Research Article

ROMAYA - Researches on Multidisiplinary Approaches 2024, 4(2): 212-218 ISSN:2791-9099

Comparison of Pain, Kinesiophobia, Anxiety, Sleep, and Quality of Life Conditions of Patients with Lower and Upper Extremity Fractures

Alt ve Üst Ekstremite Kırıklı Hastaların Ağrı, Kinezyofobi, Anksiyete, Uyku ve Yaşam Kalitesi Koşullarının Karşılaştırılması

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Abstract

Fractures affect the psychological status of individuals in addition to pain and functional problems. Fractures negatively affect patients' quality of life (QoL) by causing anxiety, kinesiophobia, and sleep problems. The aim was to develop personalized rehabilitation approaches by evaluating the psychological status of patients treated conservatively for lower and upper extremity fractures. 120 patients with isolated upper and lower extremity fractures who received nonsurgical treatment were compared prospectively in terms of pain, sleep quality, anxiety, kinesiophobia, and QoL. The visual analog score was used for pain, Tampa kinesiophobia scale for kinesiophobia, Beck anxiety inventory for anxiety, Pittsburgh sleep quality index for sleep, and short-form twelve for QoL. Although there was no significant difference in demographics between the groups, the mean age of upper extremity fracture patients was lower. No significant difference was found between the two groups regarding pain, kinesiophobia, anxiety, sleep quality, and QoL. Patients with fractures in the lower or upper extremities experienced a decrease in their sleep and life quality, and an increase in their pain, anxiety, and kinesiophobia levels. However, no significant differences were found between lower and upper extremity fractures. Clinicians should approach patients who have fractures as a biopsychosocial whole, not only functionally and radiologically, but also by considering their psychological conditions.

Keywords: Lower Extremity, Upper Extremity, Fracture, Sleep, Anxiety, Kinesiophobia, Quality Of Life.

Submission Date / Yayıma Geliş Tarihi : 10.09.2024
Acceptance Date / Yayıma Kabul Tarihi : 26.09.2024

Özet

Kırıklar, ağrı ve işlevsellik sorunlarının yanında kişilerin psikolojik durumlarını da etkilerler. Kırıklar, anksiyete, kinezyofobi ve uyku sorunlarına neden olarak hastaların yaşam kalitelerini olumsuz etkiler. Bu çalışmada konservatif olarak takip edilen alt ve üst ekstremite kırığı olan hastaların, psikolojik durumları değerlendirilerek, kişiselleştirilmiş rehabilitasyon yaklaşımları geliştirilmesi amaçlandı. İzole ekstremite kırığı yaşayan ve cerrahi dışı tedavi gören 120 hastanın ağrı, uyku kalitesi, anksiyete, kinezyofobi ve yaşam kalitesi açısından prospektif olarak karşılaştırıldı. Ağrı için vizüel analog skor, kinezyofobi için Tampa kinezyofobi ölçeği, anksiyete için Beck anksiyete ölçeği, uyku için Pittsburgh uyku kalitesi indeksi ve yaşam kalitesi için kısa form 12 kullanıldı. Gruplar arasında demografik veriler açısından belirgin bir fark olmamakla birlikte, üst ekstremite kırığı olan hastaların yaş ortalaması daha düşüktü. Ağrı, kinezyofobi, anksiyete, uyku kalitesi ve yaşam kalitesi açısından olumsuz etkilenen gruplar arasında istatistiksel anlamlı fark bulunmadı. Alt veya üst ekstremite kırık hastalarının uyku ve yaşam kalitelerinde azalma, ağrı, anksiyete ve kinezyofobi seviyelerinde artış görüldü. Ancak alt ve üst ekstremite kırıkları arasında anlamlı fark bulunmadı. Klinisyenler kırık hastalarına sadece fonksiyonel ve radyolojik olarak değil, psikolojik koşulları da gözeterek bir bütün klinisyenler,olarak yaklaşmalılardırlar.

Anahtar Kelimeler: Alt Ekstremite, Üst Ekstremite, Kırık, Uyku, Anksiyete, Kinezyofobi, Yaşam Kalitesi.

Introduction

A fracture is the disruption of the anatomical integrity of a bone due to trauma resulting from external or internal factors (Kılıçoğlu, 2002). In addition to pain, anxiety, kinesiophobia, sleep, and quality of life (QoL) problems are also seen in fracture patients (Alpalhão et al., 2022). Since bone fractures are a traumatic experience, kinesiophobia is common in trauma patients (Jayakumar et al., 2019). Nonunion or delayed nonunion, which may be more common in individuals with long bone fractures (Ziroglu & Huri, 2017), especially those of the femur and tibia, has been associated with anxiety (Johnson et al., 2019).

A correlation exists between fractures and sleep status, with osteoporotic fractures linked to inadequate sleep quality (Fung et al., 2017). Poor sleep quality increases anxiety and pain severity, leading to a decrease in QoL (Herrero Babiloni et al., 2020). In individuals with fractures, decreased self-care, functional disabilities, sleep problems, pain, kinesiophobia, depressive mood, and decreased social interaction significantly reduce the QoL (Jia et al., 2024). In the post-fracture period, the QoL of individuals decreases significantly due to the combination of physical and psychological problems (de Putter et al., 2014).

This study aimed to contribute to the development of a more individualized approach in the treatment and rehabilitation process by determining the differences in conditions such as pain, kinesiophobia, anxiety, sleep, and QoL experienced by patients according to their fracture locations. It was hypothesized that there may be differences in such conditions mentioned above on the fracture's site and anatomical location. Our study stands out by addressing the parameters of pain, kinesiophobia, anxiety, sleep and life quality, and kinesiophobia in a single study, which are addressed separately in many studies.

MATERIAL METHODS

Ethics

The study was conducted following the decision numbered 72128186-571 of the Istanbul Beykent University local ethics committee on 06.06.2024. This cross-sectional prospective study was conducted following the Helsinki Declaration. Informed consent was obtained from all participants.

Study Design and Setting

Between June and September 2024, 120 patients who applied to Acibadem Atakent University Hospital with a history of extremity trauma and were diagnosed with a fracture and were planned for non-operative treatment and applied a cast/splint/sling/air-cast boot by the orthopedic surgeon were included prospectively. The patients were evaluated 4-6 weeks after the date of the trauma after the cast/splint treatments were terminated.

Inclusion Criteria

- Diagnosed with isolated upper or lower extremity fractures,
- Those who have undergone non-operative treatments including plaster/splint/sling/air-cast boot applications,
- Treatment duration is limited to 4-6 weeks,
- Age between 18-80,
- Ability to read and comprehend Turkish language,
- Voluntarily participation in the study.

Exclusion Criteria,

- Both lower and upper extremity trauma,
- Axial skeleton and pelvic injuries,
- History of head, thorax, and abdominal trauma,
- Serious visual or mental disabilities,
- Concomitant psychiatric, neurological, or rheumatological diseases.

Study Groups

The first group includes patients with upper extremity fractures divided into subgroups of clavicle and scapula, humerus, forearm, and wrist-hand fractures (Group 1). The second group includes patients with lower extremity fractures divided into subgroups of the femur, tibia-fibula, and ankle and foot fractures (Group 2).

Data Collection

Participants were directed to the rehabilitation unit to increase their range of motion (ROM) and limb strengthening after the completion of their 4-6 weeks of conservative treatment. Pain, QoL, sleep, anxiety, and kinesiophobia conditions were measured by physiotherapists (PT), and clinical and demographic data were recorded.

Measurement

Visual Analog Scale (VAS)

Pain intensity was measured using VAS, and the score was between 0 and 10. The patient's painful area was assessed using a pain area drawing scale to determine both the intensity and location of the pain (Thong et al., 2018). VAS is a widely used, reliable, and valid assessment tool for measuring pain intensity (Crossley et al., 2004).

Pittsburgh Sleep Quality Index (PSQI)

PSQI scale was used to interpret sleep quality. The 24 questions in this scale were used to assess the hours the individual slept, the time it took to fall asleep, and sleep efficiency (Buysse et al., 1989). The 7-component form validated and reliable in the Turkish language was used (Ağargün et al., 1996).

Short Form 12 (SF-12) Quality of Life Scale

To assess the quality of life (QoL), the patient's emotional state, effective movement status, general body health, and ability to perform daily tasks over the last 4 weeks were assessed. The subscale scores of the 12-question form range from 0 to 100, and higher scores indicate good health (Ware et al., 1996). A valid and reliable Turkish version of the form was used (Soylu & Kütük, 2022).

Beck Anxiety Inventory

The Beck Anxiety Inventory, developed in 1998, consists of 21 questions, and the possible score varies between 0-63 (Beck et al., 1988). It provides information about the patient's emotional state in the last week (Julian, 2011). The Turkish valid and reliable form of the scale was used (Ulusoy et al., 1998).

Tampa Scale of Kinesiophobia

The 17-question scale (scorable from 17 to 68) measures fear of moving the extremity due to pain (Miller et al., 1991). There is no difference between the test and retest measurement results of the Tampa Kinesiophobia Scale, and it has been reported that it has excellent test reliability and is suitable for clinical use (Yilmaz et al., 2011).

Statistical Analysis

The data was analyzed using version 25.0 of the Statistical Package for Social Sciences (SPSS). Intergroup evaluations were made with the Independent Sample T Test. Mean, standard deviation and percentage data were provided within the framework of descriptive statistics. In the evaluation of test results, the significance level was accepted as $p<0.05$.

Sample Size Calculation

The calculation was performed with the G-Power program (3.1 version). It was calculated by taking into account the kinesiophobia scores of two different regions of Turhan et al. studies on patients with ligament injuries or fractures in the lower extremities (Turhan et al., 2019). The confidence interval was determined as 90% and the margin of error as 10%. Although the number of patients to be included was calculated as 104, it was planned to include 120 patients in case of exclusions.

RESULTS

While no significant difference was found between lower and upper extremity fracture groups regarding gender, patient/dominant side, smoking/alcohol use, regular exercise habit, and presence of chronic disease, a significant difference was shown between the groups in the age variable (p=0,027). The upper extremity fracture group was younger than the lower one.

Demographic and clinical characteristics are presented in Table 1. When Group 1 and Group 2 were compared in terms of pain, kinesiophobia, anxiety, sleep, and QoL, significant differences were not found between the groups in any variable. Group comparisons are presented in Table 2.

Both groups had moderate pain levels. Moderate pain indicates that it is bothersome but does not completely prevent the person from performing their daily activities. Although statistical significance (p=0,480) was not detected, the lower extremity group had a higher VAS value of 5.55±1.85 than the upper extremity group (VAS value was 5.14±1.72).

According to kinesiophobia values, both groups tended to avoid movement or physical activity and were seen to have moderate kinesiophobia. A statistically significant difference was not found between the

groups concerning kinesiophobia levels (p=0.808).

According to anxiety levels, the upper extremity group had 11.51±7.33 points, while the lower extremity group had 11.13±8.79 points, and both groups had mild anxiety. A statistically significant difference was found between the groups in terms of anxiety levels (p=0.648).

Regarding sleep assessment, both groups had poor sleep quality. Although there was no statistical significance (p=0.208), the sleep quality of the lower extremity group was worse (8.86±4.35 points) than the upper (7.86±3.86 points).

The QoL assessment showed that their physical health status, one of the sub-dimensions of SF-12, was good, they could easily perform their daily activities and their physical limitations were minimal. It was also seen that their mental health status was good and their emotional and social functionality was high.

Table 1. Social-demographic and Clinical Characteristics of Patients

	Group 1 (Upper Extremity) Mead±SD n (%)	Group 2 (Lower Extremity) Mead±SD n (%)	Group 1 and 2 Mead±SD n	Between Groups *p
Age (year)	37,80±15,10	40,40±11,74	38,93±13,75	0,027
Gender **Female** **Male**	29 (42,6) 39 (57,4)	26 (50) 26 (50)	65 (54,2) 55 (45,8)	0,423
Fracture Side **Right** **Left**	43 (63,2) 25 (36,8)	29 (55,8) 23 (44,2)	72 (60) 48 (40)	0,408
Dominant Side **Right** **Left**	56 (82,4) 12 (17,6)	43 (82,7) 9 (17,3)	99 (82,5) 21 (17,5)	0,961
Smoking Habits **Yes** **No**	30 (44,1) 38 (55,9)	27 (51,9) 25 (48,1)	57 (47,5) 63 (52,5)	0,396
Alcohol Usage **Yes** **No**	16 (23,5) 52 (76,5)	18 (34,6) 34 (65,4)	34 (28,3) 86 (71,7)	0,182
Regular Exercises Habits **Yes** **No**	20 (29,4) 48 (70,6)	13 (25) 39 (75)	33 (27,5) 87 (72,5)	0,592
Chronic Disease **Yes** **No**	13 (79,1) 55 (80,9)	11 (21,2) 41 (78,8)	24 (20) 96 (80)	0,782

Fracture Location				
Foot-Ankle	-			
Tibia-Fibula	-			
Femur	-			
Hand-Wrist	17 (14,2)			0,000
Radius-Ulna	31 (25,8)			
Humerus	14 (11,7)			
Scapula-Clavicula	4 (3,3)			

SD: Standard Deviation

**For numerical data, Independent Sample T-Test/For categorical data, Chi-Square Test,

Table 2. Comparison of Pain, Kinesiophobia, Anxiety, Sleep, and Quality of Life Status of Study Groups

	Group 1 (Upper Extremity) Mead±SD n (%)	Group 2 (Lower Extremity) Mead±SD n (%)	Group 1 and 2 Mead±SD n (%)	Between Groups *p
VAS	5,14±1,72	5,55±1,85	5,32±1,78	0,480
TAMPA	33,77±8,92	33,34±8,98	33,59±8,91	0,808
BAI	11,51±7,33	11,13±8,79	11,35±7,96	0,648
PSQI	7,86±3,86	8,86±4,35	8,30±4,09	0,208
SF-12 Mental Health Score	64,70±16,41	65,76±18,10	65,16±17,10	0,329
SF-12 Physical Function	61,82±16,91	64,07±16,37	62,80±16,64	0,857

SD: Standard Deviation; VAS: Visual Analog Scale; TAMPA: TAMPA Kinesiophobia Scale; BAI: Beck Anxiety Inventory; PSQI: Pittsburgh Sleep Quality Index; SF-12: Short Form-12 Quality of Life Scale

**For numerical data, Independent Sample T-Test/For categorical data, Chi-Square Test,

DISCUSSION

The most important finding of this study is that both lower extremity and upper extremity fractures are associated with similar levels of pain, decreased sleep and life quality, and increased anxiety and kinesiophobia. Considering the incidence of fractures in society, it is undeniable that this is a significant public health problem and burden. In addition, this study reminds clinicians to consider their patients not only from a functional and radiological evaluation perspective but also from a biopsychosocial status when treating and follow-up.

The prevalence of fractures varies in different demographic groups. In a study investigating the prevalence of osteoporosis-related fractures, it was found that 5-10 out of every 1000 people aged 50 and over experienced osteoporotic fractures each year (Chandran et al., 2023). In another study investigating the prevalence of fractures in children and adolescents, it was stated that 25% of all injuries seen in children were fracture injuries (Seens et al., 2021). This data is important in terms of showing the extent of psychological problems experienced by patients after fractures. In a Swedish study investigating fracture frequencies, it was stated that distal radius fractures were the most common (Rundgren et al., 2020). In lower extremity fractures, distal femoral and proximal tibial fractures around the knee, and ankle fractures were reported to be more common (Hemmann et al., 2021). It has been reported that femoral fractures, especially in people over the age of 65, negatively affect the quality of daily life more than upper extremity fractures (Wildner et al., 2002).

Linton et al. emphasize that increased levels of fear and catastrophizing are important for recovery after an acute fracture (Linton et al., 2010). Therefore, they support the fear-avoidance model and underline the importance of psychological factors in recovery after a fracture.

It was suggested that the management of unhelpful

thoughts and symptoms of depression should also be addressed for optimal fracture care (Al Salman et al., 2022). Depressed mood and distressing thoughts confound the relationship between pain and fracture severity in fracture patients.

Various studies have been conducted in both adult and pediatric age groups and have reported the effects on various psychological and health-related QoL statuses after experiencing a fracture (Ali et al., 2024; Cantero-Téllez et al., 2024; Liu et al., 2022; Myhre et al., 2023; Sarı et al., 2021; Turhan et al., 2019). Duramaz et al highlighted the association between extremity fractures and anxiety, depression, and attention deficit hyperactivity disorder in a prospective analysis of the pediatric group (Duramaz et al., 2019).

Psychological distress causes pain to suppress functioning. Depressed mood and anxiety distress increasingly impact physical functioning during the recovery phase of lower extremity trauma. Wegener et al reported that both pain and psychological distress contribute to functional deficits during the first year after trauma, and even as recovery progresses, the role of psychological distress on functioning becomes evident (Wegener et al., 2011).

Limitations and Strengths of the Study

Although 120 participants are not a small group, the fact that they may be relatively small groups when distributed across various fracture types or may show distributions outside of the global fracture incidence is a limitation of this study. Potential biases or confounding factors that might have influenced the results. Since the study was conducted among fracture patients who were followed with conservative treatment, it is insufficient to provide information for research to be conducted among surgically treated groups.

The first strength of this study is that it is one of the very limited articles in the literature that evaluates many parameters such as pain, QoL, anxiety, kinesiophobia, and sleep conditions of the participants. This study goes beyond the radiological and functional evaluations of patients with musculoskeletal fractures and examines the individual as a whole according to biopsychosocial.

CONCLUSION

Regardless of whether the patient has a fracture in the lower or upper extremities, the majority of patients experience a decrease in their sleep and quality of life, an increase in anxiety levels, and kinesiophobia. Our study showed similar results regarding psychological conditions between lower and upper extremity fractures. To understand fracture patients more holistically, studies with larger samples and longer follow-up periods should be planned. Our research emphasizes that clinicians should evaluate patients regarding functionality and radiological features and consider them as a biopsychosocial unit.

Future studies with long-term follow-up of large trauma series classified according to validated scoring systems will help illuminate the biopsychosocial aspects of trauma patients.

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