ARAŞTIRMA

THE RELATIONSHIP BETWEEN PAIN-ANGER LEVELS AND SLEEP QUALITY OF PATIENTS HOSPITALIZED IN THE ORTHOPEDICS AND TRAUMATOLOGY CLINIC BECAUSE OF MUSCULOSKELETAL INJURY

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ABSTRACT

Aim: *This study was conducted to determine the relationship between pain-anger levels and sleep quality of patients hospitalized in the orthopedics and traumatology clinic because of musculoskeletal injury.*

Methods: *This study is descriptive and cross-sectional. The study was conducted with 153 patients who underwent plaster cast and traction because of musculoskeletal injuries in an orthopedic clinic at a university hospital. The data was collected between January 1st, 2011 and June 30th, 2011 by using the visual analog scale (VAS) and the Spielberger state-trait anger expression inventory (STAXI) questionnaires. The data was analyzed using descriptive tests and the relationship between pain-anger-sleep quality was determined through the Pearson correlation test.*

Results:*. The mean age of 153 patients who participated in this study was 52.78: 56.3% were male, 74.5% were married, 55.6% had primary school education level, 56.2% were dependent, 51.0% had plaster cast applied and 53.6% had pain. The patients' mean score for the severity of their pain was found as 4.8 cm (SD=2.3) according to VAS. The average of their trait anger score was moderate (20.49) according to the STAXI. The highest score of the patients on the STAXI scale was the anger-control (22.12±4.91), and the lowest score was the anger-in subscale. (15.39±3.57). It was determined that 68.3% of the patients had a negative effect on sleep quality due to pain and their sleep quality mean score was 5.4 cm (SD=2.6) according to VAS. There was no significant relationship between pain-anger-sleep quality (p>0.05). It was found that there was a significant relationship between patients' trait- anger with anger-in, anger-out, and anger control (r=0.294, 0.589, 0.364 respectively) (p=0.001).*

Conclusion: *The results of this study showed that the sleep quality of the patients was negatively affected by pain rather than anger. According to this result, it may be recommended to manage pain effectively to improve the quality of sleep in hospitals. It is also recommended to perform well-designed prospective randomized controlled trials to obtain strong evidence.*

Keywords: *plaster casts or traction, pain, anger, sleep quality, nursing*

ÖZET

Kas-İskelet Yaralanması Nedeni ile Ortopedi ve Travmatoloji Kliniğine Yatırılmış Hastaların Ağrı-Öfke Düzeyi ve Uyku Kalitesi Arasındaki İlişki

Amaç: *Bu çalışma, kas-iskelet yaralanması nedeni ile ortopedi ve travmatoloji kliniğine yatırılmış hastaların ağrı- öfke düzeyi ve uyku kalitesi arasındaki ilişkinin belirlenmesi amacı ile yapıldı.*

Yöntem: *Bu çalışma, tanımlayıcı ve kesitseldir. Çalışma, Cumhuriyet Üniversitesi hastanesinin ortopedi ve travmatoloji kliniğinde kas iskelet yaralanması nedeni ile alçı ve traksiyon uygulanan 153 hasta ile yürütüldü. Veriler 1 Ocak 2011- 30 Haziran 2011 tarihleri arasında anket formu, ağrı düzeyi ve uyku kalitesini belirlemek için görsel kıyaslama ölçeği (GKÖ) ve Spielberger'ın sürekli öfke ve öfke ifade tarzı ölçeği (SÖÖTÖ) kullanılarak toplandı. Veriler tanımlayıcı testler, ağrı-öfke-uyku kalitesi arasındaki ilişki Pearson korelasyon testi kullanılarak analiz edildi.*

Bulgular: *Bu araştırmaya katılan 153 hastanın yaş ortalaması 52.78 idi:%56.3'ü erkek,%74.5'i evli,%55.6'sı ilkokul,%55.6'sı şehirde yaşıyordu,%56.2'si bağımlı idi,%51.0'ına alçı uygulanmıştı. Hastaların %53.6'sının ağrısı vardı. Hastaların GAÖ'ye göre ağrı şiddeti ortalamasının 4.8 cm (Ss=2.3) idi. SÖÖTÖ'ne göre sürekli öfke puan ortalamasının orta düzeyde (20.49) olduğu belirlendi. Hastaların SÖÖTÖ ölçeğinden aldıkları en yüksek ortalama puanının öfke kontrol alt boyutu (22.12±4.91), ve en düşük ortalama puanın ise öfke-içe alt boyutundan (15.39±3.57) aldığı bulundu. Hastaların %68.3'ünün ağrı nedeni ile gece uyku kalitesinin olumsuz etkilendiği ve GAÖ'ye göre uyku kalitesi ortalamasının 5.4 cm (Ss=2.6) idi. Ağrı-öfke düzeyi-uyku kalitesi arasındaki ilişkinin anlamlı olmadığı belirlendi(p>0.05). Hastaların sürekli öfke ile öfke içe vurma, öfke dışa vurma ve öfke kontrolü arasında anlamlı ilişki olduğu bulundu(r=0.294, 0.589, 0.364 sırası ile) (p=0.001).*

Sonuç: *Bu çalışmanın bulguları, hastaların uyku kalitesinin öfkeden ziyade ağrıdan olumsuz etkilendiğini gösterdi. Bu sonuca göre, hastanedeki uyku kalitesini arttırmak için ağrının etkin bir şekilde yönetilmesi önerilir. Ayrıca güçlü kanıt elde etmek için, iyi tasarlanmış prospektif randomize kontrollü çalışmaların yapılması önerilir.*

Anahtar Kelimeler: *alçı ve traksiyon, ağrı, öfke, uyku kalitesi, hemşirelik*

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INTRODUCTION

Musculoskeletal injuries are one of the most common causes of acute pain (Muthuuri, 2012) and limb movement increases the pain. Therefore, a limb is usually immobilized by stabilization interventions such as plaster casts and traction. In this way immobilization restricts motion allowing the injured area to heal. However, patients may experience pain at various degrees before and after these interventions due to poor alignment or swelling of the limb. Pain causes sleep disturbance. Studies have demonstrated that sleep disruption can lead to an increased perception of pain (Chhangani, Roehrs, Harris, Hyde, Drake, Hudgel 2009) and pain sensitivity (Finan, Goodin,Smith 2013). Thus, pain and sleep are thought to have a bidirectional/reciprocal relationship.

It has been identified by researchers that 45-92% of the orthopedic patients suffered moderate or severe pain (DeSouza, 2002; Esen Büyükyılmaz, Şendir and Acaroğlu 2011; Radinovic, Milan, Markoviç-Deniz, Dubljanin-Raspopovic, Javanovic and Bumbasirevic 2014; Lindberg, Grov, Gay, Rustøen, Granheim, Amlie et al. 2013), 38-70% of the patients had insomnia (DeSouza, 2002; Closs, Briggs and Everitt 1997). In addition, patients treated in orthopedic clinics have experienced various problems such as loss of function or independence, activity intolerance, inactivity, and lack of self-care (Lindberg, Grov, Gay, Rustøen, Granheim, Amlie et al. 2013; Esen Büyükyılmaz Şendir and Acaroğlu 2011; Maher, Meehan, Hertz 2012; Trost, Vangronsveld, Linton, Quartana and Sullivan 2012), appetite loss, and increased the length of hospital stays and the cost of healthcare (Giang, Chiu, Thai, Kuo and Tsai 2015; Radinovic Milan, Markoviç-Deniz, Dubljanin-Raspopovic, Javanovic and Bumbasirevic 2014; Vincent, Horodyski, Vincent, Brisbane and Sadasivan 2015) due to pain caused by injuries or stabilization interventions implemented. All these problems may cause patients to suffer anger (Vincent, Horodyski, Vincent, Brisbane and Sadasivan 2015). Anger is one of the least understood feelings. The feeling of anger is mixed with feelings of hostility and aggression. Anger, an unpleasant emotion, is regarded as an inseparable part of a prolonged pain experience (Fernandez and Wasan 2009; Greenwood, Thurston, Rumble, Waters and Keefe 2003). That pain-enhancing anger is explained by theories of pain such as gate control and neuromatrix. According to these theories, intense emotions such as anger can increase the pain by modifying the modulation system in the central pain and on the descending pathways (Melzack, 1991). As it is known, sleep and emotion are closely linked (Beattie, Kyle, Espie and Biello 2015) and normal sleep plays an emotional regulatory role in human health. The association between emotion and sleep is strong, complex and bi-directional. Bad sleep is often considered an important manifestation of experienced mental difficulty. For this reason, experienced pain by patients may adversely affect their sleep and that's why they may experience anger. According to this data, when the level of anger experienced by a patient is high, the patient's pain tolerance may decrease and he/she may suffer an insomnia problem, which suggests there is a reciprocal relationship between these three variables.

The majority of studies have been focused on orthopedic patients' pain levels and sleep quality (Esen Büyükyılmaz and Aşti, 2010; Closs, Briggs and Everitt 1997; Esen Büyükyılmaz, Şendir and Acaroğlu 2011; Mamaril, Childs and Sortman 2007). However, there is a gap in literature related to studies investigating the relationship between patients' pain-anger-sleep quality.

METHODS

Purpose of study: The aim of this study is to determine the relationship between pain-anger levels and sleep quality of patients hospitalized in the orthopedics and traumatology clinic because of musculoskeletal injury.

Study Design: This study is descriptive and cross-sectional.

Study Setting: This study was conducted in the orthopedics and traumatology clinic of Cumhuriyet University in Turkey.

Study populations or Participants: The study population included 210 patients who underwent plaster casts or traction in the orthopedics and traumatology clinic. The inclusion criteria for this study included adult patients: 1). age ≥18 2). had enough cognitive competence to answer the questions, 3). plaster or traction applied for the first time and 4). agreed to participate in the study. Patients were excluded for the following reasons: 1). refuse to participate in the study 2). patients who had no plaster cast or traction. The study sample consisted of patients who were in compliance with the research criteria and who were admitted to the orthopedics clinic for the

first time due to a cast or traction. Thirty patients refused to participate in the study, 18 patients had no cast or traction for the first time and 12 patients did not have sufficient cognitive competence. Therefore, the study was completed with 153 patients.

Ethical considerations: At the time of the study, the organization's ethics board was refused to work due to restructuring and only the institution's permission was obtained. The participants' rights to confidentiality, privacy, and safety were protected at all times during the study. Before the forms were administered, participating patients were informed of the purpose of the study and verbal consent was given at the time when they agreed to participate in the study. All the personal data was treated confidentially and anonymously and would never be used for any purpose other than this research. Also, it was done according to the ethical standards of human experimentation established in the Declaration of Helsinki in 1995.

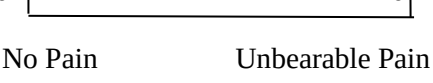
Data collection: Data was collected from January 1, 2011 to June 30, 2011. The data was collected by the nurse responsible of the orthopedic and traumatology clinic (third author). Data was collected using three tools: the questionnaire, the visual analog scale (VAS) and Spielberger trait-state anxiety invantory (STAXI). Pain level and sleep quality were determined using VAS. Data was collected in the patients' rooms through face-to-face interviews. Each interview lasted 10-15 minutes.

Instruments

The Questionnaire: The questionnaire was composed of three sections with 10 items. The first section of the questionnaire included 4 items questioning patients' socio-demographic characteristics such as age, gender, education, marital status. The second section included 4 items questioning the participants' level of dependency on others while performing daily activities, presence of invasive intervention device inserted in the body and the type of the invasive intervention, and presence of an accompanying person. The third section included 2 items questioning the participants' pain- and sleep-related characteristics: severity of the pain, whether the pain interferes with sleeping.

Spielberger Trait Anger and Anger Expression Inventory (STAXI): The Trait Anger Expression Inventory (STAXI) was developed by Spielberger, Jacobs, Russell and Crane (1983) to determine anger expression styles of people. The scale is the self-assessment scale. This questionnaire is composed of two parts that evaluate state and trait anxiety separately. Each part included 20 items with a scoring from 1 to 4, and in total, the score of each person at each part was a number from 20 to 80. Based on the questionnaire, the participants were divided into 3 categories: people with mild (20 to 40), moderate (41 to 60), and intense anxiety (61 to 80). High scores of trait anger revealed high levels of anger; high scores in the anger scale control indicate that anger can be controlled; the high scores in the anger-out scale shows that anger is easily expressed, and high scores in the anger-in scale indicate that anger is suppressed. The Cronbach's alpha value of the original inventory ranges between 0.77 and 0.88. The inventory was adapted to Turkish by Özer (1994). The Cronbach's alpha values in Özer's study were 0.84 for the "Anger Control", 0.78 for the "Anger-Out" and 0.62 for the "Anger-In" subscales. In the present study, the Cronbach's alpha values were 0.79 for the Trait Anger, 0.68 for the "Anger-In", 0.75 for the "Anger-Out" and 0.77 for the "Anger Control" subscales.

The Visual Analog Scale (VAS): The Visual Analog Scale was first used in 1923 by psychologist Freyd (Haefeli and Elfering, 2006) and it has generally a 10-cm horizontal or vertical line, one end is labeled 0 referring to "No Pain" and the other end is labeled 10 referring to "Unbearable Pain". The patient marks a point on the line corresponding to the extent of his/her pain. The VAS is stated to be more precise and reliable in measuring pain severity than other one-dimensional scales. It was told to patients that the line has two endpoints and that they are free to mark anywhere between these two points corresponding to the severity of their pain. The distance between the points referring to "no pain" and the point has marked by the patient was measured in centimeters. In the scale, "0" refer to "no pain", and "10" refers to "pain as bad as it could be". The scores between 4 and 6 refer to moderate pain.



To assess the participants' sleep quality, the VAS was used because it can be used to convert values that cannot be measured numerically into numerical values, because it is easy to respond, and because even literate patients can answer the questions easily. On the scale, "0" indicates that

the sleep quality is “very bad”, "10" indicates that the sleep quality is “very good”, and a score between 4 and 6 indicates that the sleep quality is moderate.

0 |_____10 |

Sleep Quality is “VeryBad” Sleep Quality is “Very Good”,

Before the study data was collected, the purpose of the study was explained to the participants and their verbal consent was obtained. Then the scale was administered.

The sleep quality of the patients was determined at 9:00 a.m. using the VAS. The pain level of patients was determined using VAS once, one hour after the application of plaster cast and traction, before given analgesic drug. The participants marked a point corresponding to the severity of their pain on the VAS line. Then, analgesic drugs were given to patients who expressed pain. After the level of the pain was determined, the STAXI was administered.

Data analysis

Obtained data was analyzed by using the Statistical Package for Social Science for Windows Version 16.0 (SPSS Inc., Chicago, IL, USA). The normality of the data was examined by Kolmogorov-Smirnov (K-S) test. Continuous variables are presented either as mean, standard deviation and range (min/max) for mean pain-anger-sleep quality, whereas dichotomous data was presented as numeric and percentage. Relations between pain-anger-sleep quality mean scores were determined by Pearson’s correlation. In this study, a *p*-value of less than 0.05 was considered statistically significant.

RESULTS AND DISCUSSION

There were 153 people who completed the study: the age average of the patients was 52.8±19.0 years old. All of the patients, 54% were male; 55.6% had primary school education level; 74.5% had married, 78.5% had low education, 68.0% were hospital experiences, 56.2% were dependent (Table 1).

Results of the current study indicate that 51.0% of patients underwent plaster casts, 49.0% traction stabilization and 53.6% of them suffered pain and their mean pain level was 4.8 (SD=2.3) and 68.3% had a poor night sleep quality negatively affected by this pain (Table 1). The severity of pain due to musculoskeletal injuries was high (Pasero and McCaffery, 2007)

Table 1. Characteristics of Patients

Characteristics	n	%
Mean age		52.78 (SD=19.0)
Mean length of hospital stay		9.43 (SD=11.03)
Gender		
Female	71	46.6
Male	82	53.6
Marital status		
Married	114	74.5
Single	39	25.5
Education status		
Low	120	78.5
High	33	21.6
Dependency status in ADLs*		
In dependent	29	19.0
Semi indepent	38	24.8
Dependent	86	56.2
The procedures underwent		
Plaster cast	78	51.0
Traction	75	49.0
Invasive procedure in the body **		
Foley catheter	84	96.5
Intravenous line	6	7.1
Do you have a carer		
Yes	134	87.6
No	19	12.4
Do you have pain?		
Yes	82	53.6
No	72	47.1

Insomnia with the cause of pain		
Yes	56	68.3
No	26	31.7

**ADL:Activities of Daily Living ** 3 patients have both foley catheter and vein path.*

However, the limb was often immobilized by a plaster cast or traction to alleviate pain and accelerate healing after fracture or after surgical interventions, thus immobilization relieves pain. In this study, the pain level of the patients was 4.8, which may be interpreted as pain relief due to immobilization of the limb with a plaster cast or traction. In a study conducted by Lindberg, Grov, Gay, Rustøen, Granheim, Amlie et al. (2013) to determine the pain severity of patients after they had orthopedic surgery, the patients' pain level was 4.2 (SD=2.2) according to the Numerical Rating Scale (NRS). In another a study of orthopedic patients' pain levels and sleep quality by Esen Büyükyılmaz Şendir and Acaroğlu (2011) found that patients experienced severe pain at night (Mean=6.6, SD=1.6) and thus their sleep quality was low (9.2, SD=3.5). In other a study, 19.7% of elderly patients having hip fractures were determined to suffer severe pain (Radinoviç, Milan, Markoviç-Deniz, Dubljanin-Raspopovic, Javanovic and Bumbasirevic 2014). More than 60 years, pain has been reported to be associated with various negative emotional conditions such as depression, anxiety, fear and anger (Chapman, Cohen and Cobb 1946; Webb and Lascelles 1962), and in several studies (Janssen, 2002; Staud, 2004), high levels of negative emotions have been reported to be associated with increased levels of pain. Neuroimaging data also indicate that the pain-anger are associated with brain regions including the limbic cortex. It also indicates that the neural circuses in which these feelings occur overlap each other. This circus forms a neural basis indicating that there is a positive relationship between the onset of anger and the pain response. In experimental studies conducted on humans, it is emphasized that physical pain, as a primary emotional reaction, triggers anger and anger-related thoughts. As pain can trigger emotional reactions, so acute emotional conditions can affect pain (Bruehl, Burns, Chung and Chont 2009).

Table 2. Scores Pain, Anger Levels and Sleep Quality of Patients

Scores	**Min-Max**	**Mean**	**SD**
Trait anxiety	10-40	20.49	5.56
Anger-in	8-31	15.39	3.57
Anger-out	8-32	15.93	4.03
Anger control	8-32	22.12	4.91
Mean pain level		4.8	2.3
Mean sleep quality		5.4	2.6

In present study it was found that, the participants' mean scores for trait anger, anger control, anger-in, and anger-out subscales were moderate, and anger control score was higher (Table 2). Anger is one of the basic feelings experienced when an individual's plans, demands, and needs are constrained and injustice, inequality and threat-to-self are perceived. Anger is described as an emotion that emerges when an unplanned situation exists or if there is a perceive of threat and it varies according to the type of threat. Restriction on a bed with a traction device or plaster cast may cause the patient to become frustrated and bored, and perhaps even depressed, irritable, and withdrawn. Being restricted from performing and participating in social activities because of a broken an arm or leg, or if significant traction is required, having to sit on bed for weeks, can be stressful. Musculoskeletal injuries and surgical interventions are among the most important traumas causing lifestyle changes and restrictions (Vincent, Horodyski, Vincent, Brisbane and Sadasivan 2015). Therefore, patients can experience anger due to injury, plaster casts, traction, pain, fear of losing independence, difficulties in performing daily life activities, inactivity, deterioration of body image, social isolation, depression and feelings of grief and helplessness. The researchers determined that anger led to pain and whose pain severity was high displayed anger behavior (Greenwood, 2003; Lombardo, Tan, Jensen and Anderson 2005).

According to this information, it can be said that there may be a relationship between pain- insomnia-anger. But in this study, the relationship between the participants' anger, pain level and sleep quality were not significant. There was a significant and positive direct relationship between the trait anger, and anger-in and anger-out subscales($p<0.001$). Also, there was a significant and negative direct relationship between anger control and anger-in and anger-out subscales ($p<0.001$) (Table 3).

In present study, it can be said that patients' sleep quality was not adversely affected due to high anger-control scores and low anger-in scores.

In the current study, the patients' average sleep quality was 5.4(SD=2.6) as shown in Table 2. In current study, the sleep quality of patients was negatively affected by pain. However, the relationship between the patient's sleep quality and pain level was not statistically significant($p>0.05$). In literature, it is reported that 50-70% of those who suffer pain also had sleep problems and that nighttime pain affects sleep quality adversely (Chapman, Lehman, Elliott and Clark 2006). In a study conducted to determine the relationship between night pain and sleep quality of patients with shoulder problem (Mulligan, Brunette, Shirley and Khazzam 2015), the patients' sleep quality was significantly poor due to pain they suffered. In a study conducted to investigate the relationship between postoperative pain, sleep and anxiety in orthopedic patients by Closs Briggs and Everitt (1997) determined a direct relationship between pain and sleep quality.

Table 3. The Relationship Between Pain, Anger Level and Sleep Quality

				STAXI			
		Pain level	**Sleep quality**	**Trait anger**	**Anger-in**	**Anger-out**	**Anger control**
Pain level	r	1.000					
	p	0.000					
Sleep quality	r	-0.178	1.000				
	p	0.109	0.000				
Trait anger	r	-0.188	-0.077	1.000			
	p	0.092	0.343	0.000			
Anger-in	r	-0.058	0.013	0.294**	1.000		
	p	0.606	0.870	**0.001**	0.000		
Anger-out	r	-0.079	0.143	0.589**	0.118	1.000	
	p	0.479	0.077	**0.001**	0.30	0.000	
Anger control	r	-0.011	0.010	-0.364**	-0.138	-0.296**	
	p	0.925	0.904	**0.001**	0.090	**0.001**	1.000

$p<0.001$

The same study also emphasized that sleep duration in the hospital was shorter than sleep at home, the patients' sleep was interrupted more often in the hospital, that pain was the main cause of night awakening and pain control was neglected at nights. In another study conducted in orthopedic clinics (Esen Büyükyılmaz, Şendir and Acaroğlu 2011), a significant relationship was determined between the pain experienced by the patients and their sleep quality. The results of previous and recent studies and the present study showed that pain and sleep problems remain unresolved for orthopedic patients. There was no relationship between pain and sleep quality in the present study. This result may be because sleep quality was measured the with VAS and once, pain level was measured only during daytime and determined of pain after immobilization which causes decreased pain level, also the participants perceive the pain-insomnia as a natural consequence of their health problems and most of patients had accompanying persons to relieve them.

LIMITATIONS OF THE STUDY

One of the limitations of the present study is that daytime and nighttime measurements were not performed and the data was obtained from the participants' statements. Therefore, the results obtained from this study are applicable only to the participants surveyed and cannot be generalized to other patients.

CONCLUSIONS AND RECOMMENDATIONS

In the study, the participants suffered moderate pain, their sleep quality decreased, their mean scores for the trait anger and anger control subscales were moderate, there was not a significant relationship between their pain severity, sleep quality and their mean scores for the trait anger and anger expression type, there was a positive relationship between trait anger, anger-in and anger-out, a negative relationship between trait anger and anger control and a negative relationship between anger control, and trait anger and anger-out. The results of the present study suggest that nurses should assess patients' pain characteristics and quality of sleep and individualized nursing interventions to aim sleep quality improvement of patients in orthopedic and traumatology clinics through effective pain-anger management that may enhance their comfort. It is also recommended to perform well-designed prospective randomized controlled trials to obtain strong evidence.

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