spelling

form. Measurement units are given according to the metric system; e.g. written as “mg”, no punctuation is used, in the case of extensions („) is used as a separator. Laboratory measurements are reported in International System Units (US; Systeme Internationale; SI).

Scientific responsibility

All scientific responsibility of the articles belongs to the authors. The authors of the submitted article must have a specific contribution to the work. Authors' name ordering should be a joint decision. Corresponding author is considered to accept the author sorting by filling in "Author Responsibility and Publication Transfer Form" on behalf of all authors. All of the authors should be listed under the title of article.

Publication Fees

Publication in this journal is totally FREE. There are no publication charges, no submission charges, no article processing charges and no surcharges based on the length of an article, figures or supplementary data. Editorial items (Editorials, Corrections, Additions, Retractions, Letters, Comments, etc.) are published free of charge.

Ethical responsibility

The authors are responsible for their compliance with the ethical rules. In experimental studies on animals, it should be noted that the study protocol has been approved by the animal experiment ethics committee at the institution where the study was conducted. Authors should submit the ethics committee's approval with the article. If there are previously published text, tables, pictures, etc. in the article, the authors have to get written permission from the copyright holder and the authors should specify and indicate the used material in the manuscript. In the course of the manuscript evaluation, the authors may be requested to submit the research data and / or the ethics committee approval document if deemed necessary.

Plagiarism policy

Manuscripts submitted to Mehmet Akif Ersoy University Journal of Health Sciences Institute is evaluated in terms of plagiarism. Every submitted article is checked for plagiarism through iThenticate and Turnitin software. When Smilarity Index of the article is above %20, it is sent back to the corresponding author to revise it. If plagiarism is proved after publication of the article, that article will be immediately removed from the website and the concerned authors will be considered ineligible for publication of their articles in Mehmet Akif Ersoy University Journal of Health Sciences Institute.

II- Types and Characteristics of Papers to be Submitted to the Journal

a) Research Articles: These articles are prepared in full accordance with the writing style definitions given below, in which previously unpublished original research data are evaluated. The main text section of the research articles should include (Title, Introduction Materials and Methods, Results, Discussion and Conclusion) sections and (excluding title page, bibliography, tables/figures/pictures) should not exceed 20 pages. If some parts of the research data given in these articles have previously been discussed in another paper, this must be notified without fail when sending the paper and, in addition, reference should be made to the relevant paper within the bibliography.

b) Review Articles: Review Articles should cover subjects falling within the scope of the journal which are of active current interest. They may be submitted or invited. Invited reviews will normally be solicited by the Review's Editor, but suggestions for appropriate review topics may be sent to editor.

c) Case Reports: These are articles which present and discuss the characteristics of one or more cases which have special features and scientific importance from the clinical evaluation, observation or other standpoint. Case presentations include the title page, summary, main text (includes introduction, case and discussion), bibliography, table/figure/picture sections; subtitles in the main text are organised according to the text content. Abstracts of the

case presentations should have 150 words. The main text (excluding title page, bibliography, table/figure/picture) should not exceed 10 pages.

d) Brief Reports: These are articles in which original ideas dealing with important theoretical or practical problems related to a specific subject are presented and discussed. Original articles include a title page, summary,

main text, bibliography, table/figure/picture sections; subtitles in the main text are organised according to the text content. The main text of original articles (excluding title page, bibliography, table/figure/picture) should not exceed 10 pages.

e) Special Sections:

1. Letters to the Editor: These articles include evaluation and criticisms of articles published in the journal. These are published together with the responses of the author(s) of the paper concerned where possible. Letters to the Editor may not exceed 5 pages.

2. Meeting news/notes: These articles introduce scientific meetings held or to be held on subjects within the scope of the journal. The paper may not exceed 1 page.

3. Journal news: These articles introduce scientific journals being published within the scope of the journal. The paper may not exceed 1 page.

4. Introduction of websites: These articles introduce websites relevant to the scope of the journal. These articles may not exceed 1 page.

5. Book/Thesis Section: These articles introduce books/theses published on subjects related to the scope of the journal and may not exceed 3 pages.

III- Preparation of Manuscripts

Papers to be submitted to the journal include the sections of title page, abstract, main text, references and tables/figures/pictures. Articles submitted for publication in the journal should follow the following formal principles: The text should be prepared in Microsoft Word program in Times New Roman font style with a font size of 12 font, black and 1.5 line. All side of the paper, page margins should be as 2.5 cm. Line numbers should be added to the beginning of the page.

Anatomical terms should be used as written in Latin. Running title (not exceed 40 characters) of the manuscript should add to title page. The name of the clinic, department / science, institute and institution should be stated.

a) Title Page: should contain the category, the title (only first letter capital), the names of the authors (only the first letters capital), the institution (s) where they work (indicated with numbered footnotes), corresponding author (address, phone, fax numbers and e-mail address). Corresponding author is indicated by an asterisk (*). If the article was previously presented at a scientific meeting, the name, date and place of the meeting must be stated.

b) Main Text: The main text of the paper is organised under the subtitles of Abstract and Keywords, Introduction, Materials and Methods, Results and Discussion.

Abstract and Keywords: This is written in two languages, Turkish and English, and also includes the title of the paper. The abstract is consists of 200 words. The abstract should bring out the main points of the manuscript and should include the following information: objective, the animals or sample population involved, design, the materials and methods used, the main results, a brief conclusion and clinical relevance, where applicable. They should be comprehensible to readers before they have read the paper, and abbreviations and reference citations should be avoided. At the end of the abstract, at least 3, at most 5 keywords in both languages are included.

In the introduction, following a brief statement of basic information and justifications which constitute the basis of the paper, the objective is clearly given in the last paragraph. If necessary, the “method” section may

be organised according to sub-titles such as research/patient/ test group, instruments, application and statistical analysis. This section should be written with clarity so that a person not involved in the study may easily understand. Results summarize the findings of the study and, when necessary, basic findings are supported with tables and figures. In the discussion section, the findings of the study are discussed in the light of relevant national and international studies; this section includes discussion of original findings, not a general review.

c) Acknowledgements: When considered necessary, author(s) may add brief acknowledgements in a few sentences to those whose contributions to the paper are not at author level but deserve to be mentioned. Here, the contributions of those acknowledged (e.g. financial or equipment aid, technical support etc) are clearly stated (e.g. "scientific counseling", "editing of the draft", "data collection", "participation in clinical research" etc).

d) Bibliographic References:

All citations in the text should refer to: the year of publication of the reference should be indicated in parentheses after the surname of the author or authors.

Examples: Bell (2005), Nielsen and Engberg (2006), Doyle et al. (2007) were indicated that.....

The name of the author and the year of publication should be stated in parentheses at the end of the sentence.

Examples: ...were detected as 23% of the samples (Bell, 2005); ....were detected as 23% of the samples (Nielsen and Engberg, 2006); ...were detected as 23% of the samples (Doyle et al., 2007).

In case of more than one reference, references should be arranged chronologically.

Examples: ....were reported that... (Bell, 2005; Nielsen and Engberg, 2006; Doyle et al., 2007).

More than one reference from the same author(s) in the same year must be identified by the letters 'a', 'b', 'c', etc., placed after the year of publication.

Examples: (Bell, 2005a; Bell, 2005b; Bell, 2005c …)

The authors can use below formatted style link in mendeley:

http://csl.mendeley.com/styles/529990351/sagbilensderg

References should be written in alphabetical order. Reference style, the authors' names and year of publication should be written in bold. Source list should be prepared as follows:

i) Examples of journal articles:

Cohen, N.D., Vontur, C.A., Rakestraw, P.C., 2000. Risk factors for enterolithiasis among horses in Texas. Journal of the American Veterinary Medical Association 216, 1787-1794.

Rajmohan, S., Dodd, C.E., Waites, W.M., 2002. Enzymes from isolates of *Pseudomonas fluorescens* involved in food spoilage. Journal of Applied Microbiology 93, 205-213.

Ono, K., Yamamoto, K., 1999. Contamination of meat with *Campylobacter jejuni* in Saitama, Japan. International Journal of Food Microbiology 47, 211-219.

For articles that are accepted for publication and have a DOI number but not yet published; DOI number must be specified at the end of the article.

McGregor, B.A., Butler, K.L., 2014. The value of visual fleece assessment in addition to objective measurements in identifying Angora goats of greater clean mohair production. Small Ruminant Research, in press (DOI: 10.1016/j.smallrumres.2014.04.001).

ii) Books:

Combs, G.F., 1992. The Vitamins: Fundamental Aspects in Nutrition and Health. Academic Press, San Diego.

Concannon, P.W., 1986. Physiology and Endocrinology of Cannine Pregnancy. In: Marrow, D.A. (Ed.), Current Therapy in Theriogenology. Philadelphia, W.B. Saunders Company, pp. 491-497.

Perkins J.B., Pero, J., 2002. Vitamin biosynthesis. In: Sonenshein, A., Hoch, J., Losick, R. (Eds.), Bacillus subtilis and Its Closest Relatives: from Genes to Cells. ASM Press, Washington D.C., pp. 271-286.

Kramer, J.M., Gilbert, R.J., 1989. Bacillus cereus. In: Doyle, M.P. (Ed.), Foodborne Bacterial Pathogens. Marcel Dekker, New York, pp. 22-70.

iii) Thesis:

Bacınoğlu, S., 2002. Boğa spermasında farklı eritme süreleri ve eritme sonrasında oluşturulan soğuk şoklarının spermatolojik özelliklere etkisi. Doktora Tezi, İstanbul Üniversitesi Sağlık Bilimleri Enstitüsü, İstanbul.

iv) Web site or author is an institution:

FDA, 2001. Effect of the use of antimicrobials in food-producing animals on pathogen load. Systematic review of the published literature. http://www.fda.gov/cvm/antimicrobial/PathRpt.pdf (Accessed: 14.12.2001)

Cleveland, C.W., Peterson, D.S., Latimer, K.S., 2005. An Overview of Canine Babesiosis. Clinical Pathology. College of Veterinary Medicine, The University of Georgia: http://www.vet.uga.edu/vpp/clerk/Cleveland (Accessed: 17.12.2005).

Thierry, F., 2006. Contagious equine metritis: a review. Equine Reproductive Infections: http://www.equinereproinfections.com (Accessed: 07.07.2006).

FSAI, 2008. Report of the Implementation Group on Folic Acid Food Fortification to the Department of Health and Children. Food Safety Authority of Ireland:http://www.fsai.ie/assets/0/86/204/cc3c2261-7dc8-4225-bf79-9a47fbc2287b.pdf (Accessed: 20.06.2008).

v) Paper presented at a scientific meeting

Cardinali, R., Rebollar, P.G., Mugnai, C., Dal Bosco, A., Cuadrado, M., Castellini, C., 2008. Pasture availability and genotype effects in rabbits: 2. development of gastro-intestinal tract and immune function of the vermiphorm appendix. In: Proc. 9th World Rabbit Congress, Verona, Italy, 1159-1164.

Mauget, R., Legendre, X., Comizzoli, P., 1998. Assisted reproductive technology in sika deer: a program to preserve endangered deer subspecies. In: Proc. 4th Int. Deer Biology Congress, Kaspovar, 185-186.

e) Tables: Each table is printed on a separate page and numbered according to the sequence of referral within the text (Table 1). Each table has a title and, when necessary, explanations are given under the table (e.g. abbreviations given in the table). Each table should be understandable without need for referral to the text. Each table should be referred to in the text..

f) Figures and Pictures: Figures should be numbered according to the order of use and should be expressed with short titles.Figures should be numbered in the text (Figure 1). Letters, numbers and symbols within the figure should be clear and readable when downsized for printing.Each figure should be referred to in the text..

IV- Submission of Articles (Blind Peer-Review)

The article submission is only accepted online via 'http://dergipark.gov.tr/maeusabed' The Corresponding authors, all the files can be added to the system by clicking the submit new article icon at the above address. Authors must register on Dergipark system before submitting a manuscript. After signing up, clicking Mehmet Akif Ersoy University Journal of Health Sciences icons on the main page, the manuscript written according to the guide for authors is submitted in 4 steps (start, submission, reference, preview & submit). The submitted manuscript must not contain any identifying information, such as author information, institution, ethics committee or special permit address, during the preliminary evaluation phase. The manuscript that pass the preliminary evaluation (paper scientific qualification, language, conformity to Guide for author and checking plagiarism via iThenticate and Turnitin program,) are assigned to the Reviewers. The corresponding author can follow the article

evaluation process from the section on the Articles in the Process. According to the blind peer-review rules, the main text, tables, graphics and pictures of the manuscript are uploaded via the system and sent to the appointed reviewers for an article evaluation request via e-mail. The reviewers accept or reject the request by clicking on the link sent via e-mail. The reviewers who accept it have to upload their decisions together with the reasons within a maximum of 1 month via the system. If the correction requested by the Reviewer is sent back to the author. If the requested corrections are not completed within 1 month, the article will be automatically canceled. After the desired corrections are made, the article is uploaded back to the system by the author. The editor makes decisions to accept or reject papers based on their opinion of the papers' publication worthiness and reviewers' comments. As stated in the privacy statement, authors' identity information and e-mail addresses will not be used for any other purpose.

MEHMET AKİF ERSOY ÜNİVERSİTESİ SAĞLIK BİLİMLERİ ENSTİTÜSÜ DERGİSİ

(Mehmet Akif Ersoy University Journal of Health Sciences Institute)

MÜRACAAT VE YAYIN HAKLARI DEVİR FORMU

(Application and Copyright Transfer Statement)

Derginin kısaltılmış adı: **"MAKÜ Sağ. Bil. Enst. Derg."** dir.

Mehmet Akif Ersoy Üniversitesi Sağlık Bilimleri Enstitüsü Dergisinde yayınlanmak üzere göndermiş olduğumuz "……." adlı

Orijinal Araştırma / *Research Articles* ( ),
Derleme / *Review Articles* ( ),
Gözlem / *Case Reports* ( ),
Editöre Mektup / *Editorial Letter* ( ),
Diğer / *Other* **( ), (**……..…….) ile ilgili olarak;

The authors confirm the fallawing statements:

1-that there has been no duplicate publication or submission elsewhere of this work

2-that all authors have read and approved the manuscript, are aware of the submission for publication and agree to be listed as co-authors.

1-Bu makalenin/derlemenin bir kısmı ya da tamamı başka bir dergide yayınlanmamıştır.

2-Bu makale/derleme yayınlanmak üzere başka bir dergiye gönderilmemiştir.

3-Makale/derleme yayınlandıktan sonra tüm hakları Mehmet Akif Ersoy Üniversitesi Sağlık Bilimleri Enstitüsü Dergisine devredilmiştir.

4-Tüm yazarlar makaleyi okumuş ve onaylamıştır. Yayınlanmak üzere dergiye gönderildiğinden haberdardır.

5-Tümü veya bir bölümü yayınlandı ise derginizde yayınlanabilmesi için gerekli iznin alındığını garanti ederiz.

Aşağıdaki maddelerde belirtilen haklarımız saklı kalmak kaydı ile makalenin telif hakkını Mehmet Akif Ersoy Üniversitesi Sağlık Bilimleri Enstitüsü Dergisi'ne devrettiğimizi taahhüt ve imza ederiz.

a- Telif hakkı dışında kalan patent vb. bütün haklar,

b- Yazarların ders, kitap gibi çalışmalarında makaleyi ücret ödemeksizin kullanabilme hakkı,

c- Satmamak üzere kendi amaçları için makaleyi çoğaltma.

Yazarlar / Author Name (tüm yazarlar tarafından imzalanacaktır)	**İmza / Signature**	**Tarih / Date**

Yazışma adresi / Corresponding author address:		
Telefon:	**Fax:**	**E-mail:** …….@.....

(Form doldurulup imzalandıktan sonra; **"Mehmet Akif Ersoy Üniversitesi Sağlık Bilimleri Enstitüsü Dergisi Editörlüğü, 15030-BURDUR"** adresine yollayınız).

This Form should be signed by all authors OR by the corresponding (or senior) author who can vouch for all co-authors. A scanned copy of the completed Form may be submitted online. Alternatively, the completed Form may be faxed to the relevant Editor:

Burdur Mehmet Akif Ersoy Üniversitesi

Mehmet Akif Ersoy Üniversitesi
Sağlık Bilimleri Enstitüsü Dergisi

İÇİNDEKİLER / CONTENTS

Araştırma Makaleleri / Research Articles

Olgu Sunumları / Case Reports

MAKU J. Health Sci. Inst. 2022, 10(3): 134-145.
doi: 10.24998/maeusabed.1123566

Mehmet Akif Ersoy University
Journal of Health Sciences Institute
http://dergipark.gov.tr/maeusabed

Research Article / Araştırma Makalesi

The Comparative Effects of Ball Squeezing and Cartoon Watching in Pain Management in Children during İntramuscular İnjection: A Randomized Control Trial

Çocuklara Enjeksiyon Sırasında Stres Topu Verilmesinin ve Çizgi Film Seyrettirmenin Ağrıyı Azaltma Etkisi: Randomize Kontrollü Çalışma

Feyza BÜLBÜL[1], Serap ÖZDEMİR[2*]

[1]Uşak University, School of Health, Uşak, Türkiye
[2]Kilis 7 Aralık University, Yusuf Seferoglu Faculty of Health Sciences, Department of Nursing, Kilis, Turkiye

Abstract: This study was designed as a randomized controlled trial to investigate the comparative effect of ball squeezing and watching cartoons on pain management in children during intramuscular injection. The population of the study was comprised of 6-12 years old children who came to emergency for intramuscular injection. Power analysis was performed by G*Power program. Approximately 147 protocols completed with 6-12 years old children (each group 49 children). In the study, a questionnaire including child and socio-demographic characteristics their experiences of hospitalization data and Facial Pain Scale- Revised (FPS-R), Visual Analog Scale (VAS), and ball (for squeezing) were used. According to the results of the study, the FPS-R score during the procedure was the lowest in the stress ball group and was statistically significant ($p<0.05$). The lowest VAS scores during the procedure the lowest score was in the stress ball group and the differences between the relevant groups were statistically significant ($p<0.05$). It was determined that squeezing the ball and watching cartoons were effective in reducing pain during injection, however, the ball squeezing group had the lowest pain level. Among non-pharmacological methods, ball squeezing can be preferred as a practical and effective method, especially by pediatric nurses, in reducing pain during intramuscular injection in children.

Keywords: Pain management, Stress ball, Cartoon watched, Injection.

Öz: Bu çalışma, kas içi enjeksiyon sırasında çocuklarda ağrı yönetiminde top sıkma ve çizgi film izlemenin karşılaştırmalı etkisini araştırmak amacıyla randomize kontrollü bir çalışma olarak tasarlandı. Araştırmanın evrenini IM enjeksiyon için acile gelen 6-12 yaş arası çocuklar oluşturdu. Güç analizi G*Power programı ile yapıldı. 6-12 arası yaklaşık 147 çocukla (her grup 49 çocuk) protokol tamamlandı. Araştırmada çocukların sosyo-demografik özelliklerini ve hastaneye yatış deneyimlerini içeren bir anket, Yüz Ağrı Ölçeği Revize (FPS-R), Görsel Analog Skala (VAS) ve top (sıkma için) kullanıldı. Çalışma sonuçlarına göre işlem sırasındaki FPS-R puanı en düşük puan stres topu grubundaydı ve istatistiksel olarak anlamlıydı ($p<.05$). İşlem sırasında en düşük VAS skoru stres topu grubunda olup, gruplar arasındaki farklar istatistiksel olarak anlamlıydı ($p<0.05$). Topu sıkma ve çizgi film izleme uygulamasının enjeksiyon sırasında ağrıyı azaltmada etkili olduğu, bununla birlikte top sıkma grubunun en düşük ağrı düzeyine sahip olduğu belirlendi. Farmakolojik olmayan yöntemler içinde top sıkma, çocuklarda kas içi enjeksiyon sırasında ağrının azaltılmasında özellikle çocuk hemşireleri tarafından pratik ve etkili bir yöntem olarak tercih edilebilir.

Anahtar Kelimeler: Ağrı yönetimi, Stres topu, Çizgi film izleme, Enjeksiyon.

*Corresponding author : Serap ÖZDEMİR e-mail : serap8685@hotmail.com
Geliş tarihi / Received : 30.05.2022 Kabul tarihi / Accepted: 08.09.2022

Introduction

Pain is a universal condition experienced by all people (Bukola and Paula, 2017) and children, in particular (Şahiner and Türkmen, 2019; Semerci et al., 2020), being defined as an unpleasant emotional sensation of a person's past experiences but not due to tissue damage from a particular area of the body (International Association for the Study of Pain; IASP 2010). Considering the

To cite this article: BÜLBÜL F, ÖZDEMİR S. (2022). The Comparative Effects of Ball Squeezing and Cartoon Watching in Pain Managementin Children During Intramuscular Injection: A Randomized Control Trial. MAKU J. Health Sci. Inst., 10(3), 134-145.

ISSN: 2148-2837/ MAKU J. Health Sci. Inst.

relevant sources of the pain, blood collection, injection and vaccination are of the most common sources of procedural pain. Out of the pain sources of injections available, intramuscular injection (IM) is of the painful and most common experiments during medical procedures among hospitalized children (Yıldız et al., 2017), being chosen as the case of dense and irritating drugs uses. In this regard, the appropriate selection of the IM administration sites and muscles are of the substantial issues (Tuğrul and Denat, 2014; Yıldız et al., 2017). IM administrations are employed at areas, viz. Dorsogluteal, ventrogluteal, femoral, laterofemoral, and deltoid area. Of the relevant IM administration areas, even though dorsogluteal area is not recommended due to being rich in veins and close to sciatic nerve, the dorsogluteal region is clinically preferred area, as the case reported by Gülnar and Çalışkan (2014) indicating that 85.9% of the nurses used dorsogluteal area mostly, whilst 63.3% of nurses never used ventrogluteal area. Ventrogluteal area is regarded as the safest injection area for children 18 months and older (Kaya et al., 2015; Tuğrul and Denat, 2014; Yıldız et al., 2017). Concerning with muscles commonly used for IM, gluteal muscles (gluteus maximus, gluteus medius and gluteus minimus), deltoid muscle, rectus femoris and vastus lateralis muscles are of the most common muscles (Tuğrul and Denat, 2014).

Corresponding to the pain experienced during IM, substantial alterations in emotional and physical aspects of the children might be observed (SirtinTumakaka et al., 2020). Specifically, delaying or refusing future medical treatments are of the most observed attitudes among children (Semerci et al., 2020). In order to or minimize pain during IM, interventions by pediatric nurses are relatively significant (Şahiner and Bal 2016; Viggiano et al., 2015). In this context, pharmacological and non pharmacological approaches or attempts have been employed for children (Hogan et al., 2014; Kaheni et al., 2016). Although pharmacological methods such as opioid analgesics, non-opioid analgesics and local anesthetics are of the most commonly methods used for pain treatment (Laures et al., 2019), non-pharmacological methods including breastfeeding (Erkul and Efe, 2017), watching cartoon (Akgül et al., 2021; Inan and Inal, 2019) sucrose (Kassab et al., 2020), distraction (Şahiner and Türkmen, 2019), ball squeezing (Aydin et al., 2016; Abdolalizadeh et al., 2018), and massage/pressure (Hassan Ali et al., 2021) are also employed for the pain management (Hogan et al., 2014). Regarding non-pharmacological methods, these methods are applicable sequestered or together with pharmacological methods, being also preferred due to their simple practice, inexpensive and no side effects (Miller et al., 2016).

Out of the available common non-pharmacological pain management methods, distraction is considered to be effective methods for enhancing pain tolerance by changing the focal point (Bukola and Paula, 2017; Heidari Gorji et al., 2017; Inan and Inal 2019; Laures et al. 2019; Rezai et al., 2017; Viggiano et al., 2015), being classified as active and passive. Active distraction involves such as video games, controlled breathing, balloon inflation, bubble blowing foam, stress ball squeezing, relaxation and virtual reality goggles methods (Kaheni et al., 2016). On the other hand, passive distraction involves such as listening to music, irrelevant speech, watching television, cartoons, kaleidoscope and distraction cards. These methods are generally used a child needs to remain calm and quite during a procedure (Kaheni et al., 2016; Alemdar and Aktaş, 2019). In treatment and care practices, pain can be experienced as traumatic for the child and her family. Interventions applied by nurses in pain management can contribute to the positive results of these experiences. Comparative studies of different non-pharmacological applications and testing new methods will continue to be up-to-date in child health, which is an important part of today and the future. These methods will contribute to clinician nurses in the selection of the most appropriate approach, ease of application and time management. As deduced from the recent reports,

To cite this article: BÜLBÜL F, ÖZDEMİR S. (2022). The Comparative Effects of Ball Squeezing and Cartoon Watching in Pain Managementin Children During Intramuscular Injection: A Randomized Control Trial. MAKU J. Health Sci. Inst., 10(3), 134-145.

ISSN: 2148-2837/ MAKU J. Health Sci. Inst.

the studies concerned with ball squeezing (Aydın et al., 2016; Sirtin Tumakaka et al., 2020) and cartoon watching (Heijden et al., 2019; İnangil et al., 2020) are available but the current study was designed to compare the effects of ball squeezing and cartoon watching in pain management in hospitalized children. The purpose of this study was to investigate the comparative effect of ball squeezing and cartoon watching in pain management in children during intramuscular injection.

Hypotheses

Hypothesis 0 (H0): There are no effects of giving a ball (for squeezing) and watching cartoons on reducing pain during injection.

Hypothesis 1 (H1): Children who are given ball (for squeezing) during injection have less pain than children who are not given pain-relieving interventions.

Hypothesis 2 (H2): Children who are watched cartoon during injection have less pain than children who are not given pain-relieving interventions.

Hypothesis 3 (H3): There is a difference between children who are given a ball (for squeezing) during injection and children who are watched cartoons.

Materials and Methods

The study was designed as a randomized controlled experimental study. It was carried out with 6-12 years old children at injection unit of emergency of the University Training and Research Hospital between August-October 2019. The relevant interventions were implemeted by a nurse. The experiments were finalized by the same nurse. This study was conducted using the single-blind method. Regarding the experimental set up, inclusion criteria of the study were as follows: (a) first injection for current treatment (b) aged between 6-12 years old (c) without any mental disorder (d) without any vision, audition and conversation problems (e) consent with the families regarding participation. Exclusion criteria of the study were as follows a) former injection experience b) aged lower than 6 and higher than 12 years old) with any mental, vision, hearing and conversation problems, d) nonconsent regarding family participation. Along with the experiments, same generation antibiotics, analgesics and others (antiemetic, antihistaminic etc.) were grouped for drugs of injection.

Sample Size and Randomization

For the sample size of the study, power analysis was performed using G*Power (v3.1.9.7) program. Power of study is expressed as a 1-β (β = Type II error) and is usually considered to be 80% power. According to Cohen's f (effect size) factors; assuming that the evaluations made between three independent groups will have the effect size (f=0.4).Power analysis for the present study was based on the study by Mutlu and Balcı (2015) which performed the study with at least 129 children, 43 children in each group (with 95% confidence interval and 5% alpha (two tailed). Herein, the present study was performed with a total of 147 children corresponding to 49 children for each experimental group (It was assumed that could be lost cases during the study). Randomization was achieved by means of the computer program (https://www.randomizer.org) indicating the total number of children, groups and children groups and the children divided into control and experimental groups.The research CONSORT flow diagram is given Figure 1.

Data Collection Instruments

For data collection, a questionnaire including child's age, gender, diagnosis, previous hospitalization, pain experience, painful procedure exposure and current medication characteristics (Antibiotic, Analgesic and Blood sample)and Facial Pain Scale- Revised (FPS-R) and Visual Analog Scale (VAS) were used. Also, 'ball (ball squeezing)' and 'Reader tablet' were used for the study. Prior to the study, verbal and written

To cite this article: BÜLBÜL F, ÖZDEMİR S. (2022). The Comparative Effects of Ball Squeezing and Cartoon Watching in Pain Managementin Children During Intramuscular Injection: A Randomized Control Trial. MAKU J. Health Sci. Inst., 10(3), 134-145.

ISSN: 2148-2837/ MAKU J. Health Sci. Inst.

consent were obtained for each child's parents after the purpose of the study was explained.

Questionnaire on Socio-Demographic and Experiences

A questionnaire was prepared by the researchers according to the reports by Mutlu and Balcı (2015) and Inan and Inal (2019). The relevant questionnaire included child's age, gender, diagnosis, previous hospitalization, pain experience, painful procedure exposure and current medication characteristics (antibiotic, analgesic and blood sample).

Facial Pain Scale-Revised (FPS-R)

The scale is used as a valid and reliable scale for the evaluation of acute pain for children aged 4-16 years (Drendel et al., 2011). In school-aged children between 4–12 years old, the FPS-R is considered to be the most valid and reliable measure of acute pain since an comprehensible of words or numerical values is not necessaries (Drendel et al., 2011).

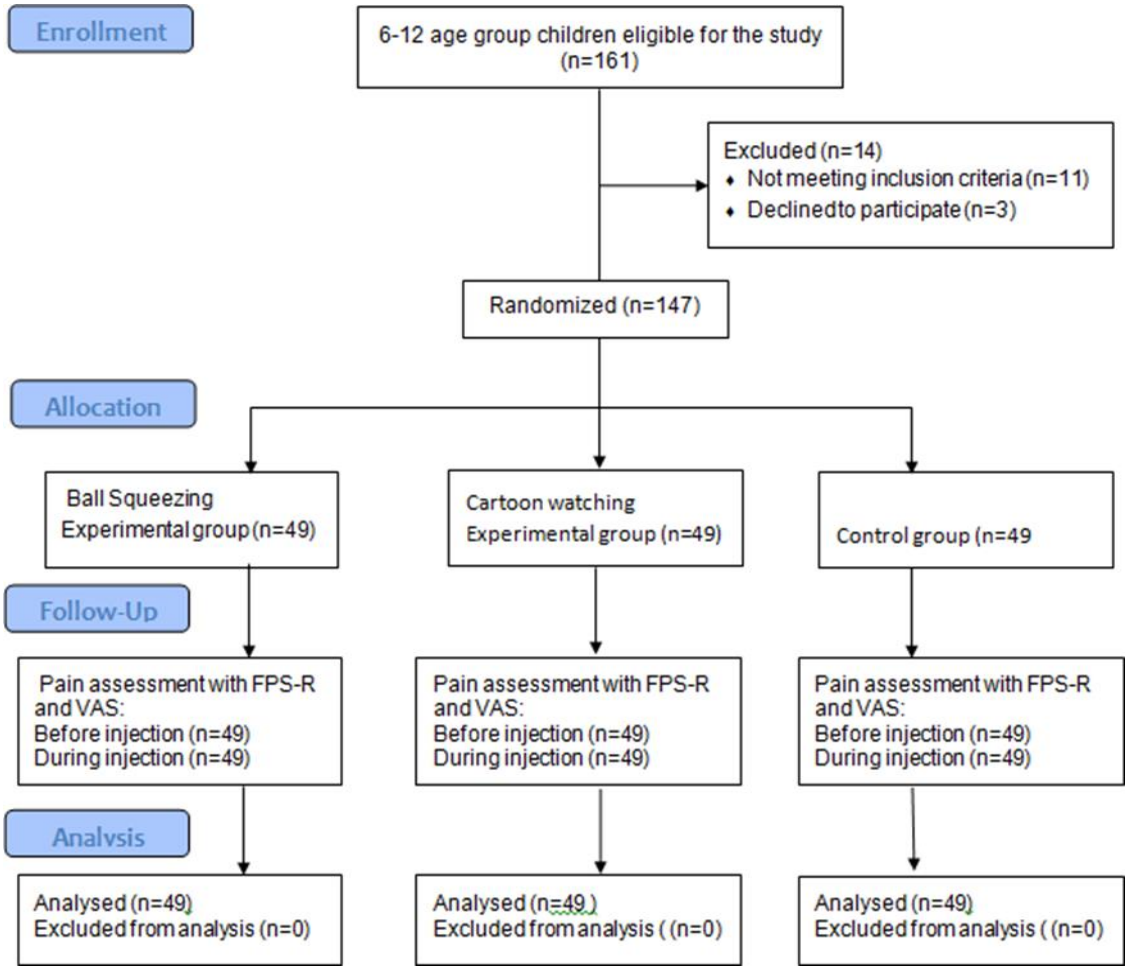


Figure 1. CONSORT flow diagram

Schulz KF, Altman DG, Moher D. CONSORT Group. CONSORT 2010 Statement: updated guidelines for reporting parallel group randomized trials. PLoS Med. 2010; 7(3): e1000251. doi:10.1371/journal.pmed.1000251 Published March 24, 2010.

To cite this article: BÜLBÜL F, ÖZDEMİR S. (2022). The Comparative Effects of Ball Squeezing and Cartoon Watching in Pain Managementin Children During Intramuscular Injection: A Randomized Control Trial. MAKU J. Health Sci. Inst., 10(3), 134-145.

ISSN: 2148-2837/ MAKU J. Health Sci. Inst.

The FPS-R consists of six facial expressions that evaluate the degree of pain, on a scale of 0–10 (Conlon, 2009). It is expressed that '0' is no pain, '10' is severe pain (Okyay and Ayoğlu, 2018). In the evaluation of the scores obtained from the scale, the scores are considered as dull (1-3), reasonable pain (4-6) and severe pain (7-10) (Drendel et al., 2011; Mutlu and Balcı, 2015). FPS-R is considered to be advantageous when compared to other facial expression scales because it commonly uses scores (0-10) and has a certain 0 score indicating not starting with smiley expression and no crying facial expression at the end (Mutlu and Balcı, 2015).

Visual Analog Scale (VAS)

The scale consist of a horizontal line 100 mm in length, with the end point 'No pain' and 'worst imagination pain' placed at each end of the line. It is a reliable and valid scale for the children aged between 3-18 years old (Bakır, 2017). The children are asked to mark the severity of the pain on the line and starting from point 0, the marking is measured and the severity of pain is determined (Okyay and Ayağlu, 2018).

Ball

The ball is 6 cm in diameter with a smiley face and suitable for over 3 years old. The ball is soft and odorless.

Reeder M8 Plus Tablet

The tablet is equipped with Android 7.0 operating system, 8 screen sizes, a resolution of 1280*800 IPS, 213.5*123.6*8.9 mm dimension, weight 351 gram. The tablet used for the group consider as cartoon watching group.

Implementation of The Study

Data of the study was collected by researchers on Monday and Tuesday of the week due to intensive days regarding injection implementations. Children who met the sample selection criteria were evaluated by the researcher on the application days. Child who has including criteria was assigned to the experimental and control groups according to the randomization table. Injection procedure in all groups was implemented by the same experienced nurse. In this study, the nurse at the injection room preferred the ventrogluteal area for injection in children 6 years and older. Only three of the children were injected from the laterofemoral area due to their weakness and anatomical structure.

All groups fulfilled the questionnaire including socio-demographic and experiences. Children were informed for Facial Pain Scale- Revised (FPS-R) and Visual Analog Scale (VAS). Herein, the children in the experimental group were asked to mark the expected pain on FPS-R and VAS to determine the level of pain before injection.

Group 1: The children in this group were given a ball (ball squeezing) at the beginning of the procedure and it was explained that child could squeeze the ball during injection. Different ball was used for each child. After a short time of injection, the children were asked to mark the experienced pain on FPS-R and VAS.

Group 2: The tablet was loaded with 10 cartoons suitable for children's age and was asked to choose one of them. Cartoons were selected according to the age groups proposed by the official channels such as TRT child (Turkish radio television), Minika child and Minika GO. For children aged between 6-8 years, cartoons such as Rafadan Crew (RafadanTayfa), Explore with Jet (Jet ileKeşfet), My Little Pony, Master Bob (Bob Usta) and StrawberryGirl (ÇilekKız) were chosen. For the children aged between 9-12 years, Bizarre team (Tuhaf İşler Takımı) Puzzle Tower (BulmacaKulesi), Thunderbirds Are Go, New Adventures of Peter Pan (Peter Pan'ınYeni Maceraları) and Guards of Istanbul (İstanbul Muhafızları) were chosen. During injection, the children were asked to mark the experienced pain on FPS-R and VAS.

To cite this article: BÜLBÜL F, ÖZDEMİR S. (2022). The Comparative Effects of Ball Squeezing and Cartoon Watching in Pain Managementin Children During Intramuscular Injection: A Randomized Control Trial. MAKU J. Health Sci. Inst., 10(3), 134-145.

ISSN: 2148-2837/ MAKU J. Health Sci. Inst.

Group 3: Routine care was employed during the injection. During injection, the children were asked to mark the experienced pain on FPS-R and VAS.

Data Analysis

Data were analysed using SPSS (Statistical Package for the Social Sciences) 24 version (IBM SPSS). Numerical variables were expressed as mean, standard deviation, frequencies, and percentages. The chi-square test, within the groups paired sample t-test and compare the groups one-way ANOVA followed by Tukey HSD multiple range test and the differences between individual averages were considered to be statistically important at p-values <0.05.

Ethical Approval for the Research

Prior to the study, written permission from faculty administration and ethics committee approval (IRB Number: OOO) were received from a University Medical Faculty Clinical Research Ethics Committee.

Results

Table 1 shows demographic characteristics of the sample. When children were compared based on gender (p=0.702) and age (p=0.945) of distribution, diagnosis (p=0.245), medicines given (p=0.064), hospitalization (p=0.891), if yes, number of hospitalizations? (p=0.451), has the painful procedure been performed before? (p=0.773), if yes, which painful procedure? (p=0.615), no statistically differences were determined between the groups. All groups showed similarity in terms of descriptive characteristics (Table 1).

Table 2 shows the comparison of FPS-R and VAS scores before and during the procedure. Accordingly, the lowest FPS-R score before the implementation was found in the control groups, while the highest score was determined in the group that watched cartoons. The differences between the relevant groups were statistically significant (p<0.05). As deduced from statistical analysis, control group was cause of differences. During the procedure the lowest score was in the stress ball group and statistically significant (p<0.05). When these scores were evaluated within the group, it was detected that the differences before and during procedure were statistically significant, and the significance in the control group was negative (p<0.05).

According to groups, the lowest VAS scores before the implementation was found in the control groups, otherwise the highest score was stated in the group that watched the cartoons. The differences were not statistically significant (p>0.05). During the procedure the lowest score was in the stress ball group and the differences between the relevant groups were statistically significant (p<0.05). As deduced from statistical analysis, trial groups were cause of differences. When VAS scores were evaluated within the groups, it was detected that the difference before and during procedure were statistically significant, and the significance in the control group was negative group (p<0.05) (Table 2). In order to determine the differences, paired sample t-test was performed (Table2). Furthermore, the changes were displayed using box-plot graph (Figures 2-3).

Discussion

During the life span of the children, pain experience is of the crucial issues while injection, resulting from blood collection, injection and vaccination from interventional procedures (Şahiner and Türkmen, 2019; Çakır and Yıldırım, 2020; Semerci et al., 2020). The former reports have revealed that the relevant pain experience brought about vital alterations in attitudes of the children (Bukola and Paula, 2017). Regarding pain management by nurses, various attempts have been done such as cartoon watching (Akgül et al., 2021; Inan and Inal, 2019), ball squeezing (Abdolalizadeh et al., 2018; Aydin et al., 2016), breastfeeding (Erkul and Efe, 2017), sucrose (Kassab et al., 2020), distraction (Şahiner and Türkmen, 2019), and massage/pressure (Hassan

To cite this article: BÜLBÜL F, ÖZDEMİR S. (2022). The Comparative Effects of Ball Squeezing and Cartoon Watching in Pain Managementin Children During Intramuscular Injection: A Randomized Control Trial. MAKU J. Health Sci. Inst., 10(3), 134-145.

ISSN: 2148-2837/ MAKU J. Health Sci. Inst.

Ali et al., 2021). Considering the importance and researches, as deduced from the cited studies herein, those non-pharmacological attempts have been employed in a quite number of studies for children but the health-care and pain management among children remain incomplete, deserving to be investigated. In addition, to compare the relevant attempts is also great interest, in this regard. For that reason, we designed the current study in order to compare the efficiency of ball squeezing and cartoon watching in pain management in children during intramuscular injection using FPS-R and VAS scales. The reasons of methods employed for pain management for the current study were due to the non-time consuming and non-long term intervention (Inan and Inal, 2019).

Table 1. Demographic characteristics of the sample

	Ball Squeezing (*n*=49)	**Cartoon watching (*n*=49)**	**Control (*n*=49)**		***p***
	Mean±SD(Min-Max)				
Age	8.95±2.11 (6-12)	8.85±2.17 (6-12)	8.87±2.00 (6-12)	0.32	0.968
	n%	n%	n%		
Gender of children					
Girls	22(31.00)	26(36.60)	23(32.40)	0.708	0.702
Boys	27(35.50)	23(34.20)	26(34.20)		
Diagnosis					
Respiratory tract diseases	33(31.10)	39(36.80)	34(32.10)	5.44	0.245
Gastrointestinal diseases	11(47.80)	3(13.00)	9(39.10)		
Other	5(27.80)	7(38.90)	6(33.30)		
Medicines given					
Antibiotics	32(29.10)	37(33.60)	41(37.30)	8.899	0.064
Analgesic	5(45.50)	6(54.50)	0(0.00)		
Other	12(46.20)	6(23.10)	8(30.80)		
Hospitalization					
Yes	20(35.70)	18(32.10)	18(32.10)	0.231	0.891
No	29(31.90)	31(34.10)	31(34.10)		
If yes, number of hospitalizations?					
First	10(41.70)	6(25.00)	8(33.30)	9.885	0.451
2-4 times	10(40.46)	12(38.63)	8(20.90)		
4 and higher	1(25.00)	0(0.00)	2(75.00)		
Has the painful procedure been performed before?					
Yes	29(32.20)	29(32.20)	32(35.60)	0.516	0.773
No	20(35.10)	20(35.10)	17(29.80)		
If yes, which painful procedure?					
Intravenous (medication, serum, etc.)	9(33.30)	9(33.30)	9(33.30)	4.456	0.615
Intra muscular	6(23.10)	8(30.80)	12(46.20)		

To cite this article: BÜLBÜL F, ÖZDEMİR S. (2022). The Comparative Effects of Ball Squeezing and Cartoon Watching in Pain Managementin Children During Intramuscular Injection: A Randomized Control Trial. MAKU J. Health Sci. Inst., 10(3), 134-145.

ISSN: 2148-2837/ MAKU J. Health Sci. Inst.

Taking a blood sample	14(37.83)	12(32.43)	11(29.72)

χ2: Chi square * p<0.05

Table 2. Comparison of the FPS-R and VAS scores during and after procedure according to groups

Scales		**Ball Squeezing (n=49)[a]**	**Cartoon (n=49)[b]**	**Control (n=49)[c]**	**F**	**p**
			Mean±SD			
FPS-R (Facial Pain Scale-Revised)	Before	5.79±2.45	5.91±2.34	4.69±2.25	4.02	**0.020* c<a;b**
	During	3.18±1.99	4.28±2.41	6.20±2.16	20.38	**0.000** a<b<c**
	t	11.88	9.50	-6.01		
	p	**0.000**	**0.000**	**0.000**		
VAS (Visual Analog Scale)	Before	5.02±2.52	5.46±2.06	4.75±1.79	1.385	0.254
	During	2.69±1.99	4.14±2.11	6.04±1.97	33.561	**0.000** a<b<c**
	t	12,25	14,84	-6,88		
	p	**0.000**	**0.000**	**0.000**		

F: Anova F test a-b-c: Tukey HSD t: Paired Sample Test * p<0.05 **p<0.001).

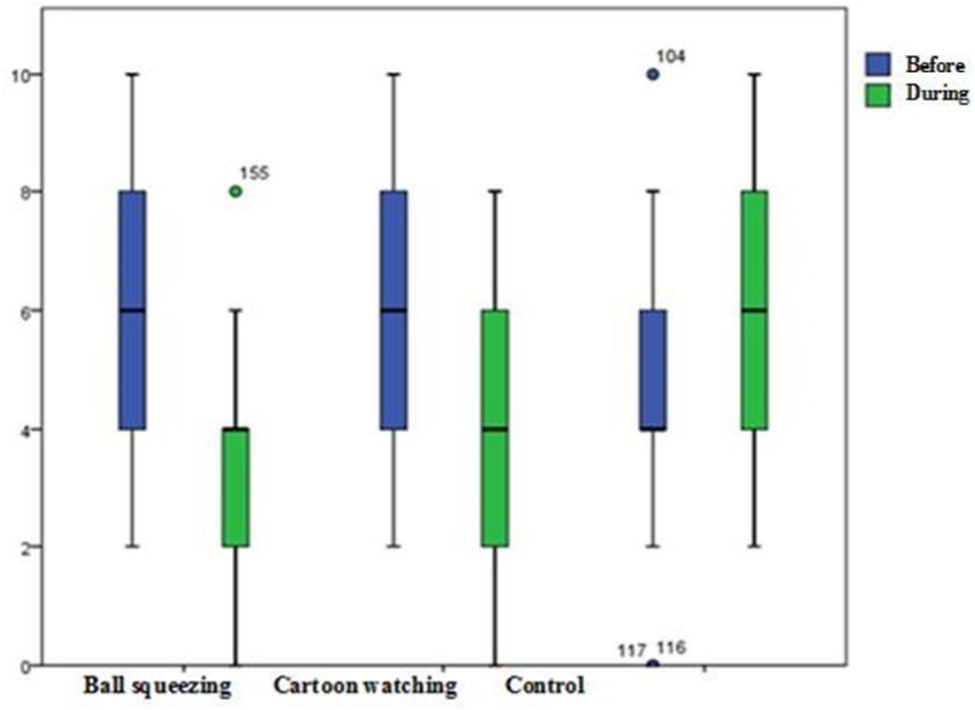


Figure 2. Changes in groups for FPS-R scores

To cite this article: BÜLBÜL F, ÖZDEMİR S. (2022). The Comparative Effects of Ball Squeezing and Cartoon Watching in Pain Managementin Children During Intramuscular Injection: A Randomized Control Trial. MAKU J. Health Sci. Inst., 10(3), 134-145.

ISSN: 2148-2837/ MAKU J. Health Sci. Inst.

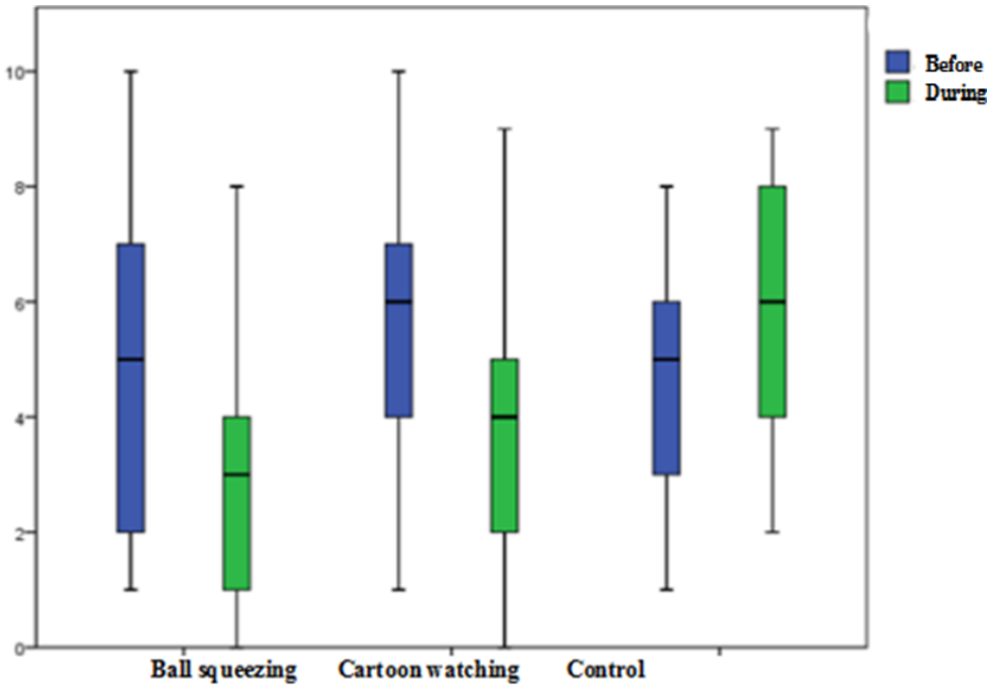


Figure 3. Changes in groups for VAS scores

Regarding injection types, IM are common but the relevant interventions are often addressed on vaccination (Bergomi et al., 2018; Robabi et al., (2016) for watching cartoon), phlebotomy=venipuncture (Aydin et al. (2016); Girgin and Göl (2020) for ball squeezing), venous catheterization (SirtinTumakaka et al. (2020) for ball squeezing), intramuscular injection (Çelik and Khorshid, 2015; Yilmaz and Alemdar, 2019). However, nonpharmacological interventions employed during IM are rare. In this regard, we compared the two different distraction methods in pain management during IM. Accordingly, the findings of the current study revealed that significant differences between ball squeezing and cartoon watching were observed. Those groups exhibited lower pain scores in relative control group as expected and similar to the previous reports [Akgül et al., (2021); İnangil et al. (2020); Inan and Inal (2019); Kuo et al., (2018) for cartoon watching; Aydin et al., (2016); Abdolalizadeh et al., (2018) for ball squeezing]. However, corresponding to the comparison of the relevant groups, ball squeezing was more effective in reduction of pain during injection among children. The higher efficiency of the ball squeezing might be attributed to the cognitive engagement of the children with the distracting stimulus (Hussein, 2015), suggesting that the distraction techniques applied during lumbar puncture are effective in pain management (Heidari Gorji et al., 2017). Also, Aydin et al., (2016) compared ball squeezing with balloon inflating and distraction cards and reported that ball squeezing was less effective in comparison with the other relevant groups during venipuncture. Girgin and Göl (2020) also revealed that ball squeezing was less efficient in relative to the coughing but more effective than balloon inflating during venipuncture. However, it is worth to note that active engagement methods should be convenient and compatible with age and state of development and include several sensory components of the children (Laures et al., 2019; Rezai et al., 2017). As deduced from the methods applied for the injection types, the relevant methods also should be convenient with the injection types.

Limitation of Study

A limitation of the study was that no preliminary preparation or intervention was made before

To cite this article: BÜLBÜL F, ÖZDEMİR S. (2022). The Comparative Effects of Ball Squeezing and Cartoon Watching in Pain Managementin Children During Intramuscular Injection: A Randomized Control Trial. MAKU J. Health Sci. Inst., 10(3), 134-145.

ISSN: 2148-2837/ MAKU J. Health Sci. Inst.

watching cartoons and applying the ball (for squeezing). However, it is important as it is the first study to use ball squeezing, which is one of the non-pharmacological methods used to reduce pain during intramuscular injection. In the period of the study, the cartoons shown to the determined age groups are limited to the selected ones.

Conclusion

According to this study outcome; ball squeezing and cartoon watching implementation were revealed to be effective in alleviating the pain during the injection. Ball squeezing and watching cartoons should be expanded to manage pain in children during IM injections in emergency departments and other units. In this case, it is thought that the application times of invasive procedures will be shortened and the health personnel will benefit in terms of time and ease of application. The implementations employed, the ball squeezing group had the lowest pain level in comparison to the cartoon watching and control groups. In future studies, it is recommended to repeat the methods with IM pain-reducing effects in children comparatively, to include these methods more in clinical applications, and to conduct more clinical studies to determine the best method.

References

Abdolalizadeh, H., NamdarArshatnab, H., Janani, R., Arshadi Bostanabad, M., 2018. Comparing the effect of two methods of distraction on the pain intensity venipuncture in school-age children: A randomized clinical trial. International Journal of Pediatrics 6(10), 8423-8432.

Akgül, E.A., Karahan, Y., Başoğlu, F., Oğul, A., Öztornaci, B.Ö., Yetim, P., Sari, H.Y., 2021. Effects of watching cartoons on pain scores in children undergoing venepuncture. Nursing Children and Young People 33(3), doi: 10.7748/ncyp.2018.e913

Alemdar, D.K., Aktaş, Y.Y., 2019. The use of the buzzy, jet lidokaine, bubbleblowing and aromatherapy for reducing pediatric pain, stress and fear associated with phlebotomy. Journal of Pediatric Nursing 45, 64-72.

Aydin, D., Şahiner, N.C., Çiftçi, E.K., 2016. Comparison of the effectiveness of three different methods in decreasing pain during venipuncture in children: Ball squeezing, balloon inflating and distraction cards. Journal of Clinical Nursing 25(15-16), 2328-2335.

Bakır, E., 2017. Pediatric pain assessment and tools: the influence of culture and age on pain assessment. Turkey Clinical J Nurs Sci. 9(4), 299-314.

Bergomi, P., Scudeller, L., Pintaldi, S., Dal Molin, A., 2018. Efficacy of nonpharmacological methods of pain management in children undergoing venipuncture in a pediatric outpatient clinic: a randomized controlled trial of audiovisual distraction and external cold and vibration. Journal of Pediatric Nursing 42, 66-72.

Bukola, I.M., Paula, D., 2017. The effectiveness of distraction as procedural pain management technique in pediatric oncology patients: A meta-analysis and systematic review. Journal of Pain and Symptom Management 54(4), 589-600.

Conlon, P.M., 2009. Assessment of pain in the paediatric patient. Paediatrics and Child Health 19(Suppl. 1), S85–S87.

Çakır, O., Yıldırım, B., 2020. New method for pain, anxiety and stress management in children; virtual reality glasses. In: Goncagul, G., Gunaydın, E. (Eds.), Current Studies in Health Sciences, Duvar Publisher, İzmir, pp. 135-149.

Çelik, N., Khorshid, L., 2015. The use of shotblocker for reducing the pain and anxiety associated with intramuscular injection. Holistic Nursing Practice 29(5), 261-271.

Drendel, A.L., Kelly, B.T., Ali, S., 2011. Pain assessment for children overcoming challenges and optimizing care. Pediatric Emergency Care 27(8), 773–781.

Erkul, M., Efe, E., 2017. Efficacy of breastfeeding on babies' pain during vaccinations. Breastfeeding Medicine 12(2), 110-115.

Girgin, B.A., Göl, İ., 2020. Reducing pain and fear in children during venipuncture: A randomized controlled study. Pain Management Nursing 21(3), 276-282.

Gülnar, E., Çalışkan, N., 2014. Determination of knowledge level of nurses regarding intramuscular injection administration to ventrogluteal site. E-Journal of Dokuz Eylul University Nursing Faculty 7(2), 70-77.

Hassan Ali, H., Yousef Salah, N., Wahid Amer, H., Ragab Mohamed, H., Hussein Abdelhalim, E., 2021. The effect of aromatherapy parent education in

alleviating injection pain among children submitting to vaccination. Egyptian Journal of Health Care 12(1), 686-706.

Heidari Gorji, A., Taebei, M., Ranjbar, M., BabaeiHatkehlouei, M., Goudarzian, A.H., 2017. Effect of distraction technique and hypnosis in pain of bone marrow aspiration in children: a narrative review. International Journal of Pediatrics 5(3), 4521-4531.

Hogan, M.E., Probst, J., Wong, K., Riddell, R.P., Katz, J., Taddio, A., 2014. A randomized-controlled trial of parent-led tactile stimulation to reduce pain during infant immunization injections. The Clinical Journal of Pain 30(3), 259-265.

Hussein, H.A., 2015. Effect of active and passive distraction on decreasing pain associated with painful medical procedures among school aged children. World Journal of Nursing Sciences 1(2), 13-23.

Inan, G., Inal, S., 2019. The impact of 3 different distraction techniques on the pain and anxiety levels of children during venipuncture. The Clinical Journal of Pain 35(2), 140-147.

İnangil, D., Şendir, M., Büyükyılmaz, F., 2020. Efficacy of cartoon viewing devices during phlebotomy in children: a randomized controlled trial. Journal of Peri Anesthesia Nursing 35(4), 407-412.

International Association for the Study of Pain (IASP), 2010. Pain terminology. http://www.iasp-pain.org/. (Accessed on: 04.10.2020).

Kaheni, S., SadeghRezai, M., Bagheri-Nesami, M., Goudarzian, A.H., 2016. The effect of distraction technique on the pain of dressing change among 3-6 year-old children. International Journal of Pediatrics 4(4), 1603-1610.

Kassab, M., Almomani, B., Nuseir, K., 2020. Efficacy of sucrose in reducing pain during immunization among 10-to 18-month-old infants and young children: A randomized controlled trial. Journal of Pediatric Nursing 50, 55-61.

Kaya, N., Salmaslıoğlu, A., Terzi, B., Turan, N., Acunaş, B., 2015. There liability of site determination methods in ventroglutealarea injection: a cross-sectional study. International Journal of Nursing Studies 52(1), 355-360.

Kuo, H.C., Pan, H.H., Creedy, D.K., Tsao, Y., 2018. Distraction-based interventions for children undergoing venipuncture procedures: a randomized controlled study. Clinical Nursing Research 27(4), 467-482.

Laures, E., LaFond, C., Hanrahan, K., Pierce, N., Min, H., McCarthy, A.M., 2019. Pain assessment practices in the pediatric intensive care unit. Journal of Pediatric Nursing 48, 55-62.

Miller, K., Tan, X., Hobson, A.D., Khan, A., Ziviani, J., O'Brien, E., Baura, K., McBride, C., Kimble, R.M., 2016. A prospective randomized controlled trial of nonpharmacological pain management during intravenous cannulation in a pediatric emergency department. Pediatric Emergency Care 32(7), 444-451.

Mutlu, B., Balcı, S., 2015. Effects of balloon inflation and cough trick methods on easing pain in children during the drawing of venous blood samples: A randomized controlled trial. Journal for Specialists in Pediatric Nursing 20(3), 178-186.

Okyay, R.D., Ayoğlu, H., 2018. Postoperative pain management in children. Pediatric Practice and Research 6(2), 16-25.

Rezai, M.S., Goudarzian, A.H., Jafari-Koulaee, A., Bagheri-Nesami, M., 2017. The effect of distraction techniques on the pain of venipuncture in children: a systematicreview. J Pediatr Rev. 5(1), 9459.

Robabi, H., Askari, H., Saeedinegad, F., 2016. Comparing the effectiveness of two distraction techniques of inflating balloon and watching cartoon in reducing the vaccination pain among school age children. Medical-Surgical Nursing Journal 5(3), 18-22.

Şahiner, N.C., Bal, M.D., 2016. The effects of three different distraction methods on pain and anxiety in children. Journal of Child Health Care 20(3), 277-285.

Şahiner, N.C., Türkmen, A.S., 2019. The effect of distraction cards on reducing pain and anxiety during intramuscular injection in children. Worldviews on Evidence-Based Nursing 16(3), 230-235.

Schulz, KF., Altman, DG., Moher, D. CONSORT Group. CONSORT 2010 Statement: updated guidelines for reporting parallel group randomized trials. PLoS Med. 2010; 7(3): e1000251. doi:10.1371/journal.pmed.1000251 Published March 24, 2010.

Semerci, R., Kocaaslan, E.N., Kostak, M.A., Akın, N., 2020. Reduction of pain during intravenous cannulation in children: Buzzy application. Pain 32(4), 177–185.

Sirtin Tumakaka, G.Y., Nurhaeni, N., Wanda, D., 2020. Squeezing a squishy object effectively controls pain in children during intravenous catheter insertion. Pediatric Reports 12(S1), 8-10.

Tuğrul, E., Denat, Y., 2014. Nurses' knowledge, opinions and practices regarding injection into the ventrogluteal area. E-Journal of Dokuz Eylul University Nursing Faculty 7(4), 275-284.

Viggiano, M.P., Giganti, F., Rossi, A., DiFeo, D., Vagnoli, L., Calcagno, G., Defilippi, C., 2015. Impact of psychological interventions on reducing anxiety, fear and then eedforsedation in children undergoing magnetic resonance imaging. Pediatric Reports, 7(1). Doi: 10.4081/pr.2015.5682

Yıldız, D., Kızıler, E., Eren Fidancı, B., Suluhan, D., 2017. What are the trues in applicating of intramuscular injection to children?: Review. Turkey Clinical J Nurs Sci. 9(2), 144-152.

Yilmaz, G., Alemdar, D.K., 2019. Using Buzzy, Shotblocker, and bubble blowing in a pediatric emergency department to reduce the pain and fear caused by intramuscular injection: A randomized controlled trial. Journal of Emergency Nursing 45(5), 502-511.

To cite this article: BÜLBÜL F, ÖZDEMİR S. (2022). The Comparative Effects of Ball Squeezing and Cartoon Watching in Pain Managementin Children During Intramuscular Injection: A Randomized Control Trial. MAKU J. Health Sci. Inst., 10(3), 134-145.

ISSN: 2148-2837/ MAKU J. Health Sci. Inst.

MAKU J. Health Sci. Inst. 2022, 10(3): 146-150.
doi:10.24998/maeusabed.1200417

Mehmet Akif Ersoy University Journal of Health Sciences Institutehttp://dergipark.gov.tr/maeusabed

Research Article/ Araştırma Makalesi

Determination of Aflatoxin M1 Levels in Some Honamli Goat Herds in Burdur Province

Burdur İlindeki Bazı Honamlı Irkı Keçi Sürülerinde Aflatoksin M1 Düzeylerinin Belirlenmesi

Hale ERGİN EĞRİTAĞ[1*], Kemal VAROL[2]

[1]Burdur Mehmet Akif Ersoy University, Faculty of Veterinary Medicine, Department of Biochemistry, Burdur, Turkiye
[2]Burdur Mehmet Akif Ersoy University, Food, Agriculture and Livestock Vocational Collage of Burdur Veterinary Department, Burdur, Turkiye

Abstract: In this study, aflatoxin M1 (AFM1) levels were determined from the milk serum of 90 lactating Honamli goats aged 2-6 years in 12 herds breeding Honamli goats in Burdur province in spring and April in 2021. A statistically significant difference was found between flock 1 and flock 4-12 and between flock 3 and flock 9,11 ($p<0.05$). In addition, the mean AFM1 concentration was determined as 29.79 ng/L in 12 farms of Honamli breed goat breeding in Burdur province. The minimum AFM1 concentration was 7.99 ng/L and the maximum AFM1 concentration was 46.28 ng/L in 12 flocks. As a result, AFM1 was detected in the milk samples of all 12 flocks in Burdur city evaluated in the present study. AFM1 levels were determined at an acceptable level according to the Turkish Food Codex. However, while the presence of AFM1 in the entire flocks is acceptable according to the Turkish Food Codex, it suggests that the storage conditions of forage crops are not sufficient. The concentration of aflatoxin in plants in pastures should be investigated. Natural toxin binders, which have been actively used in animal nutrition recently, should also be used in goat breeding.

Keywords: Aflatoxin M1, Aflatoxicosis, Honamli Goat, Milk.

Öz: Bu çalışmada 2021 yılında bahar mevsiminde ve Nisan ayında Burdur ilinde Honamlı ırkı keçi yetiştiriciliği yapan 12 sürüde bulunan ve yaşları 2-6 yaş arasında değişen 90 adet laktasyondaki Honamlı ırkı keçilerin süt serumlarından aflatoksin M1 (AFM1) seviyeleri belirlenmiştir. Bulgularda sürü 1 ile sürü 4-12 arasında ve sürü 3, 9 ve 11 arasında istatistiksel olarak anlamlı farklılık ($p<0.05$) bulunmuştur. Ayrıca, Burdur iline bağlı Honamlı ırkı keçi yetiştiriciliği yapılan 12 işletmede ortalama AFM1 konsantrasyonu 29.79 ng/L olarak belirlenmiştir. 12 sürüde minimum AFM1 konsantrasyonu 7.99 ng/L maksimum AFM1 konsantrasyonu 46.28 ng/L olarak belirlenmiştir. Sonuç olarak bu çalışmada Burdur ilinde çalışmaya dahil edilen 12 sürünün tamamının süt numunelerinde AFM1 tespit edilmiştir. AFM1 düzeylerinin Türk Gıda Kodeksine göre kabul edilebilir düzeyde belirlenmiştir. Ancak Türk Gıda Kodeksine göre kabul edilebilir olsa da sürünün tamamında AFM1 bulunması yemlerin depolama şartlarının uygun olmadığını göstermektedir. Meralardaki bitkilerde bulunan aflatoksin yoğunluğu araştırılmalıdır. Hayvan beslemede son dönemlerde aktif bir şekilde kullanılan doğal toksin bağlayıcıların keçi yetiştiriciliğinde de kullanılması gerekmektedir.

Anahtar Kelimeler: Aflatoksin M1, Aflatoksikoz, Honamlı Keçisi, Süt.

[*]Corresponding author :Hale E. EĞRİTAĞ
e-mail : vh.haleergin@gmail.com
Geliş tarihi / Received :07.11.2022
Kabul tarihi / Accepted:16.12.2022

Introduction

Aflatoxins have both toxigenic and teratrogenic effects for humans and animals. Aflatoxides are naturally produced by these three species as a result of cantamine of plants and their products with *Aspergillus* (*A*) (*A. flavus*, *A. parasiticus* and *A. nomius*) species. These toxins display immunosuppressive, mutagenic, teratrogenic and carcinogenic effects as well as having acute toxic effects. The main target organ where it has toxigenic and carciogenic effects is the liver (Betina, 1989; Kaya, 2002).

A. flavus produces only Aflatoxin B1 (AFB1) and Aflatoxin B2 (AFB2). *A. parasiticus* produces AFB1, AFB2, Aflatoxin G1 (AFG1) and Aflatoxin G2 (AFG2). In particular, the toxins

To cite this article: ERGİN EĞRİTAĞ H, Varol K. (2022). Determination of Aflatoxin M1 Levels in Some Honamli Goat Herds in Burdur Province. MAKU J. Health Sci. Inst., 10(3), 146-150.

ISSN: 2148-2837/MAKU J. Health Sci. Inst.

produced by *A. flavus* and *A. Parasiticus* have a great significance causing disorders in human and animals (Özkaya and Temiz, 2003; Akdemir et al., 2004).

AFM1 is a toxic metabolite, and as a result of the intake of AFB1 contaminated foods by lactating animals such as cattle, sheep and goats, this metabolite is converted into a hydroxylated form called Aflatoxin M1 (AFM1), which is a cytotoxic and genotoxic substance. AFB1 is biotransformed into AFM1 by hepatic microsomal cytochrome P450. AFM1 has ten-times lower carcinogenic potential than AFB1. AFM1 can be detected in milk 12-24 hours after ingestion of AFB1. It reaches a high level a few days after detection in milk. When AFB1 uptake is stopped, the concentration of AFM1 in milk falls below to detection level after 72 hours (Van Egmond, 1989; Bbosa et al., 2013). Although it is suggested that the ratio between ingested AFB1 and excreted AFM1 is 1-3 %, there are studies reporting that it increases as much as 6 %. However, this excretion differs in each animal (nutrition, milking time, etc.). AFM1, a metabolite of AFB1, which has cytotoxic and genotoxic properties in animals, is an extremely important toxin (Martins and Martins, 2000; Özdemir, 2007). Burdur city is one of the provinces where Honamli goat breeding is done intensively. In this study, it was aimed to determine the AFM1 levels in Honamli goats in Burdur province.

Materials and Methods

Ethical Considerations

Since milk sample was used in this study, it is not necessary to obtain an ethics committee approval in accordance with the Regulation on Working Procedures and Principles of Animal Experiments Ethics Committees. However, since AFM1 levels will be determined in Honamli goats in Burdur province, this study was carried out with the knowledge of the Ministry of Agriculture and Forestry.

Study Design and Sampling

In this study, it was aimed to determine the levels of AFM1 from the milk serum of 90 lactating Honamlı goats aged 2-6 years in 12 herds breeding Honamlı goats in Burdur province. All herds included in the study is fed with ground barley and grazed in the bushes. For this purpose, fifteen milliliters (mL) of milk samples were taken from each goat into falcon tubes in spring and April in 2021. The serum of the samples were extracted by centrifugation (3500 rpm/10 min). AFM1 levels from the extracted sera were determined by using commercial ELISA assay kit (ELABSCIENCE KA36762ETS E0099Go) according to the manufacturer's instructions.

Data Analysis

IBM SPSS 22.0 for Windows package program was used for statistical analysis of study data. The normal distribution of the groups in the analyzes was evaluated by using the Shapiro-Wilk test. Due to the normal distribution of the data, comparisons among the groups were carried out by using one-way analysis of variance test. The Bonferroni test was used as a multiple comparisons. The statistical significant was considered as $p<0.05$.

Results

A statistically significant difference ($p<0.05$) was found between flock 1 and flock 4-12 and between flocks 3, 9, and 11. In addition, the mean AFM1 concentration was determined as 29.79 ng/L in 12 farms of Honamlı breed goat breeding in Burdur province. The minimum AFM1 concentration was 7.99 ng/L and the maximum AFM1 concentration was 46.28 ng/L. As a result, AFM1 was detected in the milk samples of all 12 herds included in the Burdur study in this study.

Discussion

Mycotoxins; are toxic metabolites produced by fungi. They are generally formed during growth or and storage of feed and feed raw materials under unsuitable conditions (Van Egmond,

To cite this article: ERGİN EĞRİTAĞ H, Varol K. (2022). Determination of Aflatoxin M1 Levels in Some Honamli Goat Herds in Burdur Province. MAKU J. Health Sci. Inst., 10(3), 146-150.

ISSN: 2148-2837/MAKU J. Health Sci. Inst.

1989). Mycotoxins cause poisoning called mycotoxicosis in humans and animals (Guntekin et al., 2016; Türel and Calapoğlu, 2017). For toxin formation, appropriate environmental conditions are needed.

In this context, optimal conditions for mycotoxins; the humidity rises above 50-60 %, the ambient temperature is between 25-38 °C, the pH is near 6.0, and the low levels of oxygen concentration (Navarro and Zettler, 2001; Özkaya and Temiz, 2003; Çankırı and Uyarlar, 2013; Whitlow et al., 2010). Anorexia, weight loss, icterus, nervous symptoms, and finally death occur in acute aflatoxicosis cases in animals. Autopsy shows decreased color and lipidosis in the liver. Hemorrhage in the kidneys and fluid collection in the body cavities can be also observed. On the other hand, teratrogenicity and hepatotoxicity are the main findings in chronic toxications (Pohland 1993).

Table 1. AFM1 levels by flocks.

Grup	AFM1 (ng/L)	
	$\bar{x}\pm sd$	*Mean (min-max)*
Flock 1(n=8)	43.69±2.19[a]	44.57 (40.02-46.28)
Flock 2 (n=8)	32.63±5.54[ab]	32.65 (26.05-40.68)
Flock 3 (n=8)	37.10±5.28[a]	37.64 (29.17-45.59)
Flock 4 (n=8)	30.67±6.74[bc]	28.36 (21.95-44.05)
Flock 5 (n=7)	29.30±9.46[bc]	30.95 (10.96-42.49)
Flock 6 (n=7)	26.47±8.11[bc]	26.47 (15.73-40.07)
Flock 7 (n=8)	26.02±3.18[bc]	26.88 (20.29-30.81)
Flock 8 (n=7)	27.42±6.12[bc]	26.63 (18.86-34.50)
Flock 9 (n=7)	23.45±3.80[b]	24.47 (15.63-27.53)
Flock 10 (n=8)	25.80±4.72[bc]	25.72 (19.06-33.68)
Flock 11 (n=7)	22.66±10.41[b]	25.23 (7.99-34.76)
Flock 12 (n=7)	29.76±9.46[bc]	27.66 (12.51-40.31)
Total (n=90)	29.79±8.52	28.47 (7.99-46.28)

There is a statistically significant difference ($p<0.05$) between rows with different lowercase superscripts.

After AFB1 is taken with feed, it is excreted as AFM1 with milk, urine and faeces (Baygeldi and Tanyıldızı, 2018). AFB1 is detected in milk as AFM1 within a 6-24 hour period following ingestion. The time to reach the highest level is 12-48 hours. When AFB1 uptake does not continue, the level of AFM1 visibility reaches its lowest levels within 72-96 hours (İşleyici et al., 2015; Baygeldi and Tanyıldızı, 2018).

The maximum acceptable AFM1 level in milk is as 50 ng/L according to the Turkish Food Codex (TFC) (Turkish Food Codex, 2002). As mentioned, AFM1 levels in Honamlı goats in Burdur province were determined below the limit.

AFM1 levels may vary bycountries, regions, seasons, geographical and climatic characteristics, rations of animals, and lactation period (Kaya Tuz et al., 2017; Karadal et al., 2018). In the present study, the differences between flock 1 and flock 4-12, flock 3 with flock 9 and flock 11 were significant ($p<0.05$), and this can be linked to the care and feeding and lactation status of the animals.

Özdemir et al. (2007) found that the mean AFM1 concentration in the milk of goats in Kilis farms in March and April was 19.23 ng/L. They reported that the minimum and maximum values of AFM1 concentration ranged from of 5.16 to 116.78 ng/L. In another study, Karadal et al. (2018) found that the concentration of AFM1 in goat milk rangin between 0.33-11.79 ng/L in

To cite this article: ERGİN EĞRİTAĞ H, Varol K. (2022). Determination of Aflatoxin M1 Levels in Some Honamli Goat Herds in Burdur Province. MAKU J. Health Sci. Inst., 10(3), 146-150.

ISSN: 2148-2837/MAKU J. Health Sci. Inst.

Niğde province. In accordance with this information, the average AFM1 concentration was found to be 29.79 ng/L in April in Honamlı goats in Burdur province in the current study. In addition, the lowest AFM1 concentration was 7.99 ng/L, while the highest AFM1 concentration was 46.28 ng/L.

The ability to convert AFB1 to AFM1 excreted in milk varies between large and small ruminants. In this manner, the rate of conversion of AFB1 to AFM1 are 0.35 % and 3 % in cows (Veldman et al., 1992; Frobisch et al., 1986), 0.018 % to 3.1 % in goats (Goto and Hsieh, 1985; Nageswara Rao and Chopra, 2001; Ronchi et al., 2005), and 0.08 % and 0.33 % in sheeps (Battacone et al., 2005).

It is well known that the AFM1 concentrations in cow's milk is higher than in goat and sheep milk (Virdis et al., 2014). Compared to cattle fattening, due to pasture grazing reduces the intake of feeds contaminated with mold strains and aflatoxin exposure. The use of concentrates and feedstuffs in sheep and goats is limited due to economic reasons and milk production (Molle et al., 2008).

The AFM1 concentrations (mean±standard deviation) in goat milk were greatly varry between the contries. In this context, it was reported that the AFM1 levels were 14.5±8.4 ng/L in Italy (Virdis et al., 2014), 19±13.8 ng/L in Syria (Ghanem and Orfi, 2009), 2.0±5.0 ng/L in Pakistan (Hussain et al., 2010), 31.8±13.7 ng/L in Iran (Rahimi and Ameri, 2012), 7.6±8.94 ng/L in Croatia (Bilandzic, 2014). In this study, the AFM1 concentration was determined as 29.79±8.52 ng/L.

Conclusion

In conclusion, AFM1 was detected in the milk samples of all 12 herds included in the Burdur city in this study. AFM1 levels were determined below the maximum acceptable level according to the TFC. However, while the presence of AFM1 in the entire flocks is acceptable according to the TFC, it suggests that the storage conditions of forage crops are not sufficient. When feeding animals forage plants with poor storage conditions, caution should be taken. The concentration of aflatoxin in plants in pastures should be investigated. Natural toxin binders, which have been actively used in animal nutrition recently, should also be used in goat breeding. This study has proven that natural toxin binders, which have been actively used in animal nutrition recently, should also be used in goat breeding.

References

Akdemir, Ç., Altıntaş, A., 2004. Ankara'da işlenen sütlerde aflatoksin-M1 varlığının ve düzeylerinin HPLC ile araştırılması. Ankara Üniversitesi Veteriner Fakültesi Dergisi, 51(3), 174-179.

Battacone, G., Nudda, A., Palomba, M., Pascale, M., Nicolussi, P., Pulina, G., 2005. Transfer of aflatoxin B1 from feed to milk and from milk to curd and whey in dairy sheep fed artificially contaminated concentrates. Journal of Dairy Science, 88(9), 3063-3069.

Baygeldi, Y., Tanyıldızı, S., 2018. Elazığ'da Üretilen İnek Sütlerinde Aflatoksin M1 Düzeylerinin HPLC ile Araştırılması. Fırat Üniversitesi Sağlık Bilimleri Veteriner Dergisi, 32(3), 191-195.

Bbosa, G.S., Kitya, D., Ogwal-Okeng, J., 2013. Aflatoxins metabolism, effects on epigenetic mechanisms and their role in carcinogenesis. 5, 14-34.

Betina, V., 1989. Aflatoxins, sterigmatocystins and versicolorins. Mycotoxins: Chemical, Biological and Environmental Aspects. Elsevier, Amsterdam-Oxford-New York-Tokyo.

Bilandžić, N., Božić, Đ., Đokić, M., Sedak, M., Kolanović, B.S., Varenina, I., Cvetnić, Ž., 2014. Assessment of aflatoxin M1 contamination in the milk of four dairy species in Croatia. Food control, 43, 18-21.

Çankırı, B., Uyarlar, C., 2013. Mikotoksinlerin süt sığırlarının beslenmesindeki yeri ve önemi. Kocatepe Veterinary Journal, 6(2), 57-69.

Frobisch, R.A., Bradley, B.D., Wagner, D.D., Long-Bradley, P.E., Hairston, H., 1986. Aflatoxin residues in milk of dairy cows after ingestion of naturally contaminated grain. Journal of food protection, 49(10), 781-785.

To cite this article: ERGİN EĞRİTAĞ H, Varol K. (2022). Determination of Aflatoxin M1 Levels in Some Honamli Goat Herds in Burdur Province. MAKU J. Health Sci. Inst., 10(3), 146-150.

ISSN: 2148-2837/MAKU J. Health Sci. Inst.

Ghanem, I., Orfi, M., 2009. Aflatoxin M1 in raw, pasteurized and powdered milk available in the Syrian market. Food Control, 20(6), 603-605.

Goto, T., Hsieh, D.P., 1985. Fractionation of radioactivity in the milk of goats administered 14C-Aflatoxin B1. Journal of the Association of Official Analytical Chemists, 68(3), 456-458.

Guntekin Ergün, S., Özkan, S., Abbasoğlu, U., 2016. Investigation of aflatoxin B1 levels in red-scaled pepper by ELISA. Gazi Medical Journal, 27(4).

Hussain, I., Anwar, J., Asi, M.R., Munawar, M.A., Kashif, M., 2010. Aflatoxin M1 contamination in milk from five dairy species in Pakistan. Food control, 21(2), 122-124.

İşleyici, Ö., Sancak, Y.C., Sancak, H., Yücel, U.M., 2015. Determination of Aflatoxin M1 Levels in Unpackaged Sold Raw Cow's Milk. Van Veterinary Journal, 26(3), 151-155.

Karadal, F., Onmaz, N.E., Hızlısoy, H., Yıldırım, Y., Al, S., Gönülalan, Z., 2018. Niğde ilindeki çiğ koyun, keçi ve inek sütlerinde aflatoksin M1 düzeyleri. Kocatepe Veterinary Journal, 11(2), 119-125.

Kaya, S., Pirinçci, İ., Bilgili, A., 2002. Veteriner hekimliğinde toksikoloji. Medisan Yayınevi.

Kaya Tuz, M., Asan, A., Ökten, S., 2017. Devam sütlerinde Aflatoksin M1 varlığının elisa yöntemiyle tespit Edilmesi. Trakya University Journal of Natural Sciences, 18(1), 55-58.

Martins, M.L., & Martins, H.M., 2000. Aflatoxin M1 in raw and ultra high temperature-treated milk commercialized in Portugal. Food additives & contaminants, 17(10), 871-874.

Molle, G., Decandia, M., Cabiddu, A., Landau, S. Y., Cannas, A., 2008. An update on the nutrition of dairy sheep grazing Mediterranean pastures. Small Ruminant Research, 77(2-3), 93-112.

Navarro, S., & Zettler, J.L., 2001. Critical limits of sealing for successful application of controlled atmosphere or fumigation. In Proc. Int. Conf. on Controlled Atmosphere and Fumigation in Stored Products. Executive Printing Services, Clovis, CA, 507-520.

Özdemir, M., 2007. Determination of aflatoxin M1 levels in goat milk consumed in Kilis province. Ankara Üniversitesi Veteriner Fakültesi Dergisi, 54(2), 99-103.

Özkaya, Ş., Temiz, A., 2003. Aflatoksinler: Kimyasal yapıları, toksisiteleri ve detoksifikasyonları. Orlab On-Line Mikrobiyoloji Dergisi, 1(1), 1-21.

Pohland, A.E., 1993. Mycotoxins in Review. Food Addivites and Contaminants 10(1), 17-28.

Rahimi, E., Ameri, M., 2012. A survey of aflatoxin M1 contamination in bulk milk samples from dairy bovine, ovine, and caprine herds in Iran. Bulletin of Environmental Contamination and Toxicology, 89(1), 158-160.

Rao, S.N., Chopra, R.C., 2001. Influence of sodium bentonite and activated charcoal on aflatoxin M1 excretion in milk of goats. Small Ruminant Research, 41(3), 203-213.

Ronchi, B., Danieli, P. P., Vitali, A., Sabatini, A., Bernabucci, U., Nardone, A., 2005. Evaluation of AFB1/AFM1 carry-over in lactating goats exposed to different levels of AFB1 contamination. Proc 56th Ann Meet EAAP, Uppsala, Sweden, 1-10.

Türel, G.Y., Calapoğlu, N.Ş., 2017. Mikotoksinler ve moleküler düzeydeki etkileri. SDÜ Tıp Fakültesi Dergisi, 24(1), 13-28.

Türk Gıda Kodeksi Tebliğ., 2002. Türk Gıda Kodeksi gıda maddelerinde belirli bulaşanların maksimum seviyelerinin belirlenmesi hakkında tebliğ (No:2002/63). Resmi Gazete, 23.09.2002, Sayı: 24885.

Van Egmond, H.P., 1989. Aflatoxin M_1: occurrence, toxicity, regulation. In H.P. Van Egmond (Ed), Mycotoxins in Dairy Products. Elsevier Applied Science, New York. 11-55.

Van Egmond, H.P., 1989. Current situation on regulations for mycotoxins. Overview of tolerances and status of standard methods of sampling and analysis. Food Additives & Contaminants, 6(2), 139-188.

Veldman, A., Meijs, J.A.C., Borggreve, G.J., & Heeres-Van Der Tol, J.J., 1992. Carry-over of aflatoxin from cows' food to milk. Animal Science, 55(2), 163-168.

Virdis, S., Scarano, C., Spanu, V., Murittu, G., Spanu, C., Ibba, I., De Santis, E.P.L., 2014. A survey on Aflatoxin M1 content in sheep and goat milk produced in Sardinia Region, Italy (2005-2013). Italian journal of food safety, 3(4), 4517.

Whitlow, L.W., Hagler, W.M., Diaz, D.E., 2010. Mycotoxins in feeds. Foodstuffs, 74-84.

To cite this article: ERGİN EĞRİTAĞ H, Varol K. (2022). Determination of Aflatoxin M1 Levels in Some Honamli Goat Herds in Burdur Province. MAKU J. Health Sci. Inst., 10(3), 146-150.

ISSN: 2148-2837/MAKU J. Health Sci. Inst.

MAKU J. Health Sci. Inst. 2022, 10(3): 151-160.
doi: 10.24998/maeusabed.1211858

Mehmet Akif Ersoy University
Journal of Health Sciences Institute
http://dergipark.gov.tr/maeusabed

Research Article / Araştırma Makalesi

Evaluation of Neck Pain in Patients with Chronic Obstructive Pulmonary Disease

Kronik Obstrüktif Akciğer Hastalığı olan Hastalarda Boyun Ağrısının Değerlendirilmesi

Ayşenur YILMAZ[1]*, Ayşe ÜNAL [1], Orçin TELLİ ATALAY[1], Filiz ALTUĞ[1], Göksel ALTINIŞIK[2]

[1]Pamukkale University, Department of Physical Therapy and Rehabilitation, Denizli, Türkiye
[2]Pamukkale University, Faculty of Medicine, Department of Chest Diseases, Denizli, Turkiye

Abstract: In chronic obstructive pulmonary disease(COPD) patients use extensively supplementary respiratory muscles such as trapezium and scalenes muscles in order to facilitate ventilation. These situations cause pain restricting by the upper body mobility and neck movements. This study was conducted to investigate the presence of neck pain in individuals with COPD and to compare it with healthy individuals. The study included sixty-two patients with COPD(COPD group) and sixty-two healthy volunteer subjects(control group). Visual Analog Scale(VAS) to determine pain intensity were used. Severity of neck disability level and the effects of pain on daily life were evaluated by Neck Disability Index and Nordic Musculoskeletal System Questionnaire. Chest mobility was assessed by circumference measurement. VAS of the COPD group was higher than the control group ($p<0.05$). While mild disability was found due to neck pain in the COPD group, there was no impairment in the control group ($p<0.05$). In chest circumference measurements measured from axillary, epigastric and subcostal parts, the COPD group values were found to be statistically lower ($p<0.05$). Individuals with COPD have neck pain. When these patients rehabilitate, musculoskeletal problems, such as neck pain should be considered.

Keywords: Chronic obstructive pulmonary disease, Neck pain, Neck disability level.

Öz: Kronik obstrüktif akciğer (KOAH) hastaları ventilasyonu kolaylaştırmak için sıklıkla trapezin üst parçası ve skalen gibi yardımcı solunum kaslarını kullanmaktadır. Bu durum üst gövdenin mobilitesini ve boyun hareketlerini kısıtlayarak ağrıya sebep olur. Bu çalışma, KOAH'lı hastalarda boyun ağrısını değerlendirmek ve sağlıklı bireylerle karşılaştırmak amacıyla yapılmıştır. Çalışmaya altmış iki KOAH hastası (KOAH grubu) ve altmış iki sağlıklı gönüllü birey (kontrol grubu) dahil edildi. Ağrı şiddetini belirlemek için Görsel Analog Skala kullanıldı. Boyun özür derecesi ve ağrının günlük yaşama etkileri Boyun Özür Göstergesi ve Nordic Kas-iskelet Sistemi Anketi ile değerlendirildi. Göğüs mobilitesi değerlendirmek için göğüs çevre ölçümü yapıldı. KOAH grubunun ağrı şiddeti kontrol grubuna göre daha yüksekti. KOAH grubunda boyun ağrısına bağlı hafif özürlülük saptanırken, kontrol grubunda yetersizlik yoktu ($p<0,05$). Aksillar, epigastrik ve subkostal bölgelerden ölçülen göğüs çevresi ölçümlerinde KOAH grubu değerleri istatistiksel olarak daha düşük bulundu ($p<0,05$). KOAH'lı bireylerde boyun ağrısı görülmektedir. Bu hastalar rehabilitasyon programına alındığında boyun ağrısı gibi kas-iskelet sistemi sorunları göz önünde bulundurulmalı ve buna yönelik tedaviler rehabilitasyon programına eklenmelidir.

Anahtar Kelimeler: Kronik obstrüktif akciğer hastalığı, boyun ağrısı, boyun özür düzeyi.

*Corresponding author : Ayşenur YILMAZ e-mail : fzt.aysenurgungor@gmail.com
Geliş tarihi / Received : 30.11.2022 Kabul tarihi / Accepted: 15.12.2022

Introduction

Chronic obstructive pulmonary disease (COPD) is a common, preventable, and treatable disease characterized by progressive respiratory symptoms and airflow limitation. In recent years, it has been known that COPD is associated with systemic effects and comorbidities leading to anomalies in the lung besides other organs. Weight loss, nutritional disorders, musculoskeletal dysfunction, exercise intolerance, cardiovascular diseases, lung cancer, depression and anxiety, osteoporosis, diabetes, obstructive sleep apnea syndrome, and

To cite this article: YILMAZ A, ÜNAL A, TELLİ ATALAY O, ALTUĞ F, ALTINIŞIK G. (2022). Evaluation of Neck Pain with Chronic Obstructive Diseae. MAKU J. Health Sci. Inst., 10(3), 151-160.

ISSN: 2148-2837/ MAKU J. Health Sci. Inst.

anemia are the most common systemic effects of COPD (Maltais et al., 2014). Patients with respiratory diseases like chronic obstructive pulmonary disease (COPD) and asthma have been found to have postural disorders due to hyperinflation and overuse of accessory muscles of respiration, such as increased forward tilt of the head, protraction, and retraction of the scapula, increased cervical lordosis, chest wall enlargement, decreased mobility of the thoracic spine, and increased lumbar lordosis (Lee et al., 2018; Lunardi et al., 2011). In the presence of the kypholordotic posture in which the head tilts forward and the swayback posture in which the hip is pushed forward of the trunk, weakness is observed in the external oblique muscle, one of the expiratory muscles (Kendall 2005).

Recent studies have shown an apparent correlation between impaired cervical motor control and respiratory dysfunction (Kapreli et al., 2005; Wirth et al., 2014). During breathing, stabilization of the cervical and thoracic spine is needed for muscle activation to allow the upward and downward movements of ribs. In COPD patients, the increased activity of accessory muscles of respiration such as sternocleidomastoid (SCM) and scalene causes fatigue in involved muscles. Spasms and pain occur in the cervical region due to hyperinflation and excessive use of accessory muscles for respiration and postural changes (Lunardi et al., 2011; Kapreli et al., 2009). However, individuals with chronic neck pain have also been found to have impaired pulmonary functions (Dimitriadis et al., 2013) and reduced strength of respiratory muscles (Kapreli et al., 2009; Dimitriadis et al., 2014). The anatomic proximity of cervical and thoracic regions and the increased activity of the accessory muscles of respiration changes the kinetic control of the thoracic and costal joints in individuals with neck pain, increasing the respiratory workload. Therefore, it impairs respiratory parameters indicating respiratory functions and respiratory muscle strength (Kapreli et al., 2009).

Studies have shown that the quality of life of COPD patients is adversely affected by the disease (Wirth et al., 2014, Tsiligianni et al., 2011). Although it is mainly associated with shortness of breath (Habraken et al., 2011), some studies associate the reduction in the quality of life in COPD patients with pain (Borge et al., 2011, Bentsen et al., 2011, Lee et al., 2015). It was reported that 70% of patients with COPD presented with complaints of pain (Borge et al., 2011). A study investigating symptom distress and quality of life in advanced COPD reported that 37% of patients had chest pain and 41% had pain in other parts of the body (Blindermann et al., 2009). Patients with severe COPD had moderate to severe pain complaints, most commonly in the chest, neck, arms, back, or hips (Lohne et al., 2010). Due to the excessive use of accessory muscles in COPD, there is a high risk of developing neck pain as a result of the stress on the musculoskeletal structures around the neck (Heneghan et al., 2015).

There are no studies in the literature examining neck pain and its consequences on activities of daily living in COPD patients. Therefore, we conducted our study to investigate the presence of neck pain in patients with COPD and to compare it with healthy individuals.

Materials and Methods

This study included 124 volunteers, consisting of 62 healthy individuals and 62 patients diagnosed with COPD, who were followed up in the Pamukkale University Chest Diseases Outpatient Clinic.

Participants

The study included 62 COPD patients, who were 18 years old or older, who were treated with the diagnosis of COPD in Pamukkale University Hospital Chest Diseases Outpatient Clinic, who met the inclusion criteria, and who voluntarily agreed to participate in the study. The study also included 62 healthy individuals from the same age group, who had no known comorbidities.

To cite this article: YILMAZ A, ÜNAL A, TELLİ ATALAY O, ALTUĞ F, ALTINIŞIK G. (2022). Evaluation of Neck Pain with Chronic Obstructive Diseae. MAKU J. Health Sci. Inst., 10(3), 151-160.

ISSN: 2148-2837/ MAKU J. Health Sci. Inst.

Inclusion Criteria

For COPD patients: Individuals, who had no respiratory diseases other than COPD, who were literate, who had no history of a whiplash injury, who had no malignancies, who did not have diabetes mellitus, and individuals, who had no cardiac, neuromuscular, neurological, mental, or metabolic disorders of significant severity, were included in the study.

For the control group: Individuals, who had no known comorbidities, who were literate, who had no history of a whiplash injury, who had no malignancies, and those who did not have diabetes mellitus were included in the study.

Exclusion Criteria

For COPD patients: Individuals, who did not meet the inclusion criteria, and those who suffered from acute or chronic neuromusculoskeletal pain in any part of the body were excluded.

For the control group: Individuals, who did not meet the inclusion criteria, who had any acute or chronic neuromusculoskeletal pain in any part of the body, and those who had cardiac, pulmonary, neuromuscular, neurological, mental, or metabolic disorders were excluded from the study.

Study design

Socio-demographics of participants, who met the inclusion criteria, were collected through interviews, recorded, and then, their chest circumferences were measured. Neck pain severity was assessed using the Visual Analog Scale. It was questioned whether there was painkiller use related to neck pain in the last week. Musculoskeletal problems related to the neck and upper extremities were collected using the Nordic Musculoskeletal Questionnaire. The Neck Disability Index was used to determine the impact of neck pain on activities of daily living. Pulmonary functions of only COPD patients were tested. The GOLD classification was used for COPD diagnosis and staging (Global Initiative for Chronic Obstructive Lung Disease (GOLD) 2006).

Evaluation methods

Chest circumference measurement: To determine the chest mobility and respiration type, chest circumferences were measured using a tape measure in the upright sitting position over the axillary (4th coastal level), epigastric (xiphoid process level), and subcostal (9th coastal level) regions. Chest circumference was measured during deep inspiration and deep expiration, and the difference was recorded in centimeters (Viitanen et al., 1992; Reddy et al., 2019).

Visual Analog Scale (VAS): Pain severity was assessed using VAS. "0" denoted no pain, and "10" denoted the most severe pain level perceived. Patients marked the pain severity on a 10 cm horizontal line, and then the measurements were recorded. Patients were inquired to find out whether they suffered from neck pain currently (Heneghan et al., 2015).

Nordic Musculoskeletal Questionnaire (NMQ): Using NMQ, tested for validity and reliability in Turkish by Kahraman et al., the patients were questioned for the presence of symptoms (pain, discomfort, numbness) in the last 12 months in nine different anatomic regions (neck, shoulder, elbow, wrist/hand, upper body, lower body, hip/thigh, knee, ankle/foot) (Kuorinka et al., 1987; Kahraman et al., 2015). In our study, we focused only on regions related to the neck and upper extremities.

Neck Disability Index (NDI): NDI was used in the study to determine the impact of neck pain on activities of daily living. This index consists of 10 questions on the severity of pain, personal care, load lifting, reading, headaches, the ability to concentrate, work life, the ability to drive, sleep characteristics, and leisure activities. Each question is given a value in the range of 0-5 points. When there are unanswered questions, they are removed from the calculation of the total score. The neck disability rate is calculated by dividing

To cite this article: YILMAZ A, ÜNAL A, TELLİ ATALAY O, ALTUĞ F, ALTINIŞIK G. (2022). Evaluation of Neck Pain with Chronic Obstructive Diseae. MAKU J. Health Sci. Inst., 10(3), 151-160.

ISSN: 2148-2837/ MAKU J. Health Sci. Inst.

the participant's score by the highest possible score and multiplying it by 100. A high score and a high rate indicate a high degree of disability related to the neck. A disability rate of 0-20 percent means no disability, 21-40 means mild, 41-60 Moderate, 61-80 severe, and 81-100 complete disability (Kesiktas et al., 2012; Aslan et al., 2008).

Pulmonary Function Test (PFT): PFT was performed with the COSMED Pony Fx portable oral pressure measuring device. Pulmonary function parameters were measured while patients were sitting in a comfortable position with the nose clip attached. The test was repeated three times. Forced Expiratory Volume in the first second (FEV1), Forced Vital Capacity (FVC), FEV1/FVC ratio, Peak Expiratory Flow (PEF), and Maximal Mid-Expiratory Flow Rate (FEF25-75) values were recorded (Neder et al., 1999; Neder et al., 2020). Pulmonary function tests were performed to determine the stages of COPD.

Statistical Analysis

The effect size obtained in the reference study was large (d=1.01) (Heneghan et al., 2015). Based on the results of the reference study, we performed a power analysis assuming that we could obtain a lower effect size (d=0.8). We calculated that the inclusion of at least 84 subjects (at least 42 subjects for each group) would provide 95% power at a 95% confidence level. The data were analyzed using the SPSS package software. Continuous variables were presented as mean ± standard deviation. Categorical variables were presented as numbers and percentages. When the parametric test assumptions were met, the Test of Significance of Difference between Two Means was used to compare independent group differences. In addition, the relations between continuous variables were analyzed with Spearman's correlation analysis, and the differences between categorical variables were analyzed with the Chi-square analysis.

Ethical consideration

Before starting the study, all participants were informed about the aim and scope of the study, and written consent was obtained from each participant. This study was approved by decision no.23 dated 08.12.2020 of the Pamukkale University Medical Ethics Committee of Non-Interventional Clinical Research.

Table 1. Demographic and clinical characteristics of groups.

Variables	COPD group Mean±SD	Control group Mean±SD	p-value
Age (years)	66.77±11.66	64.83±12.06	0.366[a]
BMI (kg/m²)	26.31±5.16	27.71±4.96	0.125[a]
	n (%)	**n (%)**	
Gender			
Female	11 (17.7)	19 (30.6)	0.141[b]
Male	51 (82.3)	43 (69.4)	
COPD stage			
Stage 1	8 (12.9)		
Stage 2	27 (43.5)		
Stage 3	18 (29.0)		
Stage 4	9 (14.5)		

BMI: Body mass index, COPD: Chronic obstructive pulmonary disease, SD: Standard deviation, [a]: Test of Significance of Difference Between Two Means, [b]: Chi-square analysis

To cite this article: YILMAZ A, ÜNAL A, TELLİ ATALAY O, ALTUĞ F, ALTINIŞIK G. (2022). Evaluation of Neck Pain with Chronic Obstructive Diseae. MAKU J. Health Sci. Inst., 10(3), 151-160.

ISSN: 2148-2837/ MAKU J. Health Sci. Inst.

Results

The study included a total of 124 subjects consisting of 62 patients followed up with a diagnosis of COPD (COPD group; 11 females, 51 males) and 62 healthy subjects (control group; 19 females, 43 males). All participants met the inclusion criteria.

Descriptive findings

The mean age of the COPD group was 66.77±11.66 years and the mean age of the control group was 64.83±12.06 years. The mean body mass index was 26.31±5.16 kg/m2 in the COPD group and 27.71±4.96 kg/m2 in the control group. The demographic and clinical characteristics of participants are detailed in Table 1. The descriptive characteristics of participants were similar between the groups (p>0.05). According to GOLD classification, patients with FEV1 values of >80% and FEV1/FVC values of <0.7 were classified as Gold 1 (Mild); 50%< to <80% as Gold 2 (moderate); 30%< to <50% as Gold 3 (severe); and <30% as Gold 4 (Very Severe).

Comparison of neck pain and disability conditions

As for the neck pain severity of the groups, the mean VAS was 2.13 ±2.53 in the COPD group and 1.21 ±2.35 in the control group (p=0.038). The duration of pain was 21.43 ± 75.53 weeks in the COPD group and 31.30 ± 108.90 weeks in the control group (p=0.600). The COPD group scores were higher in terms of disability level. The NDI score was 11.91±9.78 in the COPD group and 7.12±8.74 in the control group. As for the disability rate, the mean percentage of neck disability was 25.28±20.36 in the COPD group and 13.68±14.59 in the control group. Mild disability due to neck pain was found in the COPD group, while the control group had no disability (p=0.001).

Based on the neck and shoulder pain assessment with NMQ, 34 patients (54.8%) had neck pain and 31 patients (50.0%) had shoulder pain in the COPD group.

When the use of painkillers for neck pain in the last week was compared, 45 (%72.5) patients in the COPD group and 14 (%22.5) patients in the control group reported that they used drugs. In the control group, 18 (29.0%) participants had neck pain and 25 (40.3%) had shoulder pain. There was no difference between the groups in terms of NMQ shoulder pain subscale scores (p=0.280), while the prevalence of neck pain was higher in the COPD group than in the control group (p=0.006). The comparison of pain and disability conditions of the groups is given in Table 2.

Comparison of chest mobility

As for the chest circumference measurements of the groups, axillary region mobility was 3.41±2.37 cm in the COPD group and 5.18±2.18 cm in the control group. Epigastric region mobility was 3.14±1.96 cm in the COPD group, and 5.35±2.42 cm in the control group. Subcostal region mobility was 3.47±1.96 cm in the COPD group and 6.00±3.34 cm in the control group. Measurement of chest circumference over the axillary, epigastric, and subcostal regions showed that the values of the COPD group were statistically lower (p=0.001) (Table 3).

Assessment of respiratory parameters

Mean respiratory parameters of the COPD group were recorded as follows: FEV1(%) 54.76±19.56; FVC(%) 69.49±21.57; FEV1/FVC ratio 60.11±10.94; PEF(%) 53.38±19.58; and FEF25-75(%) 31.89±18.01 (Table 3).

The relationship of neck pain with chest mobility and respiratory parameters in patients with COPD

The relationship between neck pain severity and disability level with chest mobility and respiratory parameters in patients with COPD was not statistically significant (p>0.05) (Table 4).

Discussion

Aiming to investigate the presence of neck pain in COPD patients and to compare them with healthy individuals, this study found that neck pain was common in patients with COPD and that the

To cite this article: YILMAZ A, ÜNAL A, TELLİ ATALAY O, ALTUĞ F, ALTINIŞIK G. (2022). Evaluation of Neck Pain with Chronic Obstructive Diseae. MAKU J. Health Sci. Inst., 10(3), 151-160.

ISSN: 2148-2837/ MAKU J. Health Sci. Inst.

severity of pain and disability due to neck pain were higher than the control group. It has been reported in the literature that upper body mobility and neck movements become restricted due to the frequent use of accessory muscles of respiration for facilitation of ventilation, resulting in pain in respiratory system diseases (Lunardi et al., 2011; Kapreli et al., 2009; Vardar-Yagli et al., 2019).

Table 2. Comparison of the neck pain and disability conditions of groups

Variables	COPD group Mean±SD	Control group Mean±SD	p-value
VAS (score)	2.13±2.53	1.21±2.35	**0.038**[a]
Pain duration (weeks)	21.43±75.53	31.30±108.90	0.600[a]
NDI (score)	11.91±9.78	7.12±8.74	**0.005**[a]
NDI (disability rate)	25.28±20.36	13.68±14.59	**0.001**[a]
	n (%)	**n (%)**	
Use painkiller	45(72.5)	14 (22.5)	**0.000** [b]
NDI category			
No disability	17 (27.4)	34 (54.8)	
Mild disability	22 (35.5)	17 (27.4)	
Moderate disability	16 (25.8)	8 (12.9)	**0.020**[b]
Severe disability	5 (8.1)	1 (1.6)	
Complete disability	2 (3.2)	2 (3.2)	
NMQ - Neck Subscale			
Presence of pain	34 (54.8)	18 (29.0)	**0.006**[b]
Number of days with pain			
1-30 days	18 (52.9)	16 (88.8)	**0.026**[b]
More than 30 days	16 (47.1)	2 (11.2)	
Limitation of activity			
Limitation of work	8 (12.9)	8 (12.9)	0.200[b]
Limitation of leisure activities	15 (24.2)	10 (16.1)	0.769[b]
Number of days with limitation of the work life	27 (43.5)	17 (27.4)	0.282[b]
1-30 days	4 (6.5)	1 (1.6)	
More than 30 days			
NMQ - Shoulder Subscale			
Presence of pain	31 (50.0)	25 (40.3)	0.280[b]
Number of days with pain			
1-30 days	21 (67.7)	18 (98.4)	**0.012**[b]
More than 30 days	10 (32.3)	1 (1.6)	
Limitation of activity			
Limitation of work	5 (8.1)	8 (12.9)	0.177[b]
Limitation of leisure activities	2 (3.2)	12 (19.4)	**0.001**[b]
Number of days with limitation of the work life	24 (38.7)	17 (27.4)	0.595[b]
1-30 days			

VAS: Visual analog scale, NDI: Neck Disability Index, NMQ: Nordic Musculoskeletal Questionnaire, COPD: Chronic obstructive pulmonary disease, SD: Standard deviation, [a]: Test of Significance of Difference Between Two Means, [b]: Chi-square analysis

To cite this article: YILMAZ A, ÜNAL A, TELLİ ATALAY O, ALTUĞ F, ALTINIŞIK G. (2022). Evaluation of Neck Pain with Chronic Obstructive Diseae. MAKU J. Health Sci. Inst., 10(3), 151-160.

ISSN: 2148-2837/ MAKU J. Health Sci. Inst.

Table 3. Comparison of chest mobility and respiratory parameters of the groups

Variables	COPD group Mean±SD	Control group Mean±SD	p-value[a]
Chest circumference measurement			
Axillary region	3.41±2.37	5.18±2.18	**0.001**
Epigastric region	3.14±1.96	5.35±2.42	**0.001**
Subcostal region	3.47±1.96	6.00±3.34	**0.001**
Respiratory parameters			
FEV1 (%)	54.76±19.56		
FVC (%)	69.49±21.57		
FEV1/FVC	61.97±12.99		
PEF (%)	53.38±19.58		
FEF25-75 (%)	31.89±18.01		

COPD: Chronic obstructive pulmonary disease, SD: Standard deviation, [a]: Test of Significance of Difference Between Two Means

In our study, the pain severity of the COPD group was higher than that of the control group. A study questioned elderly COPD patients about their pain complaints and their severity and found that they had more pain complaints compared to the healthy group. The study reported that patients frequently used pain relief methods such as acupuncture, TENS, and medication for the relief of pain complaints. However, although the presence of pain was high in patients with COPD, there was not a significant difference between the groups in that study. This was because the subjects with certain comorbidities including rheumatological diseases, asthma, or fibromyalgia were not excluded from the control group of the study. Unlike this study, we did not include individuals with comorbidities. In addition, in the present study, patients mostly complained of the chest, shoulder, neck, and back pain (Bentsen et al., 2011). In our study, we specifically questioned the presence of neck pain and found that the severity of pain in the COPD group was higher compared to the control group. However, the pain level of COPD patients was below 5. We think that the reason for this is related to the high use of painkillers. In addition, the duration of pain may be shortened due to the intake of painkillers. Mild to moderate COPD patients may also have been affected by this situation. We think that the level of pain will be higher in patients with severe levels.

The more common occurrence of pain in people with COPD may be a result of shortness of breath and coughing, which increase the use of accessory muscles and cause fatigue in the chest and back. A study reported that 72% of moderate-to-severe COPD patients had pain symptoms (Borge et al., 2011). In our study, we found a 54.8% frequency of neck pain. This rate is quite high despite COPD of mild to moderate severity in our patients. We think that the frequency was high because of the high average age of our COPD patients. Another study, similar to ours, reported that the rate of pain was 34% in men and 55% in women with COPD. It has been reported that pain complaints increased in advanced age, especially above 70 years of age (Fuentes-Alonso et al., 2017).

There are articles in the literature reporting that respiratory muscle weakness is associated with chronic neck pain (Lunardi et al., 2011; Dimitriadis et al., 2014; Heneghan et al., 2015; Gupta. et al., 2019) In a study, chronic pain was reported to be more common in patients with COPD compared to healthy individuals of the same age and gender (Lee et al., 2018). In addition, a strong relationship

To cite this article: YILMAZ A, ÜNAL A, TELLİ ATALAY O, ALTUĞ F, ALTINIŞIK G. (2022). Evaluation of Neck Pain with Chronic Obstructive Diseae. MAKU J. Health Sci. Inst., 10(3), 151-160.

ISSN: 2148-2837/ MAKU J. Health Sci. Inst.

was found between increased neck flexion and head protraction and decreased respiratory muscle strength (Kapreli et al., 2009). In our study, we did not find a relationship between pain and chest mobility. However, we think that postural disorders of patients should be evaluated in terms of disease duration and severity since the effects on posture develop slowly.

HajGhanbari et al. (2012) in their study, which included 47 patients with COPD and 47 healthy subjects, found that patients with COPD had approximately 2.5 times more pain complaints compared to the control group and that their activities of daily living were affected 3.7 times more compared to healthy subjects because of pain. Borge et al. (2011) reported that the complaint of pain in patients with COPD negatively affected daily life and reduced the quality of life . In our study, mild disability due to neck pain was found in the COPD group in terms of the disability conditions that we assessed using NDI but there were no disabilities in the control group.

Table 4. The relationship of neck pain with chest mobility and respiratory parameters in patients with COPD

Variables	**p-value**	**r-value**
VAS- Axillary CCM	0.677	-0.054
VAS- Epigastric CCM	0.192	-0.168
VAS- Subcostal CCM	0.901	-0.016
NDI disability rate- Axillary CCM	0.847	-0.025
NDI disability rate- Epigastric CCM	0.343	-0.122
NDI disability rate- Subcostal CCM	0.205	-0.163
VAS- FEV1 (%)	0.337	-0.124
VAS- FVC (%)	0.525	0.082
VAS- FEV1/FVC	0.371	-0.116
VAS- PEF (%)	0.130	-0.195
VAS- FEF25-75 (%)	0.814	-0.030
NDI disability rate- FEV1 (%)	0.345	0.122
NDI disability rate- FVC (%)	0.224	0.157
NDI disability rate- FEV1/FVC	0.707	0.049
NDI disability rate- PEF (%)	0.506	0.086
NDI disability rate- FEF25-75 (%)	0.938	0.010

VAS: Visual analog scale, CCM: Chest circumference measurement, NDI: Neck Disability Index, *Pearson correlation analysis

When we evaluated the presence of shoulder pain as a sub-parameter of the Nordic Musculoskeletal Questionnaire, we found that COPD patients had a higher rate of pain. Although the prevalence of pain was not significant, there was a significant difference in pain duration and activity limitation. This suggests that COPD patients may experience shoulder pain along with neck pain and it may be related to overuse of upper body muscles. We think that the insignificant difference is related to

To cite this article: YILMAZ A, ÜNAL A, TELLİ ATALAY O, ALTUĞ F, ALTINIŞIK G. (2022). Evaluation of Neck Pain with Chronic Obstructive Diseae. MAKU J. Health Sci. Inst., 10(3), 151-160.

ISSN: 2148-2837/ MAKU J. Health Sci. Inst.

the mild-to-moderate disease severity of our COPD patients and that the complaints should increase with advancing age.

Bentsen et al. (2011) reported more comorbidities in COPD patients suffering from pain compared to those without pain. We did not assess the comorbidities of patients and this is one of the limitations of our study. Systemic consequences and comorbidities may occur also in the early stages of the disease and may adversely affect the severity and prognosis of COPD. For this reason, we think that it would be prudent to evaluate systemic effects in future studies. In addition, the male predominance in our study may affect the generalization of our study results to larger groups.

The presence of pain in COPD negatively affects daily life. We think that research on this subject should be increased. We think that should evaluate pain complaints in COPD should focus more on neck pain and the following should be evaluated including the acute or chronic nature of pain, the type of pain, the time of occurrence of pain during the day, aggravations by movements, and pain complaints by the stage of COPD. Evaluating the effect of neck pain on daily life and having a control group are our strengths.

Conclusion

We think that pain should be included in assessment parameters in COPD patients. It would be beneficial to add pain-relieving practices and exercises to rehabilitation programs to relax the accessory muscles of respiration.

References

Aslan, E., Karaduman, A., Yakut, Y., Aras, B., Simsek, I.E., Yağlı, N., 2008. The cultural adaptation, reliability and validity of neck disability index in patients with neck pain: a Turkish version study. Spine 33 (11), 362-365.

Bentsen, S. B., Rustøen, T., & Miaskowski, C., 2011. Prevalence and characteristics of pain in patients with chronic obstructive pulmonary disease compared to the Norwegian general population. The Journal of Pain 12(5), 539-545.

Blindermann CD, Homel P, Billings A, Tennstedt S, Portenoy RK., 2009. Symptom, distress and quality of life in patients with advanced chronic obstructive pulmonary disease. J Pain Symptom Manage 38,115-23,

Borge, C. R., Wahl, A. K., & Moum, T., 2011. Pain and quality of life with chronic obstructive pulmonary disease. Heart & lung 40(3), e90-e101.

Dimitriadis Z, Kapreli E, Strimpakos N, Oldham J., 2014. Pulmonary function of patients with chronic neck pain: a spirometry study. Respir Care 59(4), 543-9

Dimitriadis Z, Kapreli E, Strimpakos N, Oldham J., 2013. Respiratory weakness in patients with chronic neck pain. Man Ther 18(3), 248-53.

Fuentes-Alonso, M., López-de-Andrés, A., Palacios-Ceña, D., Jimenez-Garcia, R., Lopez-Herranz, M., Hernandez-Barrera, V., Perez-Farinos, N., Ji, Z., de-Miguel-Diez, J., 2017. COPD is Associated with Higher Prevalence of Back Pain: Results of a Population-Based Case–Control Study. Journal of Pain Research 13, 2763.

Global Initiative for Chronic Obstructive Lung Disease (GOLD), 2018. Global strategy for the diagnosis, management of chronic obstructive pulmonary disease. NHLBI/WHOWorkshop Report 2018. www.goldcopd.com/workshop/index.html. Date last updated: November 2021.

Gupta, N., Sarkar, A., & Kumar, D., **2019**. Risk Factors Associated with Onset of Neck Pain: A Review. Scopus Ijphrd Citation Score 10(7), 361.

Habraken, J. M., van der Wal, W. M., ter Riet, G., Weersink, E. J., Toben, F., & Bindels, P. J., 2011. Health-related quality of life and functional status in end-stage COPD: a longitudinal study. European Respiratory Journal 37(2), 280-288.

HajGhanbari, B., Holsti, L., Road, J.D., & Reid, W.D., 2012. Pain in people with chronic obstructive pulmonary disease (COPD). Respiratory Medicine 106(7), 998-1005.

Heneghan, N., Adab, P., Jackman, S., & Balanos, G. 2015. Musculoskeletal dysfunction in chronic obstructive pulmonary disease (COPD): An observational study. International Journal of Therapy and Rehabilitation 22(3), 119-128.

Kahraman, T., Genç A., Göz, E., 2015. The Nordic Musculoskeletal Questionnaire: Cross-Cultural Adaptation into Turkish Assessing its Psychometric Properties. Disability and Rehabilitation 37, 1-8,

To cite this article: YILMAZ A, ÜNAL A, TELLİ ATALAY O, ALTUĞ F, ALTINIŞIK G. (2022). Evaluation of Neck Pain with Chronic Obstructive Diseae. MAKU J. Health Sci. Inst., 10(3), 151-160.

ISSN: 2148-2837/ MAKU J. Health Sci. Inst.

Kapreli, E., Vourazanis, E., Billis, E., Oldham, J.A., Strimpakos N., 2009. Respiratory dysfuction in chronic neck pain patients. A pilot study. Cephalalgia 29, 701-10.

Kendall F.P., 2005. Postural Examinations. Muscles Testing and Function with Posture and Pain: Lippincott Williams & Wilkins 86-95

Kesiktas, N., Ozcan, E., & Vernon, H., 2012. Clinimetric properties of the Turkish translation of a modified neck disability index. BMC musculoskeletal disorders 13(1), 25.

Kuorinka, I., Jonsson, B., Kilbom, A., Vinterberg, H., Biering-Sørensen, F., Andersson, G., Andersson, G., & Jørgensen, K., 1987. Standardised Nordic questionnaires for the analysis of musculoskeletal symptoms. Appl Ergon 18, 233-7.

Lee, A.L., Goldstein, R.S., Chan, C., Rhim, M., Zabjek, K., & Brooks, D., 2018. Postural deviations in individuals with chronic obstructive pulmonary disease COPD). Canadian Journal of Respiratory, Critical Care, and Sleep Medicine 1-8.

Lee, A. L., Harrison, S. L., Goldstein, R. S., & Brooks, D., 2015. Pain and its clinical associations in individuals with COPD: a systematic review. Chest 147(5), 1246-1258.

Lohne, V., Heer, H.C.D, Andersen, M., Miaskowski, C., Kongerud, J., Rustøen, T., 2010. Qualitative study of pain of patients with chronic obstructive pulmonary disease. Heart & Lung 39, 226–234.

Lunardi, A.C., Marques da Silva, C.C.B., Rodrigues Mendes, F.A., Marques, A.P., Stelmach, R., & Fernandes Carvalho, C.R. 2011. Musculoskeletal dysfunction and pain in adults with asthma. Journal of Asthma 48 (1), 105-110.

Maltais, F., Decramer, M., Casaburi, R., Barreiro, E., Burelle, Y., Debigare, R., 2014. An official American Thoracic Society/European Respiratory Society statement: update on limb muscle dysfunction in chronic obstructive pulmonary disease. Am J Respir Crit Care Med 189(9):e15-62.

Neder, J.A., Andreoni, S., Lerario, M.C., & Nery, L.M. 1999. Reference values for lung function tests: II. Maximal respiratory pressures and voluntary ventilation. Brazilian journal of medical and biological research 32(6), 719-727.

Neder, J.A., Pablo de-Torres, J., Milne, K.M., & O'Donnell, D.M., 2020. Lung function testing in chronic obstructive pulmonary disease. Clinics in Chest Medicine 41(3), 347–366.

Reddy, R.S., Alahmari, K.A., Silvian, P.S., Ahmad, I.A., Kakarparthi, V.N., Rengaramanujam, K., 2019. Reliability of chest wall mobility and its correlation with lung functions in healthy nonsmokers, healthy smokers, and patients with COPD. Canadian respiratory journal 2019,11.

Tsiligianni, I., Kocks, J., Tzanakis, N., Siafakas, N., van der Molen, T., 2011. Factors that influence disease-specific quality of life or health status in patients with COPD: a review and meta-analysis of Pearson correlations. Primary care respiratory journal: journal of the General Practice Airways Group 20(3), 257-268.

Vardar-Yagli, N., Saglam, M., Calik-Kutukcu, E., Inal-Ince, D., Arikan, H., & Coplu, L., 2019. Increased pain sensitivity, postural abnormalities, and functional balance impairment in obstructive lung disease compared to healthy subjects. Heart & Lung 48(4), 351-355.

Viitanen JV, Suni J, Kautiainen H, Liimatainen M, Takala, H., 1992. Effect of physiotherapy on spinal mobility in ankylosing spondylitis. Scand J Rheumatol 21(1), 38-41.

Wirth, B., Amstalden, M., Perk, M., Boutellier, U., Humphreys, B. K., 2014. Respiratory dysfunction in patients with chronic neck pain–Influence of thoracic spine and chest mobility. Manual Therapy 19(5), 440-444.

To cite this article: YILMAZ A, ÜNAL A, TELLİ ATALAY O, ALTUĞ F, ALTINIŞIK G. (2022). Evaluation of Neck Pain with Chronic Obstructive Diseae. MAKU J. Health Sci. Inst., 10(3), 151-160.

ISSN: 2148-2837/ MAKU J. Health Sci. Inst.

MAKU J. Health Sci. Inst. 2022, 10(3): 161-168.
doi: 10.24998/maeusabed.1195179

Mehmet Akif Ersoy University
Journal of Health Sciences Institute
http://dergipark.gov.tr/maeusabed

Research Artcile / Araştırma Makalesi

Effect of Combination of Hypericum Perforatum, Calendula Officinalis and Aloe Vera Plant Extracts on Incisional Wound Healing

Hypericum Perforatum, Calendula Officinalis ve Aloe Vera Bitki Ekstraktlarının Kombinasyonunun İnsizyonel Yara İyileşmesine Etkisi

Sultan KAYA[1], Şevkinaz DOĞAN[2]

[1]Burdur Public Education Center, Burdur, Türkiye
[2]Burdur Mehmet Akf Ersoy University, Faculty of Health Sciences, Department of Fundemantals of Nursing, Burdur, Turkiye

Abstract: Today, patients and health professionals are turning to innovative approaches due to the lack of success in treating chronic wounds. This study aimed to investigate the effect of a mixture of *Hypericum Perforatum* histopathologically, *Calendula Officinalis*, and *Aloe Vera* plant extracts on incisional wound healing. A total of 14 rats, 7 rats, were used in each group. The groups were divided into experimental and control. While daily wound care was performed with an herbal extract mixture in the experimental group, sterile saline was used for daily wound care in the control group. During the study, wound surface area measurement, macroscopic evaluation, and histopathological examination were performed in both groups. According to research findings, the control group's wound-healing process is shorter. Histopathological analyses revealed that wound healing was completed on day 21.

Keywords: *Aloe Vera*, *Calendula Officinalis*, *Hypericum Perforatum*, Incisional wound, Wound healing.

Öz: Günümüzde hastalar ve sağlık profesyonelleri, kronik yaraların bakım ve tedavisinde başarı sağlanamaması nedeniyle yenilikçi yaklaşımlara yönelmektedir. Bu çalışmada, *Hypericum perforatum, Calendula officinalis* ve *Aloe vera* bitki ekstraktlarının bir karışımının insizyonel yara iyileşmesi üzerine etkisinin histopatolojik olarak incelenmesi amaçlanmıştır. Çalışmada her grupta 7 sıçan olmak üzere toplam 14 sıçan kullanılmıştır. Gruplar deneysel ve kontrol olarak ikiye ayrıldı. Deney grubunda bitkisel ekstre karışımı ile günlük yara bakımı yapılırken, kontrol grubunda günlük yara bakımı için steril salin kullanılmıştır. Çalışma süresince her iki grupta da yara yüzey alanı ölçümü, makroskopik değerlendirme ve histopatolojik inceleme yapıldı. Araştırma bulgularına göre kontrol grubunda yara iyileşme süreci daha kısadır. Histopatolojik incelemelerde yara iyileşmesinin 21. günde tamamlandığı gözlendi.

Anahtar Kelimeler: *Aloe vera*, *Calendula officinalis*, *Hypericum perforatum*, İnsizyonel yara, Yara iyileşmesi.

*Corresponding author : Şevkinaz DOĞAN
e-mail : skonak@mehmetakif.edu.tr
Geliş tarihi / Received : 27.10.2022
Kabul tarihi / Accepted: 14.12.2022

Introduction

Chronic wounds are an important cause of mortality and morbidity. The long duration of wound healing in chronic wounds causes prolonged hospitalization, increased care costs and workload. In addition to these problems, the prolongation of the healing process negatively affects the quality of life of the individual, causing physical and psychosocial trauma, leading to the inability of the individual to fulfill his responsibilities and an increase in care expenditures economically (Özkorkmaz et al., 2009: Kısacık, 2015). Herbal therapy has gained popularity around the world in recent years. The World Health Organization (WHO) reports that approximately 60% of the world population and 60-90% of developing countries turn to treatment with medicinal plants (Sançar et al., 2017). The rich content of herbal medicines, their effect on many regions, their cheapness, low level of side effects and easy availability make them used by large masses. Medicinal plants that affect various stages

To cite this article: KAYA S, DOĞAN Ş. (2022). Effect of Combination of Hypericum Perforatum, Calendula Officinalis and Aloe Vera Plant Extracts on Incisional Wound Healing. MAKU J. Health Sci. Inst., 10(3), 161-168.

ISSN: 2148-2837/ MAKU J. Health Sci. Inst.

of wound healing such as coagulation, inflammation, collagen production and epithelial formation take their place in the scientific literature (Sançar et al., 2017). The effects of the extracts of these plants on wound healing can be listed as antibacterial, collagen synthesis enhancer, proliferation-fibroblast stimulating, antimicrobial and antioxidant (Sançar et al., 2017). *Hypericum perforatum* has been used in wound treatment for centuries and is known to have important effects, especially in incisional wounds (Prisacaru et al., 2013: Altan et al., 2015). It is reported that *H. perforatum* extracts increase collagen production, fibroblast migration, keratinocyte differentiation and epithelialization, as well as antimicrobial and antibacterial effects (Sançar et al., 2017). *Calendula officinalis* is used in wound healing as an anti-inflammatory agent (Erçetin et al., 2012: Parenthe et al., 2012: Nicolaus et al., 2017). It is seen that the hexane and ethanolic extract of *C. officinalis* stimulates the proliferation and migration of fibroblasts, accelerates re-epithelialization, increases cell proliferation, and the amount of collagen and noncollagen proteins (Budovsky et al., 2015). Another plant used in wound treatment is *Aloe vera*. *Aloe vera* is a medicinal plant with high efficacy in the treatment of skin wounds. Both *Aloe vera* gel and *Aloe vera* extract have been reported to promote wound healing in in vitro and in vivo studies. It contains many active ingredients for wound healing, including polysaccharide, aloin, emodin, rhein, aloesin and vitamins. The anti-bacterial, anti-inflammatory, anti-oxidant and immunomodulatory properties of these compositions have positive effects on skin wound healing. Aloe polysaccharide and anthraquinone, aloin, rhein and emodin components, which are found in large amounts in aloe vera, perform wound healing with their anti-inflammatory, antibacterial, angiogenic and immunomodulatory effects (Attah et al., 2016: Sa et al., 2016; Liang et al., 2020). This study was carried out to examine the effectiveness of combinations of *H. perforatum*, *C.officinalis* and *Aloe vera* plant extracts (HCA) on incisional wound healing and to make a scientific contribution to the literature.

H_1 hypothesis: The use of a mixture of Hypericum perforatum, Calendula officinalis and Aloe vera plant extract in the treatment of incisional wounds shortens the healing process.

Materials and Methods

The ethics committee approval of the study was obtained by Burdur Mehmet Akif Ersoy University Animal Experiments Local Ethics Committee with the decision numbered 512 on 15.05.2019. In the study, Wistar breed, average weight 250-350 gr. 14 male rats, ranging in age from 8-12 weeks old, were used. Rats were divided into experimental and control groups by simple randomization method. After incisional wounds were created, all rats were housed in separate cages for 12 hours during the day and 12 hours at night, under constant temperature (17-20ºC environment) and humidity under laboratory conditions. During the experiment, rats were fed with tap water and standard chow. Extracts of *Hypericum perforatum* and C*alendula officinalis* plants were obtained by classical maceration method. *Aloe vera* plant was obtained as a gel. Extracts from these plants were mixed in equal proportions. Anesthesia, dorsal hair shaving and cleaning with 70% isopropanol and surgical field staining with betadine were performed on each rat. Then, wounds were created by making 3 cm incisional incisions with a scalpel in the dorsal region of the rats. The dressing of both groups was performed once a day for 21 days, at the same time every day, assuming 0 on the day the wound was formed (no dressing was applied on the day 0). The mixture obtained from HCA plant extracts was applied to the experimental group in a 0.5 cc amount of injector to completely cover the wound area. After the dressing application, the wound area was covered with sterile sponge and fixed with an adhesive bandage dressing. On the other hand, 1 cc sterile Serum Physiological was applied to the rats in the control group, and the wound area was closed and fixed with sterile sponge. Healing of incisional wounds was evaluated at two levels, macroscopically and microscopically. In order to calculate the wound healing percentages in

To cite this article: KAYA S, DOĞAN Ş. (2022). Effect of Combination of Hypericum Perforatum, Calendula Officinalis and Aloe Vera Plant Extracts on Incisional Wound Healing. MAKU J. Health Sci. Inst., 10(3), 161-168.

ISSN: 2148-2837/ MAKU J. Health Sci. Inst.

macroscopic examination, first of all, photographs of the wounds on the 7th, 14th and 21st days were taken and the wound surface areas and healing percentages were calculated using a computer program. In microscopic examination, excisional biopsy was performed for histological examination of tissue fragments, each containing the wound edge and surface, on days 7, 14, and 21, after wounds were created. On the 7th and 14th days after the biopsy procedure, the area from which the biopsy was taken was sutured. On the 21st day, after the anesthesia phase, wound evaluations were made and the rats were sacrificed using the cervical dislocation method. The data obtained in the research were analyzed using the SPSS (Statistical Package for Social Sciences) for Windows 25.0 program. When examining the difference between groups; $p<0.05$ interpreted as statistically significant.

Table 1. Wound area reduction over time in groups (%)

Time	Group	n	Mean	Standard deviation
Wound area percentage 0. day	Control	7	100.00	0.00
	Experiment	7	100.00	0.00
Wound area percentage 7. day	Control	7	84.15	10.86
	Experiment	7	85.58	9.51
Wound area percentage 14. day	Control	7	24.05	7.90
	Experiment	7	36.29	15.21
Wound area percentage 21. day	Control	7	7.13	5.53
	Experiment	7	9.00	4.56

Table 2. Gruplarda yara alanlarının zamana göre değişimi (%)

Time	Control			Experiment			z value	p value
	Med	Min.	Mak.	Med	Min.	Mak.		
Wound area percentage 0. day	100.0	100.0	100.0	100.0	100.0	100.0	-0.192	0.848
Wound area percentage 7. day	86.36	62.10	95.65	87.36	67.39	95.55	-1.597	0.110
Wound area percentage 14. day	24.46	11.57	36.95	33.33	18.88	62.53	-1.023	0.306
Wound area percentage 21. day	5.26	2.32	17.39	8.42	3.26	15.38	-1.023	0.306
Test value		21.000			21.000			
p value		0.000			0.000			

To cite this article: KAYA S, DOĞAN Ş. (2022). Effect of Combination of Hypericum Perforatum, Calendula Officinalis and Aloe Vera Plant Extracts on Incisional Wound Healing. MAKU J. Health Sci. Inst., 10(3), 161-168.

ISSN: 2148-2837/ MAKU J. Health Sci. Inst.

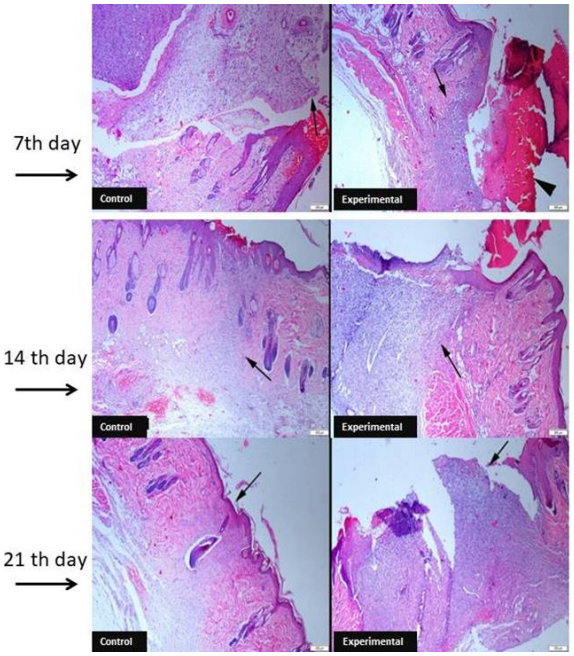
Results

Macroscopic and Wound Surface Findings

On the 4th day of wound healing, it was observed that wound crusting was completed in both study groups. Wound healing progressed more slowly in the experimental group rats for 21 days, and infection findings were observed in the experimental group. It was observed that there was a statistically significant difference in wound area shrinkage of the experimental and control groups according to time ($p<0.05$) (Table 1). In the multiple comparison test performed to find out which group the difference originated from, the wound area shrinkage on Day 0 was greater than on the 14th and 7th days; It was determined that the wound area shrinkage on the 21st day was smaller than the 7th day. It was determined that there was no statistically significant difference between the groups on all days ($p>0.05$) (Table 2).

Microscopic and Histopathological Findings

In the histopathological examination of biopsies taken on the 7th day of wound healing; In the control group, it was determined that the connective tissue formation progressed significantly and the healing of the epithelial layer began. In the experimental group, it was observed that the connective tissue was not fully formed, a necrotic crust layer and a severe inflammatory reaction were observed on the epithelial layer. In the histopathological examination of the 14th day of wound healing, it was observed that the healing was better shaped in the control group and that in addition to the healing in the connective tissue, the healing occurred in the epithelial tissue. It was observed that healing progressed in the connective tissue and epithelium in the experimental group, but the inflammatory reaction still continued. Recovery was delayed in the experimental group compared to the control group. In the histopathological examination of the 21st day of wound healing, it was observed that the healing was completed in the control group.



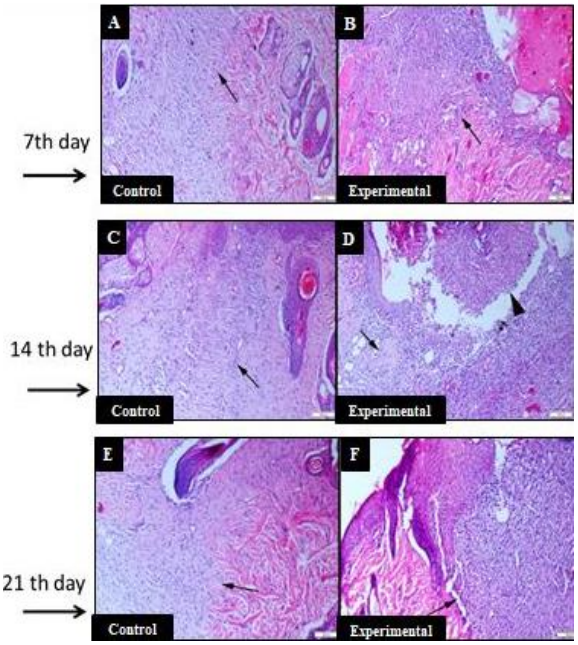
Picture 1: Wound healing on days 7, 14 and 21. Histopathological appearance of skin biopsies on days A: Extensive connective tissue development in the control group (arrow), B: Slight connective tissue formation (arrow) and extensive necrotic crustal mass (arrowhead) in the experimental group, C: Connective tissue development in the control group is about to be completed (arrow), D: Experimental In the group, it was observed that the inflammatory reaction remained prominent especially in the connective tissue (arrow). While the healing of the epithelium was about to be completed in the control group, very slight improvement was observed in the experimental group, E: Significant improvement in the epithelium and connective tissue in the control group, the epithelial layer was completely regenerated (arrow), F: Diffuse inflammatory reaction in the epithelium and connective tissue in the experimental group and delayed healing (arrow) , HE, Bar= 200µm.

In the experimental group, it was determined that widespread inflammatory reaction and loss of epithelial layer continued, and chronic granulation tissue became evident. Pictures 1 and 2 show the histopathological appearance of wound biopsies taken on days 7-14 and 21 of wound healing. In Masson trichrome staining performed for connective tissue development, it was observed that the connective tissue healing in the control group was shaped more clearly than in the experimental group in all weeks. In the control

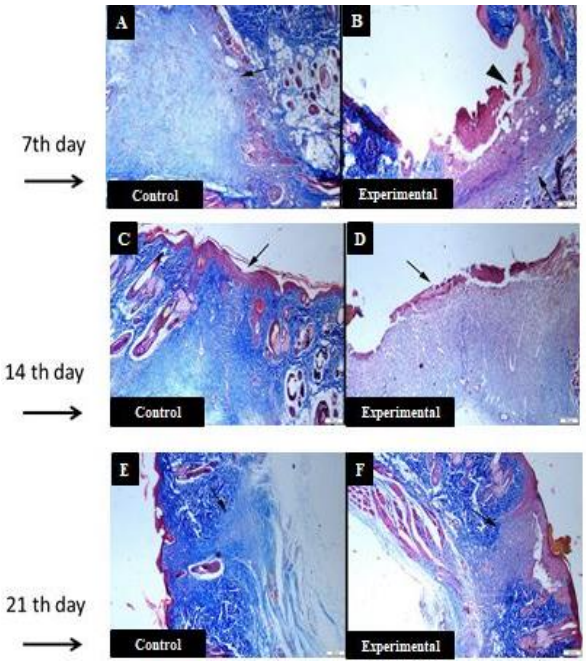
To cite this article: KAYA S, DOĞAN Ş. (2022). Effect of Combination of Hypericum Perforatum, Calendula Officinalis and Aloe Vera Plant Extracts on Incisional Wound Healing. MAKU J. Health Sci. Inst., 10(3), 161-168.

ISSN: 2148-2837/ MAKU J. Health Sci. Inst.

group, it was observed that the connective tissue development took shape from the 7th day of wound healing. In the biopsies taken on the 14th day of wound healing, the improvement in the control group was observed. On the 21st day of wound healing, complete connective tissue healing was observed in the control group, while a decrease in connective tissue and collagen formation was observed in the experimental group (Picture 3).



Picture 2: Wound healing on days 7, 14 and 21. Magnified view of skin biopsies on days. A: Connective tissue formation in the control group, B: Connective tissue formation in the experimental group (arrows), C: Connective tissue formation in the control group (arrow), D: Inflammatory reaction in the experimental group (arrowhead), E: Completely healed incision area in the control group (arrow), F: Chronic granulation tissue formation in the connective tissue in the experimental group (arrow), HE, Bar= 100µm.



Picture 3: Wound healing on days 7, 14 and 21. Connective tissue formation. A: Significant connective arrow formation in the control group, B: mild connective tissue formation (arrows) in the experimental group, ulcer formation in the experimental group (arrowhead), C: Connective tissue development and epithelial regeneration (arrow), characterized by significant blue coloration in the control group, D: Delay in healing of both connective tissue and epithelium (arrow) in the experimental group, E: Connective tissue formation in the control group (arrow) F: Connective tissue formation in the experimental group (arrow), Masson Trichrome method, Bar= 200µm.

Discussion

Measuring and recording the changes in the wound surface area is an objective evidence in determining the wound healing status. Considering the wound area percentages, the smallest wound area compared to the initial wound area belongs to the control group with 86.36%. A more effective wound area reduction was observed in all three measurements of the control group compared to the experimental group. As a result, it was observed that the HCA herbal mixture was not effective at the macroscopic level on wound healing. In the study of Nayak et al. (2017), in which they examined the effect of *H.*

To cite this article: KAYA S, DOĞAN Ş. (2022). Effect of Combination of Hypericum Perforatum, Calendula Officinalis and Aloe Vera Plant Extracts on Incisional Wound Healing. MAKU J. Health Sci. Inst., 10(3), 161-168.

ISSN: 2148-2837/ MAKU J. Health Sci. Inst.

perforatum on wound healing, a better healing was observed in the *H. perforatum* application group, unlike our study. In another study, in which herbal extracts were examined, a mixture of Musa *paradisiaca colla* and *Aloe vera* extract in different proportions was used, as a result, it was observed that using them separately or together in incision wounds affected wound healing equally. (Hashemi et al., 2015: Oryan et al., 2016: Kundarto et al., 2020). There is a lot of evidence that *H. perforatum* and *Aloe vera* have a positive effect on wound contraction and epithelialization, and even capillary formation is positively affected (Altıparmak et al., 2019; Teplicki et al., 2018; Koga et al.,2020). In addition, it is stated that C. officinalis effectively heals wounds and can be used in the treatment of superficial wounds (Rahman et al., 2020). On the 7th day of our study, the epithelial layer of the control group started to heal. In the experimental group, a necrotic crust layer and a severe inflammatory reaction were detected on the epithelial layer. In the following days, better regeneration was seen in the control group. In the experimental group, the progression was impaired and epithelial layer loss and chronic granulation were detected. It was concluded that the plant mixture used did not affect the epithelization development much. Collagens in the wound area provide the formation of collagen fibrils, which are an important part of the connective tissue matrix. At the end of this study, it was observed that the connective tissue and collagen formation in the control group was better than the experimental group. However, in a study examining the effect of Plantago major and Aloe vera on wound healing together, it was observed that Aloe vera gave better results in terms of epithelialization, collagen production and neovascularization (Ashkani-Esfahani et al., 2019). Ali et al. (2021) reported that *Aloe Vera* gel increases histopathologically epithelialization, collagenase and angiogenesis. Gunesakan et al. (2020) proved that *C. officinalis* is a wound healing agent by increasing growth factors, collagen and contraction in excisional wounds. The results of these studies do not support our study. Hidayat et al. (2021) reported that ozonated *Aloe vera* oil increases the number of fibroblasts, macrophages and endothelial cells, accelerates the wound healing process, and increases epithelialization and collagenization in full-thickness cutaneous wounds. It has also been reported that the spray form of *Aloe vera* gel has high healing activity in acute wounds (Sikumbang et al., 2020). In one study, wound healing was observed using aloe vera-containing alginate, and an increase in anti-inflammatory activity, collagen production and angiogenesis was observed (Koga et al., 2020). On the contrary, in our study, the inflammatory reaction was observed continuously, the healing time was prolonged and the collagenization decreased in the experimental group using herbal extract.

Conclusion

Wound and wound healing is one of the quality indicators in the health care system. Nowadays, despite all medical and alternative treatment approaches, wound care and treatment is an important health problem. Healing in chronic wounds can be prolonged with the effect of various factors. Therefore, new approaches to wound treatment are needed. In this study, it was determined that wound healing resulted negatively due to many factors, and healing stages such as connective tissue formation, tissue regeneration, and collagen synthesis could not be fully realized according to the content of the dressing material used in wound care. In the literature, it is reported that single or double combinations of medicinal plants used in our study accelerate wound healing, accelerate collagen synthesis and epithelialization, and stimulate proliferation. However, the herbal mixture used in this study prolongs the wound healing period, reduces collagen synthesis, and causes a widespread inflammatory reaction. Therefore, it was concluded that this mixture should not be used in wound healing. As a result, we think that this mixture should be supported by more comprehensive studies and its effect on all phases of wound healing should be examined separately.

To cite this article: KAYA S, DOĞAN Ş. (2022). Effect of Combination of Hypericum Perforatum, Calendula Officinalis and Aloe Vera Plant Extracts on Incisional Wound Healing. MAKU J. Health Sci. Inst., 10(3), 161-168.

ISSN: 2148-2837/ MAKU J. Health Sci. Inst.

Acknowledgments

This work was supported by Burdur Mehmet Akif Ersoy University Research Fund under Grant (BAP-Project No: 593-YL-19).

Conflicts of interest

There are no conflicts of interest to declare.

References

Ali, F., Wajid, N., Sarwar, MG., Qazi, AM., 2021. Oral aloe vera uygulaması, sprague dawley farelerinde iyileştirilmiş anjiyogenez ve kemotaksis yoluyla yara iyileşmesini iyileştirir. Curr Ecz. Biyoteknoloji. 2021; 22(8): 1122-8. DOI: 10.2174/1389201021999201001204345.

Altan, A., Damlar, İ., Aras, M.H., Alparslan, C., 2015. Sarı kantaronun (*hypericum perforatum*) yara iyileşmesi üzerine etkisi. *Çukurova Üniversitesi Arşiv Kaynak Tarama Dergisi*, 24(4), 578-591.

Altıparmak, M., Kule, M., Öztürk, Y., Çelik, SY., Öztürk, M., Duru, ME ve Koçer, U., 2019. Hypericum perforatum, Liquidambar orientalis ve propolis karışımlarının cilt yaralarını iyileştirme özellikleri. Avrupa Plastik Cerrahi Dergisi, 42(5), 489-494 https://doi.org/10.1007/s00238-019-01538-6

Ashkani-Esfahani, S., Khoshneviszadeh, M., Noorafshan, A., Miri, R., Rafiee, S., Hemyari, K., Kardeh, S., Hosseinabadi, O.K., Fani1, D., Faridi, E., 2019. The healing effect of plantago major and aloe vera mixture in excisional full thickness skin wounds: Stereological Study. *World J Surg.*, 8(1), 51.

Attah, M.O., Jacks, T.W., Jacob, A., Eduitem, O., John, B., 2016. The effect of aloe vera (linn) on cutaneous wound healing and wound contraction rate in adult rabbits. *NJMBS.,* 5(3).

Budovsky, A., Yarmolinsky, L., Ben-Shabat, S., 2015. Effect of medicinal plants on wound healing. *Wound Repair Regen.*, 23(2), 171-183.

Erçetin, T., Şenol, F., Orhan, I., Toker, G., 2012. Comparative assessment of antioxidant and cholinesterase inhibitory properties of the marigold extracts from Calendula arvensis L. and Calendula officinalis L. *Ind Crops Prod.,* 36(1), 203–208.

Gunasekaran, S., Nayagam, A.A.J., Natarajan, R., 2020. Wound healing potentials of herbal ointment containing Calendula officinalis Linn. on the alteration of immunological markers and biochemical parameters in excision wounded animals. *Clin. Phytoscience, 6*(1), 1-8.

Hashemi, S.A., Madani, S.A., Abediankenari, S., 2015. The review on properties of aloe vera in healing of cutaneous wounds. *Biomed Res. Int.,*1-6.

Kısacık, G.Ö., 2015. İskemik *yaraların iyileşmesinde kudret narı ekstraktı ile yapılan pansumanın, saf zeytinyağı, nitrofurazon ve serum fizyolojik kullanılarak yapılan pansumanlara göre etkinliğinin incelenmesi.* Doktora Tezi, Hemşirelik Esasları Anabilim Dalı Programı, Ege Üniversitesi Sağlık Bilimleri Enstitüsü, İzmir.

Koga, A.Y., Felix, J.C., Silvestre, R.G.M., Lipinski, L.C., Carletto, B., Kawahara, F.A., Pereira, A.V., 2020. Evaluation of wound healing effect of alginate film containing Aloe vera gel and cross-linked with zinc chloride. *Acta Cir. Bras., 35*(5), e202000507.

Kundarto, W., Pangesti, K.A.Y., Shabrina, F., Sasongko, H., 2020. Wound healing activity of skin incision and skin burn from spray gel formula contains combination of banana stem (Musa acuminata Colla) and Aloe vera ethanol extracts on mice. *In IOP Conf. Ser.: Mater. Sci. Eng.*, 858(1), 012027.

Nayak, S.B., Işık, K., Marshall, J.R., 2017. Wound-healing potential of oil of Hypercium perforatum in excision wounds of male Sprague Dawley rats. *Adv Wound Care.*, *6*(12), 401-406.

Oryan, A., Mohammadalipour, A., Moshiri, A., Tabandeh, M.R., 2016. Topical application of aloe vera accelerated wound healing, modeling, and remodeling: an experimental study. *Ann. Plast. Surg.,* 77(1), 37-46.

Özkorkmaz, E.G., Özay, Y., 2009. Yara iyileşmesi ve yara iyileşmesinde kullanılan bazı bitkiler. *Turk J Med Sci.,* 2(2), 63-67.

Parenthe LM, Lino Júnior Rde S, Tresvenzol LM, Vinaud MC, de Paula JR, Paulo NM., 2012. Wound healing and anti-inflammatory effect in animal models of Calendula officinalis L. growing in Brazil. Evid Based Complement Alternat Med., 375671: 1– 10.

Prisacaru, A.I., Andritoiu, C.V., Andriescu, C., Havarneanu, E.C., Popa, M., Motoc, A.G.M., Sava, A., 2013. Evaluation of the wound-healing effect of a novel hypericum perforatum ointment in skin ınjury. *Rom J Morphol Embryo.,* 54(4), 1053-1059.

Rahman, M.T., Hasan, M., Hossain, M.T., Islam, M.S., Rahman, M.A., Alam, M.R., Juyena, N.S., 2020. Differential efficacies of marigold leaves and turmeric paste on the healing of the incised wound in sheep. *J. Adv. Vet. Anim. Res.*,*7*(4), 750-757.

Sa, S., Dhiman, A., Nanda, S., 2016. Traditional Indian medicinal plants with potential wound healing activity: a review. *Int. J. Pharm. Sci. Res.,* 7(5), 1809-1819.

Sançar, B., Canbulat, Ş., İlhan, S.E., 2017. Yara bakımında kullanılan bitkisel yöntemler ve hemşirelik. *Türkiye Klinikleri J Intern Med Nurs-Special Topics.,* 3(2), 116-124.

Sikumbang, IM., Astuti, RA., Wahyuningtyas, ES., Lutfiyati, H., Wijayatri, R., & Nasruddin, N., 2020. Erkek balb/c farelerinde akut yarada aloe vera özü spreyinin yara iyileştirme etkinliği. Pharmaciana, 10(3), 315.

Teplicki, E., Ma, Q., Castillo, DE., Zarey, M., Hustad, AP., Chen, J., Li, J., 2018. *Aloe vera'nın* Hücre Çoğalması, Göçü ve Canlılığında Yara İyileşmesi Üzerindeki Etkileri. *Yaralar*, *30* , 263–268.

To cite this article: KAYA S, DOĞAN Ş. (2022). Effect of Combination of Hypericum Perforatum, Calendula Officinalis and Aloe Vera Plant Extracts on Incisional Wound Healing. MAKU J. Health Sci. Inst., 10(3), 161-168.

ISSN: 2148-2837/ MAKU J. Health Sci. Inst.

MAKU J. Health Sci. Inst. 2022, 10(3): 169-172.
doi: 10.24998/maeusabed.1192017

Mehmet Akif Ersoy University
Journal of Health Sciences Institute
http://dergipark.gov.tr/maeusabed

Case Report / Olgu Sunumu

Distal Metacarpus Fracture and Bandage Treatment in an Orphan Red Deer (Cervus elaphus) (Case Report)

Bir Öksüz Kızıl Geyik Yavrusunda (Cervus elaphus) Distal Metakarpus Kırığı ve Bandajlı Tedavisi (Olgu Sunumu)

Zülfükar Kadir SARITAŞ[1], Emine Hesna KANDIR[2], Fatma GÖRÜCÜ[1], M. Volkan YAPRAKCI[1], Yusuf KOÇ[1], Gökhan ÜNLÜ[1], Beste SARAÇOĞLU[2]

[1]Afyon Kocatepe University, Faculty of Veterinary Medicine, Surgery Department, Afyonkarahisar, Türkiye
[2] Afyon Kocatepe Universty, Faculty of Veterinary Medicine, Department of Wild Animal Diseases and Ecology, Afyonkarahisar, Turkiye

Abstract: In this case report, a 1-week-old female red fawn (Cervus elaphus), constituted the study material. In the clinical examination, posture disorder, malnutrition and severe lameness in both forelimbs in young deer were determined. Radiographic examination of the case revealed a distal diaphyseal transversal fracture in the left metacarpal bone, and a fracture in the lateral 1st and medial 2nd phalanx distal in the right anterior extremity. General anesthesia was not preferred due to possible malnutrition in the young deer, and the treatment of the fracture was accomplished by placing bandage aplication. After the first week of bandage application, open wound formation on the foot was noticed and wound treatment was performed by opening a window on the bandage. This case report aimed to show our colleagues and other readers about the red deer, which is taken under protection due to the decrease in its population in Turkey, that multiple fractures can be treated with bandage application.

Keywords: Cast, Metacarpal fracture, Non-invasive/non-interventional treatment, Red deer (*Cervus elaphus*).

Öz: Bu olgu sunumunda, çalışma materyalini 1 haftalık dişi bir kızıl geyik (Cervus elaphus) yavrusu oluşturdu. Yapılan klinik muayenede yavru geyiklerde postür bozukluğu, malnütrisyon ve her iki ön ayakta şiddetli topallık tespit edildi. Olgunun radyografik incelemesinde sol metakarpal kemikte distal diafiz transversal kırık ve sağ ön ekstremite lateral 1. ve medial 2. falanks distalinde kırık saptandı. Yavru geyikte olası yetersiz beslenme nedeniyle genel anestezi tercih edilmedi ve kırığın tedavisi bandaj uygulaması yapılarak sağlandı. Bandaj uygulamasının ilk haftası sonrasında ayakta açık yara oluşumu fark edildi ve alçı üzerine pencere açılarak yara tedavisi gerçekleştirildi. Bu olgu sunumu ile Türkiye'de popülasyonunun azalması nedeniyle koruma altına alınan kızıl geyiğin çoklu kırıklarının bandaj uygulaması ile tedavi edilebileceğini meslektaşlarımıza ve diğer okuyucularımıza göstermek amaçlandı.

Anahtar Kelimeler: Bandaj, Kızıl geyik (*Cervus elaphus*), Metakarpal kırık, Non-invaziv/girişimsiz tedavi.

*Corresponding author : Yusuf KOÇ e-mail : ykoc03@hotmail.com
Geliş tarihi / Received : 20.10.2022 Kabul tarihi / Accepted: 16.12.2022

Introduction

Newborn fawns have the lowest survival rate of any age class and are more susceptible than adults to a variety of death threats, including predators. Disease and malnutrition are among the most common death threats, partly due to the limited mobility of young deer, their underdeveloped immune systems, and their dependence on their mothers for nutrition (Gaillard et al., 1998, Delguidice et al., 2006). In addition, the habitat type that does not provide adequate hiding opportunities and the long distance between feeding sources affect their threat by predators (Jakson et al., 1972, Scwede et al., 1994). How individuals in a population use habitat can affect their survival by changing their exposure to certain death threats (Hasapes and Comer, 2017, Lendrum et al., 2018). Choosing habitat types that provide a hiding place to give birth may reduce the

To cite this article: SARITAŞ ZK, KANDIR EH, GÖRÜCÜ F, YAPRAKCI MV, KOÇ Y, ÜNLÜ G, SARAÇOĞLU B. (2022). Distal Metacarpus Fracture and Bandage Treatment in an Orphan Red Deer (Cervus elaphus) (Case Report). MAKU J. Health Sci. Inst., 10(3), 169-172.

ISSN: 2148-2837/ MAKU J. Health Sci. Inst.

risk of predation among newborn fawns protected by hiding, while being away from roads reduces the risk of collision with vehicles (Etter et al., 2002, Piccolo et al., 2014). Deer-vehicle collisions are seen as an important animal welfare problem in Europe and North America and are a major cause of death (Langbein, 2007). In a study conducted in roe deer with fracture findings, it was stated that sedation applied during transport, preoperative intervention and postoperative rehabilitation procedures is the most important factor necessary to prevent stress and related mortality (Nispet et al., 2010). In adult deer, major surgery and prolonged recovery stress factors are contraindicated in low welfare situations. Such highly stressed animals can only be rescued under proper care and housing conditions. Teenagers, on the other hand, tend to be relatively calmer than adults, so they are less likely to injure themselves and recover more quickly (Green, 2003).

In the treatment of fractures, bandaging technique supported by some materials such as polyvinylchloride (PVC) and aluminum or splinting alone or combined with a bandage, such as the Modified Thomas Splint technique, is used as a treatment option for external fixation of closed fractures. Internal fixation techniques using techniques such as intramedullary nailing, cerclage wire, screws, dynamic compression plates, are recommended for the fixation of displaced, comminuted and complicated fractures (Arıcan et al., 2013). It has also been used in fracture treatment in interlocking pins in recent years (Arıcan et al., 2017).

In this case report, it was aimed to return the multiple fractures of an endangered red fawn cub to its habitat with bandage treatment.

Case Presentation

In this case report, a 1-week-old orphaned female red fawn (*Cervus elaphus*), one of the world's largest deer species, evaluated as Least Concern in the Red List of the International Union for Conservation of Natural Life and Natural Resources, and whose number is decreasing day by day in our country, constituted the study material (Figure 1). The red fawn was brought to Afyon Kocatepe University Wildlife Rescue Rehabilitation Training Application and Research Center (AKÜREM) in July 2020 by the authorities of the 5th Regional Directorate of Nature Conservation and National Parks, Eskişehir Branch, with the notification of the villagers in the countryside of Eskişehir, who were exhausted and could not stand up. He was directed to the Veterinary Health Application and Research Center for consultation.

Figure 1. A view from the process of staying in the bandage of the Red Fawn.

In the clinical examination, posture disorder, malnutrition and severe lameness in both forelimbs in young deer were determined. From the bruises on the pup, it was concluded that he was injured while escaping from a predator or human. Radiographic examination of the case revealed a distal diaphyseal transversal fracture in the left metacarpal bone, and a fracture in the lateral 1st phalanx and medial 2nd phalanx distal in the right anterior extremity (Figure 2).

To cite this article: SARITAŞ ZK, KANDIR EH, GÖRÜCÜ F, YAPRAKCI MV, KOÇ Y, ÜNLÜ G, SARAÇOĞLU B. (2022). Distal Metacarpus Fracture and Bandage Treatment in an Orphan Red Deer (Cervus elaphus) (Case Report). MAKU J. Health Sci. Inst., 10(3), 169-172.

ISSN: 2148-2837/ MAKU J. Health Sci. Inst.

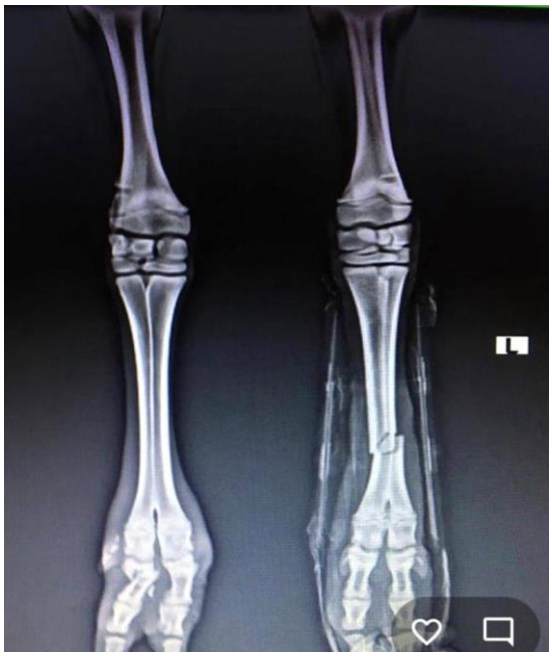


Figure 2. Radiographic view of anterior extremities in antero/posterior position in Red Deer and a transversal fracture in the distal diaphysis area of the left metacarpal bone and a fracture in the right lateral 1st phalanx and medial 2nd phalanx distal.

General anesthesia was not preferred due to possible malnutrition in the young deer, and the treatment of the fracture was accomplished by placing bandage aplication, with mild sedation (Xylazine hydrochloride, 0.2 mg/kg, im) was kept under follow-up (Figure 3). The fawn, whose care and treatment continued in AKÜREM after the bandage, was fed with a bottle. After the first week of bandage application, open wound formation on the foot was noticed and wound treatment was performed by opening a window on the bandage. Appetite and motility returned to normal within a week in the pup, which showed rapid recovery after bandage, and the start of using the relevant extremity was completed in 20 days (Figure 4). Full functional recovery of the red fawn, which used its foot sparingly after this period, took 90 days.

Discussion

The deer being a calf and the choice of the fracture stabilization method; A rapid improvement was observed in this case, as the young deer were followed up with an assisted bandage, did not undergo a surgical operation, healed quickly in young deer, were tolerant of captivity, and were less likely to injure themselves further. However, it was concluded that it is also important to take measures to prevent the mammalian offspring from getting used to humans while raising them.

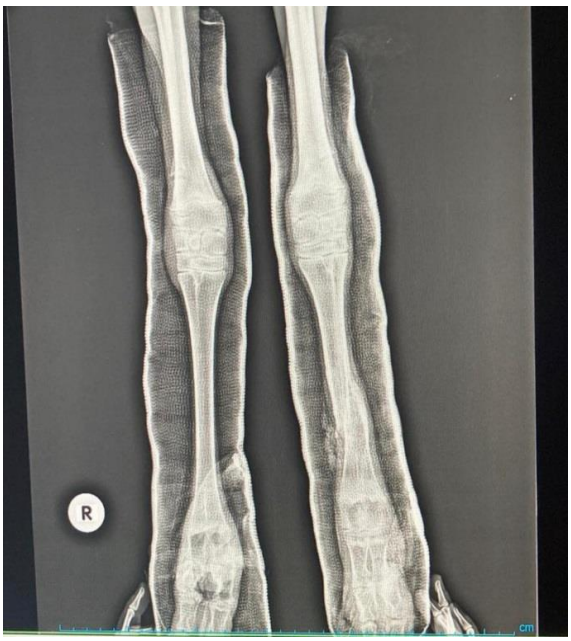


Figure 3. Rigid plaster bandage application to the front extremities in Red Deer.

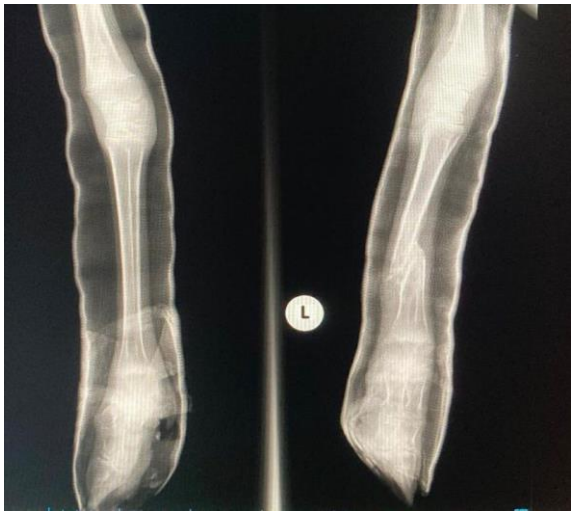


Figure 4. Radiographic image of fore limbs in medio/lateral position in Red Deer and a transversal fracture in the distal diaphysis area of the left metacarpal bone and a fracture in the right lateral 1st phalanx and distal medial 2nd phalanx.

To cite this article: SARITAŞ ZK, KANDIR EH, GÖRÜCÜ F, YAPRAKCI MV, KOÇ Y, ÜNLÜ G, SARAÇOĞLU B. (2022). Distal Metacarpus Fracture and Bandage Treatment in an Orphan Red Deer (Cervus elaphus) (Case Report). MAKU J. Health Sci. Inst., 10(3), 169-172.

ISSN: 2148-2837/ MAKU J. Health Sci. Inst.

Various techniques for treatment of extremity fractures are recommended by surgeons as depending on some factors such as type and localisation of fracture, type and severe of trauma, choice of treatment, genetical value of animal, cost of treatment and the conditions of management. It was reported that highly successful results have been obtained in the calves treated with techniques of bandage and splint (Aksoy et al., 2009, Gangl et al., 2006, Görgül et al., 2004, Latrach et al., 2006). In this case, treatment with bandage application was successful. This result is similar to the literature.

It was aimed to inform our colleagues and other readers and to raise awareness in this case of broken offspring belonging to the red deer species, which has been taken under protection because its population is decreasing in Turkey.

References

Aksoy, Ö., Özaydın, İ., Kılıç, E., Öztürk, S., Güngör, E., Kurt, B., Oral, H. 2009. Evaluation of fractures in calves due to forced extraction during dystocia: 27 cases (2003-2008). University of Kafkas Journal of the Faculty of Veterinary Medicine, 15(3), 339-344.

Arican, M., Alkan, F., Altan, S., Parlak, K., & Yavru, N. 2017. Clinical Experience of Interlocking Nail Stabilization of Long Bone Fractures in Dogs–A Retrospective Study of 26 Cases. Israel Journal of Veterinary Medicine, 72(2), 45-50.

Arican, M., Erol, H., Esin, E., Parlak, K. 2014. A retrospective study of fractures in neonatal calves: 181 cases (2002-2012). The Pakistan Veterinary Journal 34(2), 247-250.

DelGiudice, G.D., Fieberg, J., Riggs, M.R., Carstensen, P. M., Pan W. 2006. A long-term age-specific survivalanalysis of female white-tailed deer. The Journal of Wildlife Management 70, 1556–68.

Gaillard, J.M., Festa-Bianchet, M., Yoccoz, N.G. 1998. Populations dynamics of large herbivores: variable recruit-ment with constant adult survival. Trends in Ecology & Evolution 13, 58–63.

Etter, D.R., Anchor, C.L., Warner, R.E. 2002. Survival and movements of white-tailed deer in suburban Chicago, Illinois. The Journal of Wildlife Management 66, 500–10.

Gangl, M., Grulke, S., Serteyn, D., Touati, K. 2006. Retrospective study of 99 cases of bone fractures in cattle treated by external coaptation or confinement. Veterinary record, 158(8), 264-268.

Görgül, O. S., Seyrek-İntaş, D., Çelimli, N., Çeçen, G., Salcı, H., Akın, İ. 2004. Buzağılarda kırık olgularının değerlendirilmesi: 31 olgu (1996-2003). Veteriner Cerrahi Dergisi, 10(3-4), 16-20.

Green, P. 2003. Deer. In: BSAVA Manual of wildlife casualties., E. Mullineaux, D. Best, and J. E. Cooper (eds.). British Small Animal Veterinary Association, Gloucester, UK. pp. 166–181.

Hasapes, S.K., Comer, C.E. 2017. White-tailed deer fawn survival, home range, and habitat composition in north-west Louisiana. Wildlife Society bulletin 41, 499–507.

Jackson, R.M., White, M., Knowlton, F.F. 1972. Activity patterns of young white-tailed deer fawns in south Texas. Ecology 53, 262–70.

Langbein, J. 2007. National deer–vehicle collisions project— England (2003–2005). The Deer Initiative Ltd., P.O. Box 2196, Wrexham, UK. pp. 1–96.

Latrach, R., Segard, E., Frikha, M.R.2007. Cas clinique: traitement d'une fracture du tibia chez un veau par un pansement ROBERT-JONES associe a des attelles. Revue de médecine vétérinaire, 158(7), 354-361.

Lendrum PE, Northrup JM, Anderson CR, Liston GE, Aldridge CL, Crooks KR, et al. 2018. Predation riskacross a dynamic landscape: effects of anthropogenic land use, natural landscape features, and preydistribution. Landscape ecology 33, 157–70.

Nisbet, H. O., A. Özak, C. Yardimci, and Y. S. Sirin. 2010. Treatment results of traumatic injuries in 20 roe deer (Capreolus capreolus): A retrospective study. University of Kafkas Journal of the Faculty of Veterinary Medicine 16(4), 617–622.

Piccolo, B.P., Van Deelen, T.R., Hollis-Etter, K., Etter, D.R., Warner, R.E., Anchor, C. 2010. Behavior and survival ofwhite-tailed deer neonates in two suburban forest preserves. Canadian Journal of Zoology 88, 487–95.

Schwede G, Hendrichs H, Wemmer C. 1994. Early mother-young relations in white-tailed deer. Journal of mammalogy 75, 438–45.

To cite this article: SARITAŞ ZK, KANDIR EH, GÖRÜCÜ F, YAPRAKCI MV, KOÇ Y, ÜNLÜ G, SARAÇOĞLU B. (2022). Distal Metacarpus Fracture and Bandage Treatment in an Orphan Red Deer (Cervus elaphus) (Case Report). MAKU J. Health Sci. Inst., 10(3), 169-172.

ISSN: 2148-2837/ MAKU J. Health Sci. Inst.