ORİJİNAL ARAŞTIRMA ORIGINAL RESEARCH

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Does Kinesiophobia Associated with Poststroke Neuropathic Pain and Stroke Severity?

Kinezyofobi, İnme Sonrası Nöropatik Ağrı ve İnme Şiddeti ile İlişkili midir?

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ABSTRACT Objective: Kinesiophobia is defined as fear of acting due to belief of predisposition to injury. It causes physical activity limitation. There are many factors in the older age population that affect poor recovery after stroke. Central pain after stroke is a neuropathic pain disorder with unknown pathogenesis. Here, we aimed to evaluate association of kinesiophobia with poststroke central pain and the stroke severity in stroke patients at rehabilitation program. **Material and Methods:** Seventy-five (n=75) stroke patients with the mean age range of 55.5±13.1 year were included in the study. The control group (n=78) consisted of healthy volunteers of similar age and gender. Age, gender, stroke duration, involved side, stroke type (ischemic, hemorrhagic, subarachnoid etc.) were recorded in all patients. The severity of stroke was assessed by the National Institute of Health Stroke Scale. Poststroke pain was assessed by the Self-Leeds Assessment of Neuropathic Symptoms and Sign pain scale. Kinesiophobia was assessed by the Tampa Scale for Kinesiophobia. **Results:** Of the patients, 53.3% were in acute, 20% were in subacute and 20% were in chronic period. The mean duration of the stroke was 13.6±22.2 years. The rate of right side involvement was 48% and 58% was ischemic type. The mean Tampa score was 44±7.7 and was statistically higher than control group. The mean National Institute of Health Stroke Scale score was 4.5±3.9; Self-Leeds Assessment of Neuropathic Symptoms and Sign pain score was 7.2±6.7; the prevelance of neuropathic pain was 21.3% (n=16) and was similar with control group. **Conclusion:** Kinesiophobia was found to be higher in stroke patients and was positively correlated with advanced age, disease duration and stroke severity. We should consider kinesiophobia in stroke rehabilitation programs.

Keywords: Stroke; neurorehabilitation; aging; chronic pain; neuropathic pain; kinesiophobia

ÖZET Amaç: Kinezyofobi, yaralanmaya yatkınlık inanışı nedeniyle hareket etmekten korkmak olarak tanımlanmaktadır. Fiziksel aktivite sınırlamasına neden olur. Yaşlı nüfusta inme sonrası kötü iyileşmeyi etkileyen birçok faktör vardır. İnme sonrası santral ağrı, patogenezi bilinmeyen bir nöropatik ağrı bozukluğudur. Burada, rehabilitasyon programındaki inme hastalarında kinezyofobinin poststroke santral ağrı ve inme şiddeti ile ilişkisini değerlendirmeyi amaçladık. **Gereç ve Yöntemler:** Çalışmaya yaş ortalaması 55,5±13,1 yıl olan yetmiş beş (n=75) inme hastası dâhil edildi. Kontrol grubu (n=78) benzer yaş ve cinsiyette sağlıklı gönüllülerden oluşturuldu. Tüm hastalarda yaş, cinsiyet, inme süresi, tutulan taraf, inme tipi (iskemik, hemorajik, subaraknoid vb.) kaydedildi. İnme şiddeti, Ulusal Sağlık Enstitüsü İnme Skalası ile değerlendirildi. İnme sonrası ağrı, Self-Leeds Nöropatik Semptom ve Bulgu ağrı skalası ile değerlendirildi. Kinezyofobi, Tampa Kinezyofobi Skalası ile değerlendirildi. **Bulgular:** Hastaların %53,3'ü akut, %20'si subakut ve %20'si kronik dönemde idi. İnme süresi ortalama 13,6±22,2 yıldı. Sağ tarafın tutulma oranı %48 idi ve %58'i iskemik tipti. Ortalama Tampa skoru 44±7,7 idi ve kontrol grubundan istatistiksel olarak daha yüksekti. Ortalama Ulusal Sağlık Enstitüsü İnme Skalası skoru 4,5±3,9 idi; Self-Leeds Nöropatik Semptom ve Bulgu ağrı skalası skoru 7,2±6,7 idi; nöropatik ağrı prevalansı kontrol grubu ile benzerdi ve %21,3 (n=16) idi. **Sonuç:** Kinezyofobi inme hastalarında daha yüksek bulundu ve ileri yaş, hastalık süresi ve inme şiddeti ile pozitif korele idi. İnme rehabilitasyon programlarında kinezyofobiyi dikkate almalıyız.

Anahtar Kelimeler: İnme; nörorehabilitasyon; yaşlanma; kronik ağrı; nöropatik ağrı; kinezyofobi

Kinesiophobia is defined as fear of acting due to belief of predisposition to injury. It causes physical activity limitation. In the continuation of chronic pain, pain-related fear significantly contributes the

process. Pain-related fear is emphasized in the model of fear-avoidance in chronic pain. In this model, confrontation and avoidance are two extreme responses of pain-related fear. Confrontation leads to a reduction of fear over time while avoidance of back-stressing activities maintains or exacerbates pain-related fear. Depression and disuse behavior are associated with reduced pain tolerance and may promote pain behavior.[1]

Stroke is a global health problem that can lead to widespread, serious disability. Stroke rehabilitation includes promising interventions, fitness training, high intensity therapy and repetitive task training that can be useful to improve mobility. Stroke rehabilitation is a unified and coordinated use of medical, social, educational and professional measures, including re-training a stroke patient, in order to achieve maximum physical, psychological, social and occupational potential, consistent with physiological and environmental limitations.[2]

Neuropathic pain is the pain caused by damage or disease affecting the somatosensory nervous system. Neuropathic pain may be associated with abnormal sensations called dysesthesia or pain from normally non-painful stimuli (allodynia). Central poststroke pain (CPSP) is a neuropathic pain syndrome that is characterized by continuous or intermittent pain in a body part associated with sensory abnormalities and occurs after stroke. The prevalence is low (10%) and consideration, awareness, evaluating scales are required.[3]

The Tampa Scale for Kinesiophobia (TSK) is one of the most frequently employed measures for assessing pain-related fear.[4] Despite its widespread use, there is no data to show its role in stroke patients. There are many factors in advanced age population that effect poor recovery after stroke. Kinesiophobia may affect the success of stroke rehabilitation. Here, we aimed to analyse the relation of kinesiophobia with poststroke central pain and stroke severity in stroke patients.

MATERIAL AND METHODS

The study designed as prospective and case-control. Seventy-five (n=75) stroke patients with the mean age range of 55.5±13.1 year, were included to the study at university hospital Department of Physical Medicine and Rehabilitation. They were all hospitalized patients for rehabilitation program. The control group (n=78) consisted of healthy volunteers of similar age (p=0.196) and gender (p=0.081). Age, gender, stroke duration, involved side, stroke type (ischemic, hemorrhagic, subarachnoid, etc.) were recorded in all patients. All participants were examined by the same trained physician. The severity of stroke was assessed by the National Institute of Health Stroke Scale (NIHSS), and poststroke pain was evaluated with Self-Leeds Assessment of Neuropathic Symptoms and Signs pain scale (S-LANSS).[5-8] Kinesiophobia at baseline was measured with the Tampa Scale for Kinesiophobia (TSK).[9-12]

Patients with severe cognitive deficits, psychiatric problems, diabetes mellitus, chronic alcholism, polyneuropathy (idiopathic, herediter etc...), psychiatric or cognitive impairment, accompanying musculoskeletal injuries, a history of recent trauma or surgery were not included in the study. An informed consent form was taken from the participants.

SELF-LEEDS ASSESMENT OF NEUROPATHIC SYMPTOMS AND SIGNS (S-LANNS)

The LANSS pain scale was developed to identify patients with chronic pain whose pain is predominated by neuropathic mechanisms. The S-LANSS is derived from the LANSS, for which the validity and reliability as a diagnostic tool for neuropathic pain are established. The S-LANSS is a self-administered test comprising a total of five items regarding pain symptoms, and subjects are instructed to perform self-examinations to determine the presence of allodynia and altered sensation. The scores of ≤12 indicating low probability of neuropathic pain.[7,8]

TAMPA SCALE FOR KINESIOPHOBIA (TSK)

Kinesiophobia is a term that was introduced by Miller, Kori and Todd in 1990 at the Ninth Annual Scientific Meeting of The American Pain Society and describes a situation where "A patient has an excessive, irrational, and debilitating fear of phys-

ical movement and activity resulting from a feeling of vulnerability to painful injury or reinjury." TSK is a 17 item questionnaire used to assess the subjective rating of kinesiophobia or fear of movement. The original questionnaire was developed to "discriminate between non-excessive fear and phobia among patients with chronic musculoskeletal pain" Several studies have found the scale to be a valid and reliable psychometric measure. As the score increases, the severity of kinesophobia increases.[9-12]

NATIONAL ISNTITUTE OF HEALTH STROKE SCALE (NIHSS)

The National Institute of Health Stroke Scale (NIHSS) is widely used among neurologists and neuroscience nurses. It is most commonly used in conjunction with acute ischemic stroke, but is also used to assess patients after suspicion of hemorrhagic stroke or transient ischemic attack. It is a 15-item scale.

The scale is quick and reliable, obtained score is the neurological assessment consistent with infarct volume in stroke patients. It includes a gradual physical examination that assesses speech, language, cognition, carelessness, visual field disorders, motor power, sensory impairment, ataxia, and consciousness.[13]

STATISTICAL ANALYSIS

SPSS 17 (SPSS Statistics for Windows, Version 17.0. Chicago: SPSS Inc, USA) was used for statistical analysis. The normal distribution of the data was evaluated using Kolmogorov-Smirnov test. Some descriptive tests were used for the descriptive data. For each parameter, a comparison was done between the two groups. The *t* test was used for the groups that showed normal distribution. The Mann-Whitney *U* test was used for the groups that did not show normal distribution. Spearman correlation test was used for correlation. A *P* value <0.05 was considered statistically significant. The study has been approved by local ethic committe (protocol no: 2018/217) and done in accordance with the principles of Helsinki declaration.

RESULTS

The study included 57 male and 18 female stroke patients (n=75) aged between 22-85 years. Control group consisted of aged and gender matched 78 healthy subjects. Of the patients, 53.3% were in acute, 20% were in subacute and 20% were in chronic period. The duration of the stroke was 13.6±22.2 years. The involved side was 48% right and 58% was ischemic type. The mean Tampa score was 44±7.7 and was statistically higher than control group (p=0.000) (Figure 1). The mean NIHSS was 4.5±3.9; the S_LANSS score was 7.2±6.7; the prevelance of neuropathic pain presence was 21.3% (n=16) and was similar with control group (p=0.078). The descriptive and analytic data of the groups were shown at Table 1.

The Tampa scale for kinesiophobia score was positively correlated with advanced age (r=0.271; p=0.019), stroke stage (r=0.388; p=0.001), stroke duration (r=0.221; p=0.048), and NIHSS scores (r=0.527; p=0.000). When the group was divided into two according to the neuropathic pain presence (S_LANSS>12) the duration of the stroke (p=0.039) was longer and the ischemic stroke type (p=0.006) was higher than others. When we divided the group in terms of gender, ischemic stroke was more common in males (p=0.011). Other parameters were similar.

DISCUSSION

Stroke is the leading cause of death that can not be prevented in the worldwide. The progression of stroke patients differs depending on various factors.

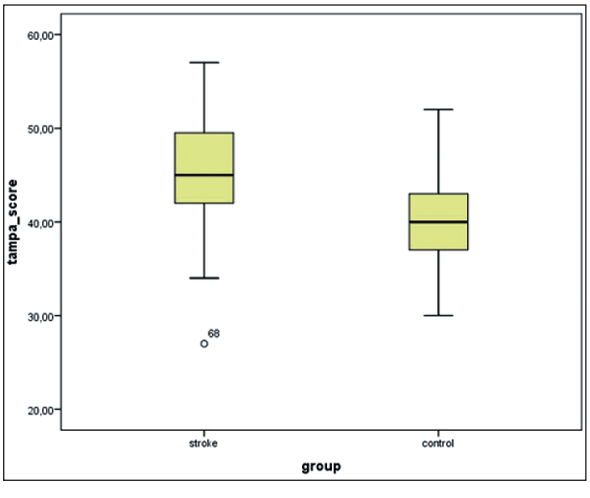

FIGURE 1: Boxplot of Tampa score according to the groups.

TABLE 1: Descriptive and analytic characteristics of the groups.

	Stroke (N=75/%) mean±std	Control (N=78/%) mean±std	p
Age (year)	55.5±13.1	52.9±13.4	0.196
Gender (Female/male)	57/18	49/29	0.081
Disease duration (year)	13.6±22.2	-	
Stroke stage			
Acute	40/53.3%		
Subacute	15/20%		
Chronic	15/20%		
Unknown	5		
Tampa score*	44±7.7	38.8±7.7	0.000
NIHSS score	4.5±3.9	-	
S-LANSS score	7.2±6.7	7.7±7.4	0.367
Neuropathic pain presence	16/21.3%	18/23%	0.078

NIHSS: The National Institutes of Health Stroke Scale; S-LANSS: Self Leeds Assessment of Neuropathic Symptoms and Signs pain scale. *p<0.05, statistically significant.

For this reason, a good knowledge of the risk factors and associated problems will lead to successful stroke rehabilitation. Early initiation of neurological rehabilitation is correlated with better outcomes. However, stroke rehabilitation improves functional ability even in people with advanced age and general condition and even with severe neurological/functional deficits. Significant improvements should not be attributed only to spontaneous recovery.[14] Predictors of stroke results can be listed as follows: type, distribution, pattern, severity of physical disorder, cognitive, language and communication skills, comorbid states, level of motivation, ability to break, family and social support, type and quality of specific training and adaptation programs.

Negative factors affecting the return of the patient can be listed as follows: low Bartel index score, long hospitalization, aphasia and previous alcohol use.[15-17] In our study, participants consisted of stroke patients in their 50s, about half of whom were in the acute phase. Most of them were in good condition according to the stroke severity scale as they were hospitalized for rehabilitation.

Central poststroke pain (CPSP) caused by sensory dysfunction of central origin is a disabling condition that significantly affects the quality of life of stroke patients. Somatosensory and cognitive impairment, cardiorespiratory disability following stroke, are associated with reduced activity participation.[18-20] Winovich et al. observed that markers of physical function-walking speed and grip strength-were consistently associated with survival and recovery after ischemic stroke.[21] Leijon et al. showed that the symptoms and signs indicate that the crucial factor for the development of CPSP is a lesion affecting the spino-thalamo-cortical pathway important for temperature and pain sensibility.[22] It has been suggested that stroke-associated loss of inhibitory neurons in the spinothalamic tract causes disinhibition of thalamic neurons, which autonomously generate ectopic nociceptive action potentials responsible for the pain experience.[22] Prevalence of CPSP following stroke is low and it majorly occurs within the first few months post stroke.[23] In our study, neuropathic pain scores were similar to the control group (at a frequency of one fifth). There are many causes of neuropathic pain. It is difficult to evaluate neuropathic pain in these patients especially in acute period. Neuropathic pain persistence was related with longer duration of the stroke, ischemic stroke type and not related with stroke severity. Longer stroke duration may increase the frequency of neuropathic pain due to advanced age. The etiopathogenesis of ischemic and hemorrhagic stroke are completely different and difficult to compare.

Kinesiophobia is thought to be a psychological barrier to exercise-based rehabilitation and

daily physical activity in people with chronic pain.[24,25] Kinesiophobia also reduces the benefit of physiotherapy in patients with chronic pain. Susan et al. showed that the fear of movement/(re)injury (kinesiophobia) are important in the etiology of chronic low back pain and associated disability in their study.[26] Kinesiophobia also may effect the progress in pain, disability and quality of life in people with chronic musculoskeletal pain, chronic obstructive pulmonary disease, chronic low back pain and osteoporosis.[27-30] According to some surveys kinesiophobia was found to be associated with high pain intensity and poor self-perceived health beliefs in advanced age.[30]

Stroke is a trauma and physical activity adversely affected due to pain, cognitive dysfunction and motor-sensory loss. In our study kinesiophobia was found higher in patients than controls. Also it was correlated with advanced age, long disease duration, stroke stage and severity. Neuropathic pain score was not associated with kinesiophobia in the study group. Increased kinesiophobia in advanced age is an expected result. In addition, we found that kinesiophobia was negatively affected and increased in stroke patients and was positively correlated with disease severity and duration. Kinesiophobia may develop due to the motor and sensorial defiits such as hemiparesia, dysesthesia, balance and walking problems. Also concomitant musculoskeletal problems (artralgia, reflex sempatic distrophy, impingement, soft tissue injury etc...) may lead to kinesiophobia in these patients. Kinesiophobia was not correlated with neuropathic pain. Neuropathic pain could be expected to increase kinesiophobia. It is known that the presence of neuropathic pain adversely affects daily life and physical activity.

Many comorbid factors may negatively effect neurorehabilitation, according to our study we may add kinesiophobia to the list.[31-36] Few studies have been reported in the literature about kinesiophobia on low back pain, amputated patients, burn, knee osteoarthritis and orthopedic repair etc. Up to date there is no study about the importance of kinesiophobia in stroke patients.[37-41] Only one case has been newly reported in Pubmed database.[42]

LIMITATION OF THE STUDY

A large number of factors that may cause low physical activity in advanced age groups may be the cause of kinesiophobia. Concomitant musculoskeletal disorders in stroke patients may also eventually affect. It is insufficient to consider kinesiophobia without considering them especially reflex sempatic distrophy, shoulder impingement.

CONCLUSION

There are many factors that may effect rehabilitation success in advanced age patients. In stroke patients many factors may lead to kinesiophobia. Advanced age, stroke duration and stroke severity are some of them. We should consider the kinesiophobia in stroke patients for rehabilitation success.

Source of Finance

During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.

Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: *Tuba Tülay Koca;* ***Design:*** *Tuba Tülay Koca;* ***Control/Supervision:*** *Tuba Tülay Koca,Vedat Nacitarhan;* ***Data Collection and/or Processing:*** *Arif Gülkesen, Tuba Tülay Koca;* ***Analysis and/or Interpretation:*** *Tuba Tülay Koca;* ***Literature Review:*** *Tuba Tülay Koca;* ***Writing the Article:*** *Tuba Tülay Koca;* ***Critical Review:*** *Tuba Tülay Koca, Vedat Nacitarhan.*

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