INFLUENCE OF PERSONAL CHARACTERISTICS ON THE OCCURRENCE OF LUMBAR PAIN IN NURSES

Summary

Introduction. Even though lumbar pain is one of the most common medical problems of today, it is difficult to determine its precise origin. When identifying the risk factors for developing lumbar pain, one should also take into account the personal characteristics such as gender, age, body mass index, smoking habits, physical activities etc. The basic goal of this study was to assess the relationship between the socio-demographic characteristics (age, gender, level of education), the body mass index, smoking habits, and lumbar pain in nurses. Material and Methods. This cross-sectional study was conducted in five healthcare institutions in the area of Vojvodina by interviewing nurses by means of the modified Nordic questionnaire. Results. The participants were predominantly female, the majority of them having secondary school degree. The study revealed a statistically significant relationship between lumbar pain and the increase of age and body mass index, while smoking habits did not influence the occurrence of lumbar pain. Conclusion. A better organization of work in relation to the age and gender as well body mass control would reduce the risk of lumbar pain.

Key words: Low Back Pain; Nursing Staff; Risk Factors; Surveys and Questionnaires; Body Mass Index; Smoking; Age Factors; Sex Factors

Sažetak

Uvod. Iako lumbalni bol predstavlja jedan od najučestalijih zdravstvenih problema današnje, teško je utvrditi tačan izvor nastanka. Prilikom identifikacije faktora rizika za nastanak lumbalnog bola treba uzeti u obzir i personalne karakteristike kao što su: pol, starost, indeks telesne mase, pušenje, fizička aktivnost, itd. Osnovni cilj ovog istraživanja bio je da se ispita povezanost između sociodemografskih karakteristika (godine života, pol, stepen stručne spretnosti), indeksa telesne mase, pušenja i lumbalnog bola kod medicinskih sestara/tehničara. Materijal i metode. Istraživanje je sprovedeno u pet zdravstvenih ustanova sa područja Vojvodine u obliku studije preseka, anketiranjem medicinskih sestara/tehničara. Za ispitivanje je korišćen modifikovani Nordijski upitnik. Rezultati. Ispitani su bili uglavnom ženskog pola. Najveći broj ispitanika imao je srednju stručnu spremu. Istraživanjem je utvrdeno da postoji statistički značajna povezanost lumbalnog bolja sa porastom godina života i indeksa telesne mase, dok pušenje ne utiče na pojavu lumbalnog bola. Zaključak. Boljom organizacijom posla u odnosu na starost i pol medicinskih sestara/tehničara kao i regulisanjem telesne mase, smanjio bi se rizik od nastanka lumbalnog bola.

Ključne reči: lumbalni sindrom; zdravstveni radnici; faktori rizika; istraživanja i upitnici; indeks telesne mase; pušenje; starosna dob; pol

Introduction

Lumbar pain is one of the most common health problems of today and the most frequent cause of temporary inability to work. According to the epidemiological data for our area, the greatest occurrence of lumbar pain in the urban population is between the ages of 50 and 59 years, and it is the cause of inability to work in over 25% of people under 45 years of age [1]. The connection between lumbar pain and the working conditions in the nursing profession shows that it occurs in up to 90% in a hospital environment [2]. The exact cause of lumbar pain is difficult to identify. Personal characteristics, such as gender, age, body mass index, smoking habit, physical activity, years of service in this profession etc. should all be taken into account when identifying risk factors for the occurrence of lumbar pain [2–4]. Since pain is a multidimensional experience, the difference in the prevalence and the manifestation of pain between the genders can appear on more than one level. Men and women have anatomical and physiological differences in the nervous system which transfers or modifies the pain signals. They also differ in the perceptual style they have and their cognitive and emotional experience of pain signals. They also differ in the perceptual style they have and their cognitive and emotional experience of pain signals.
pain, as well as how they deal with the existence of pain, i.e. their assessment of pain [5–7].

Lumbar pain can occur also as a consequence of the physiological process of aging, which causes the intervertebral disc to contain less water and lose its strength and elasticity, thus reducing its role in pressure amortization. The degenerative processes on the spine start around the age of 20, and after the age of 50 years the disc becomes completely fibrous and enveloped in the connective tissue. The prevalence of lumbar pain increases with age. Nurses over 50 years of age suffer from pain more often than those younger than 35 [8].

Body mass index (BMI) is the ratio between the weight and height and it is an indicator of the level of nourishment. Normal values are between 18.50 and 24.99 (in kg/m²). In nurses, obesity can influence the occurrence of lumbar pain in two ways [9]. Not only nurses but patients as well are gaining weight so that additional effort is required when lifting and transferring patients [10]. Healthcare workers with body mass index of approximately 30 have a 60% higher chance of developing lumbar pain [8, 11].

Smoking is considered to be one of the risk factors for developing lumbar pain because it leads to a decrease of perfusion and nourishment of intervertebral discs by means of vasoconstriction, i.e. atherosclerosis. Modified blood flow to the spinal structures can cause degenerative lesions in the discs. Smoking increases the level of circulating proinflammatory cytokines leading to pain, as well as a decrease of disc oxygenation and inhibition of fibrinolytic activities [12]. Therefore, the aim of this study was to investigate the relationship of socio-demographic characteristics (age, gender, degree of education), body mass index, smoking habit and lumbar pain in nurses.

The starting point of this study was the hypothesis that there was a positive connection between the age, increased body mass index, smoking and lumbar pain in nurses and that lumbar pain was much more frequent in female nurses and nurses with four-year level degree of education.

Material and Methods

The study was conducted at the Institute for Child and Youth Health Care of Vojvodina, Clinical Center of Vojvodina (Clinic of Gynecology and Obstetrics, Clinic of Internal Diseases, Clinic of Neurology and the Polyclinic of the Clinical enter of Novi Sad), General Hospital in Sombor, General Hospital in Subotica and General Hospital in Sremska Mitrovica, in the period from March to July 2015, by interviewing nurses through questionnaires. The study was approved by the Ethics Committees of all healthcare institutions in which it was conducted as well as by the directors of all these institutions and the Ethics Committee of the Faculty of Medicine.

The distribution of the questionnaires and the collection of data were conducted by the researcher herself, with the help of head nurses of these healthcare institutions. All the participants gave their informed consent to participate in the study. The respondents remained anonymous.

The criteria for the inclusion in the study were the following: the nurses involved in the healthcare of patients and employees dealing with the organization of healthcare. The criteria for non-inclusion in the study were the following: those with previous injuries and diseases of the spinal column, nurses who had worked in healthcare for less than a year and pregnant women.

Data on of lumbar pain in nurses were collected by means of the Modified Nordic questionnaire for the analysis of musculoskeletal symptoms, based on the Standardized Nordic questionnaire for the analysis of musculoskeletal symptoms [13]. The data obtained during the study were statistically processed.

Results

Out of the total of 550 interviewed participants, 38 (6.91%) failed to meet criteria and were excluded from the study, and 512 (93.09%) of them were included in the study.

In the age group of up to 30 and over 50 years of age, 89.4% and 98.5% of participants suffered from lumbar pain, respectively. A statistically very significant dependency was found between the age groups and the occurrence of lumbar pain: $z=34.77$, $df=12$, $p=0.00$, so the hypothesis was not dismissed. The correlation between the age and lumbar pain was examined by Spearman’s correlation coefficient. The value $\rho=0.25$ was obtained, with the corresponding p-value $p=0.00$, which means that there was a statistically very significant positive correlation between the age and pain (Graph 1).

Pain was present in 94.74% of female and 87.50% of male participants. The presence of lumbar pain related to gender was determined on reduced data by using a chi-squared test. The resulting value was $z=3.41$, with a corresponding p-value of 0.06, which means that there was no statistically significant dependence between the genders and lumbar pain. Since the p-value was close to the limit of 0.05, a difference of proportion test was conducted as well. The statistical significance of the one-sided test $p=0.01$ shows that the hypothesis was not dismissed with a threshold of significance of 0.05, i.e. that there was a significant difference in the presence of lumbar pain between the genders (Table 1).

The majority (94.96%) of participants with a secondary school diploma suffered from lumbar pain, while that percentage of the participants with a college or faculty degree was somewhat lower, 88.16%. The statistical significance of the test $p=0.00$ shows that the hypothesis was not dismissed with a significance threshold of 0.05, i.e. that there was a statistically high significant difference in the presence of lumbar pain between the group with the secondary school diploma and the group with other, higher level degrees (Table 1).

Lumbar pain was reported by all the participants with a BMI of over 30, i.e. the obese participants, where-
as 91% of the participants with ideal body mass had the lowest level of lumbar pain. The hypothesis that there was a statistically significant difference between the BMI and the presence of lumbar pain was confirmed: \( z = 24.48, \text{df} = 4, p = 0.017 \). The correlation between body mass index and lumbar pain was tested by Spearman’s correlation coefficient. The value \( \rho = 0.17 \) was obtained, with the corresponding \( p \)-value \( p = 0.00 \), which means that there was a statistically very significant positive correlation between BMI and pain (Graph 2).

Lumbar pain was reported by 92.28% of participants who were smokers and 95.28% of participants who were non-smokers. The one-sided proportion difference test was applied. The statistical significance of the test was \( p = 0.09 \), which shows that the hypothesis was dismissed with a significance threshold of 0.05, i.e. there was no statistically significant difference in the presence of lumbar pain between smokers and non-smokers. The check with the chi-squared test: the resulting value (with the Yates correction) was \( z = 1.40 \), with a corresponding \( p \)-value of \( p = 0.24 \), which means that there was no statistically significant difference (Table 1).

Discussion

Pain in the lower back is very common in nurses, but the etiology of this pain is mostly unknown, even though it represents a global problem of today. According to our research, there is a statistically significant difference in 94.74% of women and 87.50% of men reporting the presence of lumbar pain. Furthermore, there is a significant correlation in the research of Sikiru et al, where 78.46% of women and 64.86% of men reported lumbar pain [14, 15]. The reason for the more frequent occurrence of lumbar pain in women is the anatomical and physiological difference between genders. Women have less muscle fibers, muscle weakness happens more often in women, as well as the stretching and straining of the lumbar part of the spine, especially [16]. This could be related to the fact that the majority of nurses are females who, due to the lack of male nurses, have to do jobs which demand more physical strength [17].

Table 1. The difference in the percentage of lumbar pain in relation to gender, level of education and smoking

| Risk factors                              | LBP Sufferers/Ispitani sa lumbalnim bolom n (%) | \( p \)-value/p-vrednost |
|-------------------------------------------|-----------------------------------------------|--------------------------|
| Gender/Pol                                |                                               |                          |
| Women/Zene                                | 432 (94.74)                                   | 0.01                     |
| Men/Muškarci                              | 49 (87.50)                                    |                          |
| Level of education/Nivo obrazovanja       |                                               |                          |
| Secondary education/Srednja stručna sprema| 414 (94.96)                                   | 0.00                     |
| High professional education/Viša ili visoka stručna sprema | 67 (88.16)                                   |                          |
| Smoking/Pušenje                           |                                               |                          |
| No smoking/Nepušači                       | 222 (95.28)                                   | 0.09                     |
| Smoking/Pušači                            | 239 (92.28)                                   |                          |

\( n \) = Absolute frequency/Absolutna učestalost; % = Relative frequency/Relativna učestalost
Our research shows a high statistically significant correlation between lumbar pain and age. When looking at the age groups, 98.5% of participants over 50 and 89% of participants under 30 suffer from lumbar pain. In the study conducted by Mohamed Moussa et al, there was a high statistical correlation of lumbar pain and age, where 44.3% of nurses under 30 reported the presence of lumbar pain but only 1 nurse out of 107 of those over 40 did not suffer from lumbar pain [18]. The correlation of lumbar pain and age can occur also due to the existence of degenerative processes and the accumulation of damage on the spine column [19].

When it comes to the influence of the level of education of nurses on the occurrence of lumbar pain, opinions differ. A statistically significant difference between lumbar pain and the level of education can be found in the studies conducted by June et al [20] and Vieir et al [21], who explain this statistical difference by the fact that highly educated nurses devote more time to patient care, i.e. put more emphasis on their professional role [22]. Our research has shown opposite results, i.e. there is a statistically significantly higher occurrence of lumbar pain in less educated nurses. The results we have obtained could have been influenced by a small number of participants with a higher degree of education.

In our research there is a statistically very significant positive correlation between BMI and lumbar pain. All of the participants whose BMI was over 30, i.e. who were obese, suffered from lumbar pain, whereas 91% of the participants with ideal body mass had the lowest level of lumbar pain, which represents a statistically significant difference. In the research conducted by Šarkhordari et al, the occurrence of lumbar pain was much more frequent in persons whose BMI was over 25 than in other participants [23]. A significant correlation of lumbar pain and BMI shows the need for an ideal body mass in nurses. For that reason, it would be recommendable that the facilities have conditions for regular physical activities in order to provide their employees with means to achieve and maintain an ideal body mass [24].

When it comes to the influence of smoking on the occurrence of lumbar pain, we have come across different views in the literature. Our research shows no statistically significant correlation between consuming cigarettes and the occurrence of lumbar pain since as many as 95.28% of non-smoking participants suffer from lumbar pain, which is similar to the results of the studies conducted by Wong et al and Asadi et al, where 94.7% and 98.4% of non-smoking participants reported having lumbar pain [4, 25]. However, in the research conducted by Vieira there was a correlation between smoking and lumbar pain. 80% of nurses working in orthopedics and 90% of them working in intensive care, all of them non-smokers, did not report having lumbar pain [21]. In the study done by Keriri et al, 33.3% of smokers and 50% of ex-smokers had lumbar pain, but no statistically significant difference was found [17]. The correlation between smoking and lumbar pain is explained by the fact that smoking reduces the nutrition of the disc, making it vulnerable to outside influences, and disturbs the blood flow, which can lead to slower healing and prolonged pain [26].

Conclusion

Our research shows a statistically high significant correlation between the increase of age and BMI and lumbar pain. This correlation shows a need for the regulation of body mass in nurses. Smoking was not significantly related to the occurrence of lumbar pain. A significantly higher occurrence of lumbar pain has been reported in female participants and those with a four-year secondary school education. This can be explained by the fact that in our country nurses with a secondary degree of education are more engaged in patient care, unlike nurses with a higher level of education, who primarily deal with the organization of work.

References

1. Mačak-Hadžiamerović A, Ćustović-Hadžimuratović A, Mujezinović A. Vodič za prevenciju i tretman lumbalnog bolnog sindroma. Sarajevo: Ministarstvo zdravstva Kantona Sarajevo; Institut za naučnoistraživački rad i razvoj Kliničkog centra Univerziteta u Sarajevu; 2009.

2. Lorusso A, Bruno S, L’abbate N. A review of low back pain and musculoskeletal disorders among Italian nursing personnel. Ind Health. 2007;45(5):637-44.

3. Karahan A, Bayraktar N. Determination of the usage of body mechanics in clinical settings and the occurrence of low back pain in nurses. Int J Nurs Stud. 2004;41(1):67-75.

4. Wong TS, Teo N, Kyaw MO. Prevalence and risk factors associated with low back pain among health care providers in a district hospital. Malays Orthop J. 2010;4(2):23-8.

5. Gear RW, Miaskowski C, Gordon NC, Paul SM, Heller PH, Levine JD. Kappa-opioids produce significantly greater analgesia in women than in men. Nat Med. 1997;2(3):371-80.
14. Sikiru L, Hanifa S. Prevalence and risk factors of low back pain among nurses in a typical Nigerian hospital. Afr Health Sci. 2010;10(1):26-30.

15. Homaid M, Abdelmoety D, Alshareef W, Alghamdi A, Alhozali F, Alfahmi N, et al. Prevalence and risk factors of low back pain among operation room staff at a Tertiary Care Center, Makkah, Saudi Arabia: a cross-sectional study. Ann Occup Environ Med. 2016;28(1):1-8.

16. Pollock ML, Gaesser GA, Butcher JD, Després JP, Dishman RK, Franklin BA, et al. ACSM position stand: the recommended quantity and quality of exercise for developing and maintaining cardiorespiratory and muscular fitness, and flexibility in healthy adults. Medicine & Science in Sports & Exercise. 1998;30(6):975-91.

17. Keriri MH. Prevalence and risk factors of low back pain among nurses in operating rooms, Taif, Saudi Arabia. American Journal of Research Communication. 2013;1(11):45-70.

18. Moussa MMM, El-Ezaby HH, El-Mowafy RI. Low back pain and coping strategies’ among nurses in Port Said City, Egypt. J Nurs Educ Pract. 2015;5(7):55-62.

19. Ozguler A, Leclerc A, Landre MF, Pietri-Taleb F, Nietherammer I. Individual and occupational determinants of low back pain according to various definitions of low back pain. J Epidemiol Community Health. 2000;54(3):215-20.

20. June KJ, Cho SH. Low back pain and work-related factors among nurses in intensive care units. J Clin Nurs. 2011;20(3-4):479-87.

21. Vieira ER, Kumar S, Coury HJ, Narayan Y. Low back problems and possible in nursing jobs. J Adv Nurs. 2006;55(1):79-89.

22. Karahan A, Kav S, Abbasoglu A, Dogan N. Low back pain: prevalence and associated risk factors among hospital staff. J Adv Nurs. 2009;65(3):516-24.

23. Barkhordari A, Halvani G, Barkhordari M. The prevalence of low back pain among nurses in Yazd, Southeast Iran. International Journal of Occupational Hygiene. 2013;5(1):19-22.

24. Emmanuel MN, Ezhilarasu P, Bheemarao AB. Low back pain among nurses in a Tertiary Hospital, South India. Journal of Osteoporosis and Physical Activity. 2015;4(1):1-3.

25. Asadi P, Kasmaei VM, Zia Ziabari SM, Zohrevandi B. The prevalence of low back pain among nurses working in Pursina hospital in Rasht, Iran. Journal of Emergency Practice and Trauma. 2016;2(1):11-5.

26. Feng CK, Chen ML, Mao IF. Prevalence of and risk factors for different measures of low back pain among female nursing aides in Taiwanese nursing homes. BMC Musculoskeletal Disorders. 2007;8:52.