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Rabia TERZİ[1]
Figen ABACI[2]

RESEARCH

COMPARISON OF DEPRESSION AND DAILY LIVING ACTIVITIES IN GERIATRIC PATIENTS WITH AND WITHOUT NEUROPATHIC PAIN

ABSTRACT

Introduction: The aim of the current study was to examine the effects of neuropathic and non-neuropathic pain on depression and activities of daily living in geriatric patients.

Materials and Method: The current study was conducted with 234 patients with a mean age of 67.2±4.2 years. Pain duration, pain severity, number of painful areas, chronic diseases, drugs used, and number of recurrent falls in the past year were recorded. Patients were divided into two groups, with and without neuropathic pain, according to the Leeds Assessment of Neuropathic Symptoms and Signs. Depression was assessed using the Geriatric Depression Scale. Patients were also evaluated on the Nottingham Extended Activities of Daily Living Index.

Results: We identified 62 (26.4%) patients with neuropathic pain. The patients' mean Geriatric Depression Scale score was 18.4±4.2, while the mean Geriatric Depression Scale score for the non-neuropathic pain group was 12.5±3.7. This difference was statistically significant (p=0.04). Scores on the Nottingham Extended Activities of Daily Living index showed no significant difference between the two pain groups. The neuropathic pain group was significantly higher than the non-neuropathic pain group with respect to chronic diseases, number of drugs used, and the number of falls in the past year (p=0.03, p=0.02, p=0.02, respectively).

Conclusion: There is a fairly high rate of neuropathic pain in the geriatric population. Neuropathic pain should be investigated in this population, especially in those with chronic diseases. In addition, patients with neuropathic pain should be assessed for depression.

Key Words: Neuralgia; Pain; Geriatrics; Aging; Depression; Activities of Daily Living.

ARAŞTIRMA

NÖROPATİK VE NON-NÖROPATİK AĞRISI OLAN GERİATRİK HASTALARDA DEPRESYON VE GÜNLÜK YAŞAM AKTİVİTELERİNİN KARŞILAŞTIRILMASI

ÖZ

Giriş: Bu çalışmanın amacı geriatrik hastalarda nöropatik ve non nöropatik ağrının, depresyon ve günlük yaşam aktivitelerine etkilerini incelemektir.

Gereç ve Yöntem: Çalışma, yaş ortalaması 67,2±4,2 olan 234 hasta üzerinde gerçekleştirilmiştir. Hastaların ağrı süresi, ağrı şiddeti, ağrılı bölge sayısı, kronik hastalıkları, kullandıkları ilaçlar, son bir yılda tekrarlayan düşme varlığı kaydedildi. Hastalar Leeds Nöropatik Semptom ve Bulgu Değerlendirmesi ölçeğine göre nöropatik ağrısı olan ve olmayanlar olmak üzere iki gruba ayrıldı. Depresyon değerlendirmede Geriatrik Depresyon Skalası, günlük yaşam aktivitelerini değerlendirmede, Notthingham Genişletilmiş Günlük Yaşam Aktiviteleri İndeksi kullanıldı.

Bulgular: Çalışmamızda 62 (%26,4) hastada nöropatik ağrı tespit edilmiştir. Geriatrik depresyon skorları, nöropatik ağrısı olan grupta 18,4±4,2 iken, nöropatik ağrısı olmayan grupta 12,5±3,7 idi. Bu fark istatistiksel olarak anlamlı bulundu (p=0,04). Her iki grup arasında günlük yaşam aktivite skorları arasında istatistiksel anlamlı fark bulunmamıştır. Nöropatik ağrısı olan grupta kronik hastalık sayısı, devamlı kullanılan ilaç sayısı ve son bir yılda tekrarlayan düşme öyküsü varlığı istatistiksel olarak anlamlı oranda yüksek bulunmuştur (p=0,03, p=0,02, p=0,02).

Sonuç: Geriatrik popülasyonda nöropatik ağrı oldukça yüksek sıklıkta görülmektedir. Özellikle çoğul kronik hastalığı olan yaşlılarda nöropatik ağrı sorulmalı, nöropatik ağrı varlığında ise depresyon yönünden değerlendirme yapılmalıdır.

Anahtar Sözcükler: Nöralji; Geriatri; Yaşlanma; Depresyon; Günlük Yaşam Aktiviteleri.

Correspondance

Rabia TERZİ
Kocaeli Derince Training and Research Hospital, Physical Medicine and Rehabilitation Clinic, KOCAELİ

Phone: 0262 233 55 41
e-mail: drrabia1@yahoo.com

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[1] Kocaeli Derince Training and Research Hospital, Physical Medicine and Rehabilitation Clinic, KOCAELİ
[2] Kocaeli Derince Training and Research Hospital, Psychiatry Clinic, KOCAELİ

Introduction

Pain is a common complaint in the elderly population. Above the age of 65 years, more than half of the male population and two thirds of the female population report pain complaints (1). The increasing prevalence of degenerative joint diseases in geriatric patients causes pain for a large number of elder people (2), and physical disability caused by pain further results in the restriction of daily life activities and provides a basis for the development of depression (3). In addition to degenerative joint diseases, a higher prevalence of other conditions affecting both the peripheral and central nervous systems, such as diabetes, stroke, herpetic neuralgia, amputation, and cancer, poses a risk of developing neuropathic pain for this patient group (4). Neuropathic pain is defined as pain that develops in relation to central or peripheral nervous system pathology (5). The prevalence of neuropathic pain varies between 0.6 and 1.5% of the general population (4). It has been reported that 35-54% of the elderly population suffers from neuropathic pain (6,7). Neuropathic pain exerts negative effects on daily life (8). In a study that included all age groups, the presence of neuropathic pain restricted daily life activities in 65% of the participants (9). To our knowledge, there are no comprehensive studies that have evaluated the effects of neuropathic pain on depression and daily life activities. The aim of the present study was to determine the prevalence of neuropathic pain in geriatric patients presenting to our clinic complaining of pain, and to evaluate the effects of neuropathic pain on depression and daily life activities.

Materials and Method

The present study used a cross-sectional design to evaluate 234 patients who presented to the outpatient clinic due to pain between 2012 and 2013, and who fulfilled our inclusion criteria. Approval for the current study was obtained from the ethics committee. The data were collected using face-to-face interviews. The study included volunteer patients aged over 65 who had normal cognitive functioning, proficiency in the Turkish language sufficient for the interview, and who had experienced pain for at least the last three months. Patients with a known history of psychiatric conditions, bedridden patients, and those dependent on a wheelchair were excluded from the study. During the interview, socio-demographic features, chronic illnesses, medications, engagement in regular physical exercises, and history of recurrent falls in the past year were recorded. Regular physical exercise was defined as performing exercise for at least half an hour a day, at least three days a week.

Evaluation of Pain

The duration of pain, number of painful areas, and number of doctor visits due to pain in the past year were recorded. The pain level was evaluated using the Geriatric Pain Measurement Scale and the visual analogue scale (VAS). The Geriatric Pain Measurement Scale consists of 24 questions about pain; a score of 30 points and below indicates mild pain, a score of 31-69 points indicates moderate pain, and a score of more than 70 points indicates severe pain (10). Neuropathic pain was evaluated using the LANSS pain scale, whose validity and reliability have been established for use in Turkey (11). Patients who scored more than 12 points were assigned to the neuropathic pain group (12), while the remaining patients were assigned to the non-neuropathic pain group.

Evaluation of Depression and Daily Life Activities

Depression status was evaluated using the Geriatric Depression Scale (GDS), and the Nottingham Extended Activities of Daily Living (NEADL) scale was used to evaluate daily activities. Both of these scales use a questionnaire format.

The NEADL scale consists of 22 questions rated between 0 and 3 points, and the total score ranges between 0 and 66 points. The Turkish language version of the scale has been evaluated by Sahin et al. for its validity and reliability (13).

The GDS is a validated assessment form used by Yesavage et al. (14) to screen the elderly population for depression. The scale consists of 30 questions, each answered as "yes" or "no". Depressive responses are scored as 1 and non-depressive responses are scored as 0. The highest score possible is 30 points; a score of 0-11 indicates no depression, a score of 11-14 indicates possible depression, and a score of 14 points and above indicates definite depression (15).

Statistical Analysis

Statistical analyses were performed using the SPSS Windows 13.0 software package. Data were expressed as mean±standard deviations and percentages. In independent group comparisons, independent samples t-tests were used for parametric variables that were normally distributed, and Mann-Whitney U-tests were used for parametric variables that did not show a normal distribution. Chi-square and Fisher's exact chi-square tests were used to compare independent group ratios, and Spearman's test was used for correlation analyses.

Given the number of chronic diseases and the number of medications, ANCOVA (covariance analysis) was used in the statistical evaluations. A p value<0.05 was considered statistically significant, using a 95% confidence interval.

RESULTS

Of 234 patients, 62 (26.4%) were found to have neuropathic pain. The mean age was 66.9±5.1 years (32 females and 30 males) in the neuropathic pain group. The mean duration of pain was 5.8±4.4 months. While the mean VAS pain score at rest was 6.5±2.4, the mean VAS pain score with movement was 6.7±1.8. The mean number of painful areas was 3.1±1.4 in the neuropathic pain group, and the mean number of doctor visits in the past year due to pain was 4.2±2.1. In the non-neuropathic pain group, the mean age was 67.4±4.2 years (93 females and 78 males). The mean duration of pain was 5.2±4.9 months. The mean VAS pain score was 5.9±1.4 at rest and 6.6±2.3 with movement. The mean number of painful areas was 3.7±2.1 in the non-neuropathic pain group, and the mean number of doctor visits in the past year due to pain was 4.1±1.9. Twenty-four (57.1%) patients in the neuropathic pain group and 90 patients (52.3%) in the non-neuropathic pain group performed regular physical activities. There were no significant differences between the two groups in terms of age, gender, mean duration of pain, VAS pain score, number of painful areas, number of doctor visits, and regular physical activity (p>0.05). Fourteen patients (33.3%) in the neuropathic pain group and 29 patients (16.8%) in the non-neuropathic pain group had a history of recurrent falls. There was a statistically significant difference between the two groups in terms of fall history (p=0.03).

When the two groups were compared in terms of sociodemographic features, no significant differences were found for smoking status, marital status, and educational level (p>0.05). (Table 1) The mean number of chronic illnesses and the mean number of medications were 4.1±1.8 and 5.1±2.1, respectively, in the neuropathic pain group and 2.6±1.9 and 2.4±1.4, respectively, in the non-neuropathic pain group. There was a statistically significant difference between the two groups in terms of the mean number of chronic illnesses and the mean number of medications (p=0.03 and p=0.02, respectively).

The geriatric depression score was 18.4±4.2 in the neuropathic pain group and 12.5±3.7 in the non-neuropathic pain

Table 1— Socio-Demographic Features of the Two Groups and Evaluation of Fall Histories.

	Neuropathic Pain Group (n =62)	Non-Neuropathic Pain Group (n=172)	p
Age (mean±sd)	66.9±5.1	67.4±4.2	0.51
Female, n (%)	32 (52.3%)	93 (54%)	0.38
Male, n (%)	30 (47.7%)	79 (46%)	0.54
Body Mass Index (kg/m²)	28.03±4.5	27.38±4.1	0.28
Education level, number of individuals (%)			0.4
Literate	6 (14.2%)	12 (6.9%)	
Primary School	24 (57.1%)	120 (69.7%)	
Secondary School	8 (19%)	30 (17.4%)	
High School	4 (10.7%)	10 (6%)	
University	0 (0%)	0 (0%)	
Marital Status (number of individuals)			
Married / Single	42/20	119/53	0.7
Smoking status, number of individuals n (%)			0.6
Current Smokers	14 (22.5%)	37 (21.5%)	
Former Smokers	20 (32.2%)	51 (29.6%)	
None-Smokers	28 (45.3%)	84	
Patients with a history of fall within the last 1 year, number of individuals, n (%)	36 (58.0%)	68 (39.5%)	0.02*
Number of chronic diseases (mean±SD)	4.1±1.8	2.6±1.9	0.03*
Number of regular medications (mean±SD)	5.1±2.1	2.4±1.4	0.02*

*p<0.05

Table 2— Comparison of Pain, Depression, and Daily Activity Scores of the Two Groups.

	Neuropathic Pain Group (n =62)	Non-Neuropathic Pain Group (n=172)	p
NEADL Scala Score	28.5±5.9	30.1±6.2	0.1
LANSS Score	15.6±2.3	6.8±3.9	0.01*
Geriatric Pain Measurement Scale Score	66.5±9,2	64.7±7.4	0,2
Geriatric Depression Scale Score	18.4±4.2	12.5±3.7	0.04*

NEADL: Notthingam extended activities of daily living. LANSS: Leeds Assessment of Neuropathic Symptoms and Signs.
*p<0.05

group. Statistical evaluations were performed with the data adjusted for the number of chronic illnesses and the mean number of medications and a statistically significant difference was found between the groups in the depression scores (p=0.04). The depression score was above 11 in 42 patients (67.7%) with neuropathic pain, and in 105 patients (61.1%) in the non-neuropathic pain group. There were significant correlations between geriatric depression scores and duration of pain, geriatric pain measurement scale scores, and the number of painful areas (p=0.02, p=0.01, and p=0.04, respectively).

The mean score on the activities of daily living scale was 28.5±5.9 in the neuropathic pain group and 30.1±6.2 in the non-neuropathic pain group. No statistically significant difference was found between the two groups when the evaluation was performed with the data adjusted for the number of chronic illnesses and the mean number of medications (p=0.1). The scores of the two groups on pain, depression, and activities of daily living scales are presented in Table 2.

Discussion

Studies in the literature have shown that pain and depression are comorbid. The response of the brain to inflammatory signals is thought to contribute to the development of depression and chronic pain (16). Some studies have shown an increased prevalence of depression in patients with chronic pain (17) and, conversely, an increased prevalence of pain in patients with depression (18).

The depression rate was 19.8% in individuals with chronic pain, while the rate of major depression in general population is 5.9% (19). In hospitalized patients with the diagnosis of severe depression, 92% were shown to have at least one complaint related with pain and 76% were found to have pain in more than one point of the body (20). The presence of a depressive disease is demonstrated in some studies to increase the risk of pain in the musculoskeletal system, chest, and head over three years (21,22).

In the present study, depression scores were found to be significantly higher in patients with neuropathic pain. Both groups were composed of elderly patients with chronic pain. Higher depression scores in the neuropathic pain group are considered to be associated with the poor prognosis of neuropathic pain compared to non-neuropathic pain, a limited response to non-steroid anti-inflammatory drugs, the common occurrence of concurrent sleep disorders (13), and the social isolation of these patients (24). The present study did not address the response to medications administered for pain, sleep disorders, or the presence of social isolation. These can be regarded as limitations of the present study.

Neuropathic pain has been reported in the literature to cause more psychological problems, which is compatible with the results of our study (25,26). Bouhasirra et al. reported that the Douleur Neuropathique 4 (DN4) questionnaire score was an independent predictive factor in major depression and development of anxiety (25). It is important to note that the presence of neuropathic pain should alarm the physician to evaluate such a patient in terms of depression with a multidisciplinary approach in the geriatric patient population, which is one of the most frequently encountered group of patients for the physiatrists.

The primary condition causing neuropathic pain can also have direct effects on depression and activities of the daily life. The conditions that result in neuropathic pain were not evaluated individually in the present study. This is another limitation of the study. Denkinger et al. (27) found an association between depression and the severity and frequency of pain, and the number of painful areas in elderly patients; however, they did not report an association between depression and the quality and duration of pain. Yıldız et al. (28) did not find a relationship between the severity of pain and depression scores in elderly patients residing in a nursing home. The present study found positive correlations between depression and the duration of pain and the number of painful areas. The

restriction in daily life activities can also provide a basis for depression (18). Although not statistically significant, activities of daily life were found to be more restricted in patients with neuropathic pain than in those with non-neuropathic pain. The restrictions in daily life activities may have contributed to the significantly higher depression scores observed in patients with neuropathic pain. One study reported that one third of geriatric patients had chronic pain and approximately one fifth of these patients had restrictions in the activities of daily living (29). Activities of daily life may be restricted in both pain groups due to chronic pain.

Female gender (30), obesity (31), and cigarette smoking (32) have been reported to carry risks for the development of neuropathic pain. Chronic consumption of nicotine has been demonstrated to increase neuropathic pain by causing structural and functional changes in the nociceptive pathways (33). The differences in the pain sensitivity between different genders is suggested to develop due to the interactions between sex steroids and neuroimmune functions (34). The rate of conditions with chronic pain have been shown to be higher in divorcees (35). No statistically significant differences between the two groups were found in terms of gender, body mass index, cigarette smoking, and marital status in the present study, in contrast with the literature findings.

In the present study, the number of chronic illnesses and the number of regular medications were found to be significantly higher in the neuropathic pain group. One of the most important problems in the elderly population is the presence of multiple comorbid conditions. Some chronic disorders are known to cause neuropathic pain (4). Therefore, the development of neuropathic pain increases with an increasing number of chronic disorders (4). In a study by Berber et al., 70% of patients with two or more comorbidities had neuropathic pain, while only 13% of patients of a similar age with a single morbidity had neuropathic pain (35).

In the present study, the number of patients having a history of falls in the past year was found to be significantly higher in the neuropathic pain group than in the non-neuropathic group. In a meta-analysis by Brendon et al., chronic pain was found to be a risk factor for falls (36). A study by Terzi et al. (37) found a relationship between recurrent falls and multiple drug use in geriatric patients. The high prevalence of recurrent falls in the neuropathic pain group in the present study suggests a relationship between chronic pain and multiple drug use.

In conclusion, the patients with neuropathic pain had higher depression scores and had a higher risk of developing depression than patients in the non-neuropathic pain group. The use of multiple medications, the presence of chronic disorders, and a history of recurrent falls was significantly higher in patients with neuropathic pain. The activities of daily living were restricted by all pain, independent of its character.

REFERENCES

1. Berman A, Studenski S. Musculoskeletal rehabilitation. Clin Geriatr Med 1998;14:641-59. (PMID:9664111).
2. Lubart E, Leibovitz A, Shapir V, Segal R.On-spot rheumatology consultations in a multilevel geriatric hospital. Isr Med Assoc J 2014;16:33-6. (PMID:24575502).
3. Bruce ML, Seeman TE, Merrill SS, Blazer DG. The impact of depressive symptomatology on physical disability: MacArthur Studies of Successful Aging. American Am J Public Healthy 1994;84(11):1796-9. (PMID:7977920).
4. Davis MP. What is new in neuropathic pain? Support Care Cancer 2007;15(4):363-72. (PMID:17131133).
5. Jensen TS, Gottrup H, Sindrup SH, Bach FW. The clinical picture of neuropathic pain. Eur J Pharmacol 2001;19;429(1-3):1-11. (PMID:11698022).
6. Meyer-Rosberg K, Kvarnstrom A, Kinnman E, Gordh T, Nordfors LO, Kristofferson A. Peripheral neuropathic pain-a multidimensional burden for patients. Eur J Pain 2001;5:379-89. (PMID:11743704).
7. Gustorff B, Dorner T, Likar R et al. Prevalence of self-reported neuropathic pain and impact on quality of life: a prospective representative survey. Acta Anaesthesiol Scand 2008;52:132-6. (PMID:17976220).
8. Ferrell BA, Stein WM, Beck JC. The Geriatric Pain Measure: Validity, Reliability and Factor Analysis.J Am Geriatr Soc 2000;48:1669-73. (PMID:11129760).
9. Koc R, Erdemoglu AK. Validity and reliability of the Turkish Self-administered Leeds Assessment of Neuropathic Symptoms and Signs (S-LANSS) questionnaire. Pain Med 2010;11:1107-14. (PMID:20456071).
10. Bennett M. The LANSS Pain Scale: The Leeds assessment of neuropathic symptoms and signs. Pain 2001;92:147-57. (PMID:11323136).
11. Sahin F, Yilmaz F, Ozmaden A, et al.Reliability and validity of the Turkish version of the Nottingham Extended Activities of Daily Living Scale. Aging Clin Exp Res 2008;20:400-5.(PMID:19039280).
12. Yesavage JA, Brink TL, Rose TL et al. Develeopment and validation of a geriatric depression screening scale: a preliminary report. J Psychiatr Res 1982-1983;17(1):37-49. (PMID:7183759).
13. Ertan T, Eker E. Reliability, validity and factor structure of the Geriatric Depression Scale in Turkish elderly: are there different factor structures for different cultures? Psychogeriatr 2000 Jun;12(2):163-72. (PMID:10937537).

14. Mailis-Gagnon A, Nicholson K, Yegneswaran B, Zurowski M. Pain characteristics of adults 65 years of age and older referred to a tertiary care pain clinic. Pain Res Manag 2008;13(5):389-94. (PMID:18958310).
15. Desmeules J,Allaz AF,Binyet S,et al. Evaluation of chronic pain in geriatric patients. Schweiz Med Wochenschr 1994;5;124(44):1948-51. (PMID:7973524).
16. Walker AK, Kavelaars A, Heijnen CJ, et al. Neuroinflammation and Comorbidity of Pain and Depression. Pharmacological Reviews 2014;66:80-101. (PMID:24335193).
17. Bair MJ, Robinson RL, Katon W et al. Depression and pain comorbidity: a literature review. Arch Intern Med 2003 Nov 10;163(20):2433-45. (PMID:14609780).
18. Tsai YF, Wei SL, Lin YP, Chien CC. Depressive symptoms, pain experiences and pain management strategies among residents of Taiwanese public elder care homes. J Pain Symptom Manage 2005;30:63-9. (PMID:16043008).
19. Currie SH, Wang J. Chronic back pain and major depression in the general Canadian population. Pain 2004;107:54-60.(PMID:14715389).
20. Von Knorring L, Perris C, Eisemann M, et al. Pain as a symptom in depressive disorders. II. Relationship to personality traits as assessed by means of KSP. Pain 1983;17:377-84. (PMID:6664683).
21. Magni G, Moreschi C, Rigatti-Luchini S, et al. Prospective study on the relationship between depressive symptoms and chronic musculoskeletal pain. Pain 1994;56:289-97. (PMID:8022622).
22. Von Korff M, LeReshe L, Dworkin SF. First onset of common pain symptoms: a perspective study of depression as a risk factor. Pain 1993;55:251-8. (PMID:8309712).
23. Cohen SP, Mao J. Neuropathic pain: mechanisms and their clinical implications BMJ 2014 Feb 5;348:f7656. (PMID:24500412).
24. Sofaer-Bennett B, Walker J, Moore A, et al. The social consequences for older people of neuropathic pain: a qualitative study. Pain Med 2007;8:263-70. (PMID:17371414).
25. Bouhassira D, Letanoux M, Hartemann A. Chronic pain with neuropathic characteristics in diabetic patients: a French cross-sectional study. PLoS One 2013;13:8(9):e74195. doi:10.1371/journal.pone.0074195. eCollection 2013. (PMID:24058527).
26. Attal N, Lanteri-Minet M, Laurent B, et al. The specific disease burden of neuropathic pain: results of a French nationwide survey. Pain 2011;152:2836-43. (PMID:22019149).
27. Denkinger MD, Lukas A, Nikolaus T, et al. Multisite pain, pain frequency and pain severity are associated with depression in older adults: results from the ActiFE Ulm study. Age Ageing 2014;43(4):510-4. doi: 10.1093/ageing/afu013. Epub 2014 Mar 5. (PMID:24603284).
28. Yıldız A, Erol S, Ergün A. Pain and depression risk among elderly people living in a nursing home Turkish Journal of Geriatrics 2009;12:156-64. (in Turkish). [Internet] Available from: http://geriatri.dergisi.org/text.php3?id=434. Accessed: 04.08.2014.
29. Máximo Pereira LS, Sherrington C, Ferreira M L et al. Self-reported chronic pain is associated with physical performance in older people leaving aged care rehabilitation. Clin Interv Aging 2014;9:259-65. (PMID:24523583).
30. Fillingim R. B., King C. D., Ribeiro-Dasilva M. C., et al. Sex, gender, and pain: a review of recent clinical and experimental findings. J Pain 2009;10(5):447-85. doi:10.1016/j.jpain.2008.12.001. (PMID:19411059).
31. Spallone V, Morganti R, D'Amato C, et al. Clinical correlates of painful diabetic neuropathy and relationship of neuropathic pain with sensorimotor and autonomic nerve function. Eur J Pain 2011;15(2):153-60. doi:10.1016/j.ejpain.2010.06.011. Epub 2010 Jul 8. (PMID:20619708).
32. Richardson EJ, Richards JS, Stewart CC, et al. Effects of nicotine on spinal cord injury pain: a randomized, double-blind, placebo controlled crossover trial. Top Spinal Cord Inj Rehabil 2012 Spring;18(2):101-5. doi:10.1310/sci1802-101. (PMID:23459459).
33. Nicotra L., Loram L. C., Watkins L. R., et al. Toll-like receptors in chronic pain. Exp. Neurol 2012;234: 316–329. 10.1016/j.expneurol.2011.09.038. (PMID:22001158).
34. Vieira EB, Garcia JB, Silva AA, et al. Chronic pain, associated factors, and impact on daily life: are there differences between the sexes? Cad Saude Publica 2012 Aug;28(8):1459-67. (PMID:22892966).
35. Berger A, Dukes EM, Oster G. Clinical characteristics and economic costs of patients with painful neuropathic disorders. J Pain 2004;5:143-9. (PMID:15106126).
36. Stubbs B, Binnekade T, Eggermont L, Sepehry AA, Patchay S, Schofield P. Pain and the risk for falls in community-dwelling older adults: systematic review and meta-analysis. Arch Phys Med Rehabil 2014;95:175-87. (PMID:24036161).
37. Terzi R, Terzi H. Factors associated with recurrent falls in geriatric patients. J PMR Sci 2013;16:96-101. (in Turkish). [Internet] Available from: http://www.jpmrs.org/pdf/pdf_PMJ_475.pdf. Accessed: 03.08.2014.