

Psychiatric Symptoms in Male Traumatic Lower Limb Amputees: Associations with Neuropathic Pain, Locomotor Capabilities, and Perception of Body Image

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ÖZET:

Travmatik alt ekstremitte amputasyonlu erkeklerde psikiyatrik belirtiler ve bu belirtilerin nöropatik ağrı, lokomotor kapasite ve beden algısı ile ilişkisi

Amaç: Bu çalışmanın amacı nöropatik ağrısı olan ve olmayan alt ekstremitte amputasyonlu erkek hastaları psikiyatrik belirtiler açısından karşılaştırmak ve bu belirtilerin işlevsel kapasite ve beden algısı ile ilişkisini belirlemektir.

Yöntem: Çalışmaya 50 travmatik alt ekstremitte amputasyonlu erkek hasta alınmıştır. Bunların 27'sinde nöropatik ağrı saptanırken (Grup 1), diğer 23'ünde saptanmamıştır (Grup 2). Hastaların yaş, kilo, boy ve amputasyondan sonra geçen süre gibi demografik bilgileri, kaydedilmiştir. Çalışmaya katılan her bir hastanın amputeler için beden algısı skoru ve lokomotor kapasite indeksi skoru hesaplanmıştır. Tüm hastalar ayrıca Belirti tarama testi-90R, Beck Depresyon Envanteri, Pittsburgh Uyku Kalitesi Ölçeği, Rosenberg Benlik Saygısı Ölçeği, Durumluk-Sürekli Kaygı Envanteri ve Kısa Form-36 yaşam kalitesi ölçeğini tamamlamıştır.

Bulgular: Nöropatik grupta somatizasyon, kişilerarası duyarlılık, depresyon, anksiyete, öfke-kızgınlık, uyku bozukluğu ve yaşam kalitesi düşüklüğü belirtileri anlamlı olarak daha yüksek saptanmıştır. Psikiyatrik belirti puanları ile ampute beden algısı ölçeği ve lokomotor kapasite ölçeği puanları arasında anlamlı korelasyon saptanmıştır.

Sonuç: Nöropatik ağrısı olan ampute hastalarda anksiyete ve depresyon belirtilerinin yanısıra başka psikiyatrik belirtiler de görülebilir. Artmış fiziksel aktivite ve olumlu beden algısı psikiyatrik belirtilerde azalma ile ilişkili olabilir.

Anahtar sözcükler: ampute, nöropatik ağrı, psikiyatrik belirtiler, lokomotor kapasite

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ABSTRACT:

Psychiatric symptoms in male traumatic lower limb amputees: associations with neuropathic pain, locomotor capabilities, and perception of body image

Aims: The aim of this study was to compare psychiatric symptoms of male lower limb amputation (LLA) patients with neuropathic pain and without neuropathic pain; to show the relationship between these outcomes and functional status and body image disturbances.

Methods: Fifty male traumatic LLA patients were included into the study. Twenty-seven were diagnosed with neuropathic pain (Group 1), while 23 had no neuropathic pain (Group 2). Demographic data including age, height, weight, and duration of amputation were recorded. The amputee body image scale (ABIS) score, and locomotor capabilities index (LCI) score were calculated for each participant. They have also completed the Symptom Checklist-90-R, Beck Depression Inventory, Pittsburgh Sleep Quality Index, Rosenberg Self-Esteem Scale, State-Trait Anxiety Inventory, and Short Form 36.

Results: Intergroup comparison revealed significant differences in somatization, interpersonal sensitivity, depression, anxiety, anger-hostility, sleep quality, sleep duration, sleep disturbance, daytime sleepiness, trait anxiety and QOL. The differences were statistically significantly higher in Group 1 when compared to Group 2. There were significant correlations among the ABIS and LCI scores and psychiatric symptom severity.

Conclusion: Psychiatric symptoms other than depression and anxiety may also be present in amputees with neuropathic pain. Increasing physical activity and a positive body image perception may be associated with diminished psychiatric symptoms.

Key words: amputee, neuropathic pain, psychiatric symptoms, locomotor capability

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INTRODUCTION

Lower limb amputation (LLA) is associated with considerable morbidity, mortality, and disability (1,2). In developed countries, vascular complications are the major contributors to LLAs, whereas in developing countries traumatic accidents are the major cause of amputation (3,4).

LLA patients are exposed to several physical and psychosocial problems regarding body image, self-care activities, mobility, and occupational or non-occupational activities. In addition, amputation may affect psychological well-being, as significant associations have been reported with depression, anxiety, social discomfort and body image anxiety (5,6).

Research has shown that pain is a major risk factor for distress in a variety of cases. Many amputees experience significant amputation-associated pain, which can affect their quality of life (QOL), health, return to work, sleep and daily activities, and participation in social activities. This change is experienced more by LLA patients than by upper limb amputees. The incidence of LLAs is also higher than that of amputations of upper limbs (7-10).

Individuals with LLAs often develop gait patterns to accommodate prosthesis. This may put them at risk for other types of pain, such as hip and back pain, or pain in the unaffected leg (11). Many studies have reported a high prevalence of pain types, particularly stump pain, phantom pain, phantom sensations and back pain, after LLAs. These pains are classified as a kind of neuropathic pain induced after nerve injury. This is an after-effect of amputation occurring in up to 50-85% of patients (12,13).

Several studies have investigated the prevalence of psychiatric disorders and determinants of psychological status of patients with LLAs (14-17).

To the best of our knowledge, there are no previous studies comparing LLA patients with and without neuropathic pain in terms of psychiatric symptoms, such as somatization, obsessive-compulsiveness, anger-hostility, phobic anxiety, paranoid ideation, psychoticism, state anxiety, trait anxiety, and sleep quality.

The purposes of this study were to compare QOL, psychiatric symptoms, and sleep quality of male LLA patients with and without neuropathic pain and to evaluate the relationship between these outcomes and functional status and body image disturbances.

METHOD

Participants and Procedures

Fifty males with traumatic LLAs undergoing rehabilitation in an inpatient amputee clinic at a military rehabilitation center between April 2013 and July 2013 were included in the study.

LLA patients were further divided into two subgroups on the basis of neuropathic pain. Group 1 consisted of patients with neuropathic pain and Group 2 of LLAs without neuropathic pain. These groups were then compared in terms of scale scores.

Individuals meeting the following criteria were included in the study; age 18-47 years, history of traumatic amputation, amputation taking place at least three months previously, having completed primary wound healing, completion of prosthetic training [4-6 weeks], not having any concomitant disease that could affect the peripheral nerves, in a stable medical condition, literacy, and willingness to participate. Individuals with other concomitant system injuries that would impede gait patterns, or patients with traumatic brain injury, spinal cord injury, neurological, vascular or pulmonary diseases, and cognitive dysfunctions were excluded. Subjects who were immobilized for long periods and with other rheumatic diseases, or diagnosed with severe endocrinological disorders [such as diabetes mellitus and hypo-or hyperthyroidism] were also excluded. Inclusion criteria for the control group were willingness to participate, literacy and the absence of any medical disease.

Patients' demographic characteristics, medical history, and type and time of amputation were documented. All patients were examined by the same physicians [EA, AU]. The presence and severity of phantom, perception of body image, functional status, QOL, and psychiatric measurements were collected using standardized measures. No psychiatric interviews were performed for diagnostic purposes.

Ethical Considerations

The study protocol was approved by the local medical ethics committee, and all patients gave written informed consent.

Measures

The following outcome measures were included in each evaluation:

Neuropathic Pain

This was assessed by the Turkish version of the Leeds Assessment of Neuropathic symptoms and signs (LANSS) scale used to assess neuropathic pain for the residual limb (18). Patients were asked questions about the characterization of pain in the preceding week, and additional sensorial testing was performed to determine any current allodynia and the pinprick threshold. A 23-gauge needle inserted into a syringe barrel was used to measure pinprick threshold (19). A score of 12 or more on the LANSS pain scale was classified as neuropathic pain, and a score under 12 was classified as nociceptive pain (18).

Phantom Pain Sensation and Residual Limb Pain

We defined phantom pain as “pain in the missing part of your limb”. Residual limb pain was defined as “pain in the part of your amputated limb that is physically present”. Phantom sensation was defined as “sensation in the missing part of your limb”. Patients were asked if they had phantom sensation, phantom pain, or residual limb pain. Phantom and residual limb pain intensity was measured with a 10-cm Visual Analog Scale (VAS) [0–10 cm, 0 indicates no pain, with higher scores indicating more pain, and 10 indicating the worst possible pain] (20). In the case of bilateral amputation, participants were asked to rate pain intensity and phantom sensation for the limb they considered most severely affected.

Functional Status

The Locomotor Capabilities Index [LCI] is the 11th item of the prosthetic profile of the amputee [a questionnaire developed and validated for follow-up studies in persons with LLA], but it can be used separately from the general instrument. The LCI was evaluated on a five-point ordinal scale [ranging from “0, not able” to “4, able to accomplish the activity without aids”, with a maximum score of 56] (21). The Turkish version of the instrument was shown to be reliable by Safaz et al. (22).

Perception of Body Image

The Amputee Body Image Scale [ABIS] was used for measuring body image disturbances in individuals. The ABIS includes 20 items that assess how an amputee perceives and feels about his/her body experiences. The scale produces scores that range from 20 to 100, where high scores indicate greater body image disturbance. The reliability of the Turkish ABIS was shown by Safaz et al. (23).

Quality of Life

Quality of life was assessed using Short Form 36 (SF-36). SF-36 is a widely applied generic instrument for measuring health status and consists of eight dimensions: physical functioning, social functioning, physical role, emotional role, mental health, vitality, bodily pain, and general health perceptions. Scores range from 0 (worst) to 100 (best), with higher scores indicating better health status (24).

Pittsburg Sleep Quality Index (PSQI)

This self-administered questionnaire assesses quality of sleep during the previous month and contains 19 self-rated questions yielding 7 components: subjective sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbances, use of sleep medications and daytime dysfunction. Each component is scored from 0 to 3, yielding a global PSQI score between 0 and 21, with higher scores indicating a poorer quality of sleep (25). Agargün et al. found this index to be valid for the Turkish population (26).

Psychiatric Assessments

Symptom Checklist-90-Revised (SCL-90-R)

SCL-90-R consists of 90 items covering psychiatric symptoms and complaints and was developed by Derogatis et al. (27). The scale includes nine subscales. Responses are provided through a 5-point Likert-type scale. Studies regarding the relevance and reliability of the scale in Turkey have been carried out by Dağ and colleagues (28). An increase in total and subscale scores indicates an increase in the individual's psychiatric symptoms and the discomfort felt due to these.

Table 1: Comparison of the groups in terms of socio-demographic and clinical characteristics

Characteristics	Patients with LLA (n= 50) Mean±SD Mean±SD	LLA patients with neuropathic pain (n= 27) Mean±SD	LLA patients pain without neuropathic (n= 23)	p
Age (years)	36.91±11.37	35.61±11.13	38.30±14.79	0.32
Weight (kg)	77.69±12.18	75.34±14.91	77.87±15.36	0.61
Height (m)	1.74±0.09	1.74±0.05	1.76±0.07	0.65
Time passed since amputation (months)	136.71±89.37	133±95.42	131.71±89.37	0.76
Amputee body image scale score	13.41±09.38	16.21±9.69	10.20±08.08	0.02
Locomotor Capabilities Index score	23.79±8.83	21.29±9.09	26.20±8.09	0.04
Phantom pain VAS [0–10]	30.68±21.16			
Residual limb pain VAS [0–10]	28.07±18.72			
Side of amputation (n)				
Right	20	11	9	0.82
Left	27	14	13	
Bilateral	3	2	1	
Level of amputation (n)				
Foot-ankle	9	17	11	0.33
Transtibial	19	9	10	
Knee disarticulation	3	1	2	
Transfemoral	18			
Hip disarticulation	1			
Phantom sensation (n)				
Yes	30			
No	20			
Phantom pain (n)				
Yes	23			
No	27			
Residual limb pain n (%)				
Yes	22			
No	28			
Neuropathic pain n (%)				
Yes [LANSS score ≥12]	27			
No [LANSS score <12]	23			

LLA: Lower limb amputation, VAS: Visual Analogue Scale

Depression

Depression was assessed using the Beck Depression Inventory (BDI). The BDI is a 21-item test presented in multiple-choice format and is intended to measure presence and degree of depression. Responses are made on a four-point, minimally anchored scale, ranging from 0 to 3, with 3 representing the most severe symptoms. This scale was developed by Beck et al. (29) and is widely used in measuring depression symptom levels. The relevance–reliability of this scale for Turkey was shown by Hisli and colleagues (30).

State-Trait Anxiety Inventory (STAI)

This is a scale developed by Spielberg et al. (31) and consists of two separate inventories of 20 questions each evaluating state and trait anxiety levels. The relevance–

reliability of this scale for Turkey was shown by Öner and Le Compte (32).

Rosenberg self-esteem scale (RSES)

Developed by Rosenberg in 1965 (33), the scale consists of 63 multiple-choice questions in 12 subcategories. The first 10 items are used to measure self-esteem. We evaluated these first 10 items. High values indicate high self-esteem. The relevance–reliability for Turkey was shown by Çuhadaroğlu and colleagues (34).

Statistical Analyses

Statistical analyses were performed with SPSS 16.0 for Windows. Descriptive data were presented as mean±standard

deviation (SD) or minimum–maximum (median) when required, according to the normal distribution of the parameters. The Shapiro–Wilk test was used to analyze normal distribution assumptions of quantitative outcomes. All outcomes were not normally distributed and evaluated. The Mann–Whitney U test was used to compare changes in scores between two groups. Spearman correlation analysis was applied to investigate correlations between scale scores measuring psychiatric symptoms and clinical scores. Correlation coefficients between 0.30 and 0.49 were regarded as low, those between 0.50 and 0.69 as moderate, those between 0.70 and 0.89 as high and those between 0.90 and 1.00 as very high. The socio-demographical characteristics of the groups were evaluated using the Chi-square test. P values less than 0.05 were considered statistically significant.

RESULTS

Demographic properties of the patients are shown in Table 1. There was no statistically significant difference in terms of age, gender, weight, height or how long ago amputation had been performed between the two groups ($p>0.05$) (Table 1). ABIS scores were higher in Group 1 compared to Group 2. LCI scores were lower in Group 1 compared to Group 2 (Table 1).

There were no difference between the two groups in terms of SCL-90-R total and all subscale scores, except for somatization, interpersonal sensitivity, depression, anxiety, and anger-hostility.

Somatization, interpersonal sensitivity, depression, anxiety, and anger-hostility scores were higher in Group 1 compared to Group 2 (Table 2). There was no difference between the two groups in terms of State anxiety score or Rosenberg self-esteem score ($p>0.05$).

Trait anxiety score and Beck depression scale score were higher in Group 1 compared to Group 2. PSQI total and all subscale scores, except for sleep latency, usual sleep efficiency, and sleeping aid use, were higher in Group 1. All subscale scores of SF-36, except for physical role limitation, emotional role limitation, and mental health, were also higher in Group 1 (Table 2).

Correlations

ABIS score was positively correlated with subscale scores of SCL-90-R (depression, phobic), and trait anxiety

score and negatively correlated with Rosenberg self-esteem score.

LCI score was negatively correlated with subscale scores of SCL-90-R (somatization, depression, anxiety, and phobic), and trait anxiety score and positively correlated with Rosenberg self-esteem score. All correlations are shown in Table 3.

DISCUSSION

Post-amputation pain is one of the most challenging chronic pain states confronted by physicians. After major limb amputation, 50 to 80% of patients experience significant pain categorized into residual limb pain and phantom limb pain (35,36). These pains are classified as a kind of neuropathic pain. Neuropathic pain is typically a consequence of direct nerve injury or damage to neural tissue, resulting in abnormal sensory processing (37). Emotional factors are influential in patients' experience of prolonged pain in a phantom limb after amputation. It is probable that phantom pain leads to poor health-related QOL, such as emotional problems including anxiety and depression (38). We compared QOL, psychiatric symptoms and sleep quality in male LLA patients with neuropathic pain and LLA patients without neuropathic pain and also evaluated the relationship between psychiatric symptoms and functional status and body image disturbances in LLAs.

Limb amputation may affect physical functioning, QOL, and psychiatric symptoms, as significant associations have been found with depression, anxiety, participation in social activities, sleep and daily activities, and body image anxiety (5,6). Previous studies have shown that post-amputation pain, and deterioration of emotional status and QOL are present in LLA patients (5-10). Similarly, in our study, QOL scores such as physical function, social function, energy, pain, and general health were lower among male traumatic LLA patients with neuropathic pain than those without. In addition to the increase in anxiety and depression in amputees with neuropathic pain determined in these studies, we observed an increase in somatization, interpersonal sensitivity, anger-hostility and trait anxiety scores and a decrease in self-esteem scores.

Sleep complaints are one of the most important symptoms for people with neuropathic pain. Such complaints in people with neuropathic pain include

Table 2: Comparison of the groups in terms of psychiatric scales

	Neuropathic Pain (+) (n=27)	Neuropathic pain (-) (n=23)	p
SCL-90 R			
Total	0.80±0.68	1.02±1.10	0.07
Somatization	0.95±0.81	0.54±0.64	0.01
Obsessive-compulsive	1.03±0.92	0.80±0.68	0.43
Interpersonal sensitivity	0.91±0.93	0.55±0.82	0.02
Depression	1.00±0.66	0.59±0.72	0.02
Anxiety	0.86±0.57	0.54±0.66	0.02
Anger-Hostility	1.25±0.88	0.75±0.88	0.03
Phobic anxiety	0.59±0.83	0.33±0.69	0.10
Paranoid ideation	0.85±0.72	0.68±0.92	0.12
Psychoticism	0.53±0.73	0.39±0.64	0.42
PSQI			
Total	7.04±3.99	4.65±2.85	0.02
Sleep quality	1.56±1.30	0.75±0.55	0.01
Sleep latency	1.86±1.96	1.10±0.85	0.09
Sleep duration	1.60±1.11	0.75±0.85	0.01
Usual sleep efficiency	0.65±1.07	0.50±0.94	0.68
Sleep disturbance	1.69±0.70	1.20±0.41	0.01
Sleeping aid use	0.47±1.03	0.10±0.44	0.11
Daytime sleepiness	0.78±0.85	0.25±0.55	0.02
Beck depression scale	10.43±7.74	7.20±8.88	0.04
STAI-I (State)	35.56±10.02	39.70±8.74	0.19
STAI-II (Trait)	45.39±10.54	38.20±9.37	0.02
Rosenberg self-esteem scale	20.78±6.40	23.60±3.83	0.11
SF-36-subscale			
Physical function	57.16±25.16	38.68±20.41	0.01
Social function	67.13±28.22	50.31±27.68	0.02
Physical role limitation	61.21±27.88	46.88±28.06	0.13
Emotional role limitation	58.01±25.35	46.34±26.99	0.17
Mental health	61.04±20.67	51.58±20.37	0.10
Energy	65.69±17.96	54.02±17.25	0.02
Pain	63.77±24.67	44.25±23.23	0.01
General health	61.92±17.91	48.17±18.34	0.007

SCL-90 R: Symptom Checklist-90-Revised, PSQI: Pittsburg Sleep Quality Index, SF-36: The Short Form (36) Health Survey, STAI: State-Trait Anxiety Inventory

difficulty in falling asleep and poor quality sleep (39,40). The impacts of sleep disorders and sleep disruption in worsening neuropathic pain processes are still poorly understood, although pain, depression and anxiety are inter-related with sleep complaints (39-41). Previous studies have suggested that pain may be the most consistent influence on sleep, making it difficult to fall asleep and interfering with the ability to return to sleep when awakened during the night (26,42). There have been few studies investigating sleep problems in amputee patients (43-45). Pell et al. showed that overall QOL and sleep quality following LLA for peripheral arterial disease are poor, although much of this is secondary to restricted mobility (44). Another study assessed sleep in amputee patients with restless leg syndrome (45). This sleep evaluation in both

studies was performed using a general scale. The PSQI used in our study is capable of a multi-faceted sleep evaluation. Another difference in our study is that this was the first time these assessments had been performed with traumatic amputee patients with neuropathic pain. In our study, PSQI global score, subjective sleep quality, sleep duration, sleep disturbance, and daytime sleepiness were higher among male traumatic LLA patients with neuropathic pain than those without.

Psychiatric morbidity significantly impairs activity, mood, working, walking, sleep, relationships, and enjoyment. Psychiatric morbidity is associated with increased pain perception and also poor functional status. However, the cause-effect relationship between psychiatric illness and functional impairment is difficult to establish

Table 3: Correlations

	Somatization	Obs-comp	Interpersonal-sens	dep	anx	Ang-hos	phobic	Par- id	psycho
Amputee body image scale score	r=0.26 p=0.08	r=0.15 p=0.32	r=0.29 p=0.05	r=0.38 p=0.01	r=0.28 p=0.06	r=0.20 p=0.19	r=0.30 p=0.04	r=0.20 p=0.19	r=0.18 p=0.22
Locomotor Capabilities Index score	r=-0.36 p=0.01	r=-0.18 p=0.23	r=-0.20 p=0.19	r=-0.36 p=0.04	r=-0.31 p=0.04	r=-0.29 p=0.05	r=-0.32 p=0.03	r=-0.12 p=0.43	r=-0.10 p=0.48
	Beck-d	STAI-I	STAI-II	Rosenberg	puki				
Amputee body image scale score	r=0.30 p=0.05	r=0.05 p=0.74	r=0.575 p=0.001	r=-0.47 p=0.01	r=0.30 p=0.50				
Locomotor Capabilities Index score	r=-0.29 p=0.05	r=0.16 p=0.30	r=-0.40 p=0.007	r=0.32 p=0.03	r=-0.24 p=0.11				

due to their mutually contributory nature (46). A relationship may be expected between physical activity and depression and anxiety in the amputee population (47,48). Our hypothesis was that physical capacity in amputee patients with neuropathic pain might be correlated with other psychiatric symptoms in addition to depression, such as somatization, depression, obsessive-compulsive, anger-hostility, phobic anxiety, state anxiety, trait anxiety, and self-esteem. Only one study has assessed psychiatric symptoms and mobility in amputee patients with neuropathic pain. Graham et al. (49) found that stump pain was associated with poorer mobility and negative psychological symptoms, thus emphasizing that the management of traumatic amputees requires a holistic approach. The fact that the psychiatric assessment in that study did not involve all symptoms in detail is the most important difference between it and ours. The psychiatric scales used in our study are very detailed and assess several symptoms at the same time. Locomotor capacity in amputee patients with neuropathic pain in our study was lower compared to those without pain. Additionally, we found that physical capacity was negatively correlated with depression, phobic anxiety and trait anxiety and positively correlated with self-esteem.

Body image may be defined as the combination of an individual's psychological experiences, feelings and attitudes related to the form, function, appearance and desirability of his/her own body. This is influenced by individual and environmental factors. Impaired body image has been found to be a predictor of depression and low QOL (17,47,50). A relationship has been noted between a negative body image and psychological maladjustment to

a leg amputation (51). Moreover, Breakey (52) reported that with increasingly negative feelings regarding body image, people with LLAs were more likely to be less satisfied with their lives. Yesim et al. (47) showed that patients with LLAs with higher body image disturbance had significantly poorer QOL and increased depression and anxiety. In our study, LLA patients with neuropathic pain and with higher body image disturbance had significantly poorer self-esteem, increased depression, phobic anxiety and trait anxiety.

The present study has some limitations requiring further discussion. The major limitation is the limited number of patients, and these being all men. The fact that all participants were members of the military may also represent a limitation. No psychiatric interviews were performed for diagnostic purposes. Additionally, the majority of amputation studies in the literature are vascular, whereas all amputations in this study were traumatic LLAs. Our results cannot therefore be generalized to the general LLA population. On the other hand, the study population's homogeneity increases the strength of the study.

Our study shows that in addition to decreased QOL and depression in amputee patients with neuropathic pain, sleep disorder and psychiatric symptoms such as somatization, interpersonal sensitivity, anxiety, phobic anxiety, trait anxiety and anger-hostility may also be seen.

Psychiatric rehabilitation of these patients must also focus on these symptoms. It must be kept in mind that improvement of body image and physical activity will also contribute to psychiatric rehabilitation.

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