J Health Sci Technol. 2017 December;1(4):193-199.
Published online 2017 December 27 **Research Article**

# Evaluation of prevalence of low back pain and affecting factors in Birjand University of Medical Sciences in 2016

Mitra Moodi[1], Maryam Miri[2], Sara Sahranavard[1]

[1]Social Determinants of Health Research Center, Department of Public Health, Faculty of Health, Birjand University of Medical Sciences, Birjand, Iran

[2]MSc Health Education and Promotion, Social Determinants of Health Research Center, Birjand University of Medical Sciences, IR Iran

**Corresponding author*: Sarah Sahranavard, Social Determinants of Health Research Center, Department of Public Health, Faculty of Health, Birjand University of Medical Sciences, Birjand, Iran, Tel: +985632381251, Fax: +9832381132, Email: Sahranavard_sara@bums.ac.ir

**Received *September 21, 2017*; Accepted *December 13, 2017***

**Abstract**

**Background:** Low back pain is one of the serious health problems in communities. It is the third common cause for medical visits after upper respiratory tract and headache. Based on the studies conducted in this regard, low back pain has different distribution in various kinds of job groups, and most researchers argue that this problem is correlated with job type of individuals. Accordingly, the present study was conducted to evaluate the prevalence of low back pain and affecting factors in employees of Birjand University of Medical Sciences in 2016.

**Methods:** This descriptive-analytical study was conducted on all employees in the deputies of Birjand University of Medical Sciences in 2016. The data were collected using Quebec standard questionnaire and analyzed using SPSS19 software and descriptive and analytical statistics of Mann-Whitney, Logistic regression, Kruskal-Wallis and Spearman at a significant level of $\alpha$=0.05.

**Results:** 216 people (120 females and 96 males) were examined in this study. Out of 216 people, 184 were married and 32 were single. The mean age of employees was 36.36 ± 8.27 years, their mean weight was 70.04 ± 13.66 kg, their mean BMI was 13.4±43.25, their mean hours of sitting behind desk at workplace was 6.25±1.56 hours, and their mean low back pain score was 19.7 ± 17.15. The highest age group was between 30 and 40 years and 60.6% of them had a history of low back pain. Mann-Whitney test showed a significant difference between the mean scores of low back pain in terms of gender (p=0.008) and history of low back pain in a person (p<0.001). However, this test did not show any significant relationship with other demographic variables. Based on the Spearman correlation test, there was a significant correlation between mean scores of low back pain and mean of employment history (r=0.1, p=0.04). Based on logistic regression test, a significant relationship was found between gender (OR=2.45, CI=195.25, 4.83) and low back pain (OR=10.53, CI=495.24, 26.13).

**Conclusions:** The results of the study showed that as the employment history of the employee increases, their low back pain also increases. Additionally, a small percentage of employees used stretching exercises between their working hours. Thus, given their tendency to manage educational classes, it is necessary to provide educational interventions for them to perform physical activities in order to prevent low back pain in the employees.

***Keywords:*** Low back pain; Employees; Employment history; Physical activities; Birjand

## 1. Introduction

Back pain is one of the most common musculoskeletal disorders, occurring in about 50% to 80% of normal people throughout of their life and nearly 80% of spinal cord problems occur in the low back (1). Studies show that the prevalence of low back pain is about 84% during an individual's life (2). Based on the statistics released by the Statistics Center of Iran and the Ministry of Health, 76% of workers have no appropriate physical posture (1) and the prevalence of low back pain among university employees has been reported 86%. Based on the report of the Medical Commission of Social Security Organization of Tehran province, musculoskeletal disorders account for 14.4% of diseases leading to disability (3), so that half of the work

absenteeism is due to musculoskeletal disorders (4-5). Musculoskeletal disorders have been reported among the main causes of work counseling, which can have a negative effect on the ability and effectiveness of work (4). Due to its negative effects on daily life and imposing financial costs and compromising mental and physical health, low back pain is considered as a serious concern in communities. In industrial countries, the second most common pain complaint is low back pain, after headache (6). In ranking the diseases leading to medical visits, low back pain ranks second, after cold. In a study conducted in 2005 in England, it was found that more than one billion people (about 2.4% of the total workforce) suffer from musculoskeletal disorders associated with work (7). In contrast to infectious and cardiovascular diseases or cancer, low back pain is viewed often as less important problem. Epidemiological evidence in different groups suggests that prevalence of this disease was between 7.5% and 36% (7). In England, 3.5 billion working days have been lost due to musculoskeletal disorders and often low back pain in years 2008-2009 (8). In a study conducted by Aminian et al on 261 male dentists and 193 male pharmacists who have at least one-year employment history, the prevalence of low back pain was 54.8% in male dentists and 36.3% in male pharmacists over the last 12 months (9).

In various studies, gender has been reported as one of the most important factors in this regard and it has been shown that the prevalence and severity of this disorder are less in males than females. Furthermore, individual risk factors do not minimize the effect of job. Moreover, the job may not be the only cause of symptom in one person (9-12). Disability related to low back pain is determined by restricted ability in performing at least one of the main activities of life (13). This problem has increased over the past 50 years, as SoleimanZadeh et al showed that 56.7% of nurses had a moderate disability, and 32.7% of them had mild disability in performing their daily activities (14). The disability related to low back pain is important since problems in performing daily activities can cause job absenteeism in these people (15). A study conducted in Turkey also showed that significant rate of movement restrictions (21%) and problem in performing the tasks (5.7%) was due to low back pain and disability (16). Thus, the disability associated with low back pain became a vital problem for community due to some intense effects on the economy, performance, and general health of the community (17). Performing difficult activities plays an important role in the development of low back pain (20). However, many researchers report that physical factors only justify part of the causes of low back pain prevalence (18-20). Stressful conditions might cause muscle spasms in the low back or reduce the threshold of pain perception, leading to an increase in prevalence of low back pain (19). Employees are among those people who have low level of physical activity in Iran, which might lead to many problems in this regard. Compared to other jobs, less attention has been paid to the injuries and anomalies of this group of people and major part of studies has focused on other jobs. Therefore, in order to reduce the prevalence of low back pain and reduce the therapeutic and care costs, preventive measures should be taken. In this regard, identifying and controlling the risk factors of low back pain is crucial. As performing any plan to prevent, treat, rehabilitate, and improve the work efficiency of individuals requires knowledge on prevalence of low back pain and examining the factors related to it, this study was conducted to evaluate the prevalence of low back pain and affecting factors among the employees of the University of Medical Sciences Birjand in 2016.

## 2. Methods

The present study was a descriptive-analytical cross-sectional study. The research population included all employees of Birjand University of Medical Sciences in 2016 and sampling was performed using census method on 216 persons (including all employees of the Directorate, Deputy for Development and Human Resources, Deputy of Education, Research and Technology, Treatment, Health, Food and Drug). All ethical considerations were applied in this study and the code of ethics (ir.bums.1394.156) was obtained. Subjects completed the questionnaire with their consent and their information remained confidential.

The used questionnaire consisted of two parts:

1-Personal and job characteristics and physical activity level: Personal characteristics included age, gender, height, weight, marital status and job characteristics included type of job and employment history and physical activity such as performing or not performing continuous physical activity. Based on the definition presented by Quebec et al, regular exercise has been defined as regular physical activity performed at least 3 times per week and at least 20 minutes each time (21).

2-Quebec low back pain questionnaire: The data on low back pain were collected through this questionnaire. The

questionnaire was developed by Quebec et al in 1995. The questionnaire included 25 questions with 5 options. The questionnaire questions are scored in a 6-point Likert scale (no problem=0 to I cannot do it=5). The pain severity is ranked between 0 and 100. If the rank obtained by a person is zero, the person would have complete and painless health. If the rank obtained by a person is 25, he or she would have moderate pain. If the rank obtained by a person is 50, 75, and more than 75, pain would be severe, very severe, and very acute, respectively (21).

Questionnaires were distributed by a contributing student to employees of the university and they were collected after three days. To assess the body mass index (BMI), weight and height of the subjects were determined. Then, subjects were placed in one of the following 5 classes: thin (less than 18.5), normal (18.5-24.99), overweight (25-29.99), obese (30-39.99) and morbid obesity (40 and higher) (22). Data were analyzed using SPSS 19 software. In the descriptive statistics section, frequency distribution, mean, and standard deviation were used, and in the analytical statistics section, due to non-normality of data, nonparametric tests of Kruskal-Wallis and Mann-Whitney, Spearman correlation, and Logistic regression were used at a significance level of $\alpha \leq 0.05$.

## 3. Results

This study was conducted on 216 employees of Birjand University of Medical Sciences with a mean age of 36.38 ± 8.27 years. The selected sample completed all questions of the questionnaire. The results of demographic information of the subjects are presented in Table 1. The statistical analysis of Spearman's correlation coefficient showed a significant correlation between the mean score of low back pain and the mean employment history (r=0.1, p=0.04). Results are presented in Table 2. The frequency distribution of low back pain severity in employees is presented in Table 3.

**Table 1:** Distribution and central indices of quantitative variables in the studied employees

| Variable | n | Mean | SD | Min | Max |
|---|---|---|---|---|---|
| Age | 213 | 36.36 | 8.27 | 23 | 59 |
| Height | 214 | 165.73 | 9.18 | 148 | 187 |
| Weight | 216 | 70.04 | 13.66 | 45.2 | 113 |
| BMI | 214 | 25.43 | 4.13 | 16.91 | 38.2 |
| employment history | 212 | 12.3 | 8.75 | 1 | 32 |
| mean hours of sitting behind the desk in workplace | 215 | 6.25 | 1.56 | 1 | 10 |
| Mean hours of using computer in workplace | 212 | 5.33 | 1.74 | 1 | 9 |
| Low back pain score of employees | 216 | 19.7 | 17.15 | 0 | 85 |

**Table 2:** Correlation between mean scores of low back pain and quantitative variables studied

| Variable | Age | Employment history | Duration of sitting behind the desk | Duration of using computer | BMI |
|---|---|---|---|---|---|
| Low back pain | r=0.1<br>p=0.1<br>n=213 | r=0.1<br>p=0.04<br>n=212 | r=0.03<br>p=0.66<br>n=215 | r=0.09<br>p=0.18<br>n=212 | r=0.1<br>p=0.08<br>n=214 |

**Table 3:** Frequency distribution of low back pain in employees studied

| Severity | n | % |
|---|---|---|
| No pain | 9 | 4.2 |
| Low pain | 141 | 65.2 |
| Moderate pain | 54 | 25 |
| High pain | 11 | 5.1 |
| Severe pain | 1 | 0.5 |
| Total | 216 | 100 |

**Table 4:** Comparison of the mean scores of pain in terms of different variables in the employees studied

| Variables | | Low back pain severity | | | Statistic value | p-value |
|---|---|---|---|---|---|---|
| | | n | Mean | SD | | |
| Gender* | Female | 120 | 22.63 | 18.63 | -2.68 | 0.008 |
| | Male | 96 | 15.90 | 14.47 | | |
| Marital Status* | Married | 184 | 20.67 | 17.34 | -2.36 | 0.01 |
| | Single | 32 | 13.89 | 115.42 | | |
| Age Group** | Less Than 30 | 64 | 18.3 | 15.55 | 1.95 | 0.38 |
| | 30-40 | 78 | 18.06 | 16.28 | | |
| | Over 30 | 74 | 22.07 | 11.19 | | |
| BMI** | Thin | 4 | 16.75 | 22.20 | 1.48 | 0.48 |
| | Normal | 99 | 18.72 | 16.63 | | |
| | Overweight | 111 | 20.93 | 17.57 | | |
| Exercise* | Yes | 99 | 18.08 | 17.11 | -0.98 | 0.33 |
| | No | 117 | 20.05 | 17.25 | | |
| Regular Exercise* | Yes | 49 | 18.93 | 18.08 | -0.48 | 0.63 |
| | No | 167 | 19.95 | 17.12 | | |

*=Mann Whitney Test**=Kruskal Wallis Test

**Table 5:** Frequency distribution of low back pain in the employees studied

| Subject's posture | The level of feeling low back pain | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No pain | | Low | | Moderate | | High | | Severe | | No answer | |
| | f | % | f | % | f | % | f | % | f | % | f | % |
| In resting | 138 | 63.9 | 52 | 24 | 17 | 7.9 | 7 | 3.2 | 1 | 0.5 | 1 | 0.5 |
| Sitting on knees (before prostrated) | 117 | 54.2 | 57 | 26.4 | 31 | 14.4 | 8 | 3.7 | 0 | 0 | 3 | 1.4 |
| Normal sitting for one hours | 62 | 28.7 | 71 | 32.9 | 51 | 23.6 | 23 | 10.6 | 4 | 1.9 | 5 | 2.3 |
| Standing up for less than one hour | 59 | 27.3 | 68 | 31.5 | 48 | 22.2 | 27 | 12.5 | 12 | 5.6 | 2 | 0.9 |
| Getting up bed | 108 | 50 | 56 | 25.9 | 34 | 15.7 | 10 | 4.6 | 8 | 3.7 | 0 | 0 |
| Collecting of bedding | 108 | 50 | 63 | 29.2 | 26 | 12 | 13 | 6 | 4 | 1.9 | 2 | 0.9 |
| Combing head hair | 182 | 84.3 | 23 | 10.6 | 8 | 3.7 | 1 | 0.5 | 0 | 0 | 2 | 0.9 |
| bowing in prayer | 151 | 69.9 | 48 | 22.2 | 11 | 5.1 | 4 | 1.9 | 2 | 0.9 | 0 | 0 |
| Wearing cloths | 171 | 79.2 | 32 | 14.8 | 9 | 4.2 | 1 | 0.5 | 1 | 0.5 | 2 | 0.9 |
| Wearing socks | 154 | 71.3 | 42 | 19.4 | 11 | 5.1 | 5 | 2.3 | 3 | 1.4 | 1 | 0.5 |
| Tying the shoes strip in squatting posture | 125 | 57.9 | 59 | 27.3 | 21 | 9.7 | 7 | 3.2 | 1 | 0.5 | 3 | 1.4 |
| Running over 500 meters at a moderate speed | 92 | 42.6 | 64 | 29.6 | 40 | 18.5 | 14 | 6.5 | 2 | 0.9 | 4 | 1.9 |
| running less than 500 meters at an moderate speed | 93 | 43.1 | 57 | 26.4 | 39 | 18.1 | 9 | 4.2 | 4 | 1.9 | 14 | 6.5 |
| running less than 100 meters at high speed | 78 | 36.1 | 59 | 27.3 | 36 | 16.7 | 19 | 8.8 | 4 | 1.9 | 20 | 9.3 |
| lifting an object with weight of 5 kg | 99 | 45.8 | 66 | 30.6 | 26 | 12 | 17 | 7.9 | 3 | 1.4 | 5 | 2.3 |
| Carrying an object with a weight of 5 kg | 83 | 38.4 | 67 | 31 | 35 | 16.2 | 19 | 8.8 | 6 | 2.8 | 6 | 2.8 |
| Bending forward | 104 | 48.1 | 65 | 30.1 | 34 | 15.7 | 9 | 4.2 | 2 | 0.9 | 2 | 0.9 |
| Bending towards two sides | 119 | 55.1 | 58 | 26.9 | 26 | 12 | 8 | 3.7 | 3 | 1.4 | 2 | 0.9 |
| Rotating in vertical axis | 119 | 55.1 | 52 | 24.1 | 26 | 12 | 9 | 4.2 | 2 | 0.9 | 8 | 3.7 |
| Driving for three hours | 44 | 20.4 | 75 | 34.7 | 53 | 24.5 | 29 | 13.4 | 6 | 2.8 | 9 | 4.2 |
| Climbing stairs in normal way | 101 | 46.8 | 63 | 29.2 | 36 | 16.7 | 11 | 5.1 | 4 | 1.9 | 1 | 0.5 |
| Climbing stairs with high speed | 66 | 30.6 | 64 | 29.6 | 47 | 21.8 | 23 | 10.6 | 10 | 4.6 | 6 | 2.8 |
| coming down the stairs | 109 | 50.5 | 65 | 30.1 | 29 | 13.4 | 9 | 4.2 | 2 | 0.9 | 2 | 0.9 |
| Standing on right leg | 101 | 46.8 | 52 | 24.1 | 41 | 19 | 12 | 5.6 | 3 | 1.4 | 7 | 3.2 |
| Standing on left leg | 104 | 48.1 | 49 | 22.7 | 41 | 19 | 12 | 5.6 | 3 | 1.4 | 7 | 3.2 |

**Table 6:** Logistic regression results in employees studied

| Variable | Beta statistic | p-value | Odd ratio | Confidence interval of 95% for odd ratio |
|---|---|---|---|---|
| Gender (female) | 0.90 | 0.009 | 2.45 | 1.25, 4.83 |
| Low back pain history | 2.35 | <0.001 | 10.53 | 4.24, 26.13 |

More than half of the employees (65.3%) had low pain, 25% had moderate pain, and only 0.5% had severe pain. Among the employees performed exercises regularly, more than half of them (59.2%) selected walking as regular and weekly exercise. Employees reported the main cause of low back pain in this way: having high level of physical activity 15%, lumbar disc 14%, and long-term sitting 12.5%. Comparison of the mean score of pain in terms of different variables is presented in Table 4. Comparison of mean score of pain in terms of different variables showed that there was a significant difference in mean scores of pain in terms of gender (p=0.008) and marital status (p=0.01). However, it showed no significant difference with age group (p=0.3), Body Mass Index (p=0.5), regular exercise (p=0.33), and irregular exercise (p=0.62).

The results of Table 5 show that the highest frequency of low back pain belongs to driving for 3 hours (13.4%), carrying an object with a weight of 5 kg (8.8), and running less than 100 m with high speed (8.8). The summary of the results of examining the variables affecting the low back pain based on the logistic regression test is presented in Table 6.

Significant difference was found between the mean scores of low back pain (p=0.008) and marital status (p=0.001), but no significant difference was found between the mean scores of back pain and other variables (p>0.05) .

Table 6 related to Logistic regression results showed that among the studied variables, including gender, age, marital status, exercise, and history of low back pain, gender and low back pain history had significant impact on low on back pain (P <0.01), so that females had low back pain 2.45 times more than males (95%CI=1.25, 4.83), and subjects with a history of low back pain had low back pain 10.53 times more than others (95% CI:4.24, 26.13).

## 4. Discussion

Low back pain affects the physical, mental and social health of the employees and reduces general health and causes permanent or periodic pain, reduced quality of work, and reduced work efficiency (4). Thus, the objective of this study was to evaluate the prevalence of low back pain and the factors affecting on it among employees of Birjand University of Medical Sciences in 2016. The mean score of back pain was 19.7 in employees. In the classification of employees based on low back pain score, it was found that more than half of the employees (65.2%) reported low pain and only 4.2% of them reported no pain. In general, the results revealed that the highest percentage of subjects had low level of back pain. Examining the status of low back pain status in terms of gender showed that the pain level was higher in females than that in males (p=0.03). In a study conducted by Sharif Nia et al., a significant relationship was found between gender and low back pain, so that the prevalence of low back pain in females was higher than that in males (23). The results of the study conducted by Parviz also revealed that the prevalence of low back pain was 50.4% in females and 35.4 in males (18).

Examining the low back pain in terms of marital status showed a significant relationship between mean scores of low back pain and marital status. In addition, the mean score of back pain in married women was higher than that in singles. The results of the study conducted by Parviz also showed a significant relationship between low back pain and marital status, so that only 25.8% of the single subjects had low back pain, while 80% of divorced and 100% of the spouse- deceased subjects had a low back pain (p<0.05%) (24). Consistency of these results with those of our study suggests the need to pay attention to this problem in employees of the Birjand University of Medical Sciences. Based on the results of this study, the highest frequency of low back pain was related to climbing stairs with high speed (4.6), driving for 3 hours (13.4), carrying the objects with weight of 5 kg (8.8) and running for 100 meters at high speed (8/8). Based on the results, there was no relationship between low back pain and exercise (p=0.7). The results of the study conducted by Sharif Nia showed a significant relationship between regular exercise and low back pain (P<0.001) (23). Moreover, the results of the study conducted by Smuck et al showed that the risk of low back pain increased with an increase in BMI, so that the risk was 2.9% in subjects with normal weight (BMI of 20 to 25), 2.5% in overweight subjects (BMI of 26 to 30), 7.7% in obese subjects (BMI of 31 to 35), and 11.6% in very obese subjects (BMI>36). Smoking was reported as the strongest predictor of low back pain (OR=1.6-2.9) (25). Among the quantitative variables studied, there was a significant correlation between low back pain score and the mean employment history of employees (p=0.04), so that with increasing the employment history, low back pain increased. In addition, a small percentage of employees used stretching exercises between the working hours. Thus, it is necessary to provide educational interventions for employees to perform physical activities and exercises in order to prevent low back pain.

## 5. Conclusion

The results of this study showed that low back pain severity was at the low level in majority of samples. In addition, the pain was higher in females than in males, and the low back pain increased with increasing employment history. The most frequent low back pain is related to long-term sitting, driving for 3 hours, and carrying heavy objects. In addition, a small percentage of employees performed stretching exercises between the working hours. Thus, accepting that prevention is better than cure, the university should take measures to reduce these problems in the employees through planning and implementing appropriate programs related to employees' job.

## 6. Acknowledgements


1. Soltani R, Dehghani Y, SadeghiNaiini H, Falahati M, Zokaii M. The welders posture assessment by OWAS technique. Occupational Medicine Quarterly Journal.2011;3(1):34-9. [Persian].

2. Rivière S, Penven E, Cadéac-Birman H, Roquelaure Y, Valenty M. Underreporting of musculoskeletal disorders in 10 regions in France in 2009. Am J Ind Med. 2014 Oct;57(10):1174-80. doi: 10.1002/ajim.22364.

3. NaslSaraji J, Ghaffari M, Shahtaheri SJ. Survey of correlation between two evaluation method of work related musculoskeletal disorders risk factors REBA& RULA. Iran Occupat Health J. 2006; 3(2):25-32. [Persian]

4. Ge H, Sun X, Liu J, Zhang C. The Status of Musculoskeletal Disorders and Its Influence on the Working Ability of Oil Workers in Xinjiang, China. Int J Environ Res Public Health. 2018 Apr 24;15(5). pii: E842. doi: 10.3390/ijerph15050842.

5. Taylor JB, Goode AP, George SZ, Cook CE. Incidence and risk factors for first-time incident low back pain: a systematic review and meta-analysis. Spine J. 2014 Oct 1;14(10):2299-319.

6. Sitthipornvorakul E, Klinsophon T, Sihawong R, Janwantanakul P. The effects of walking intervention in patients with chronic low back pain: Ameta-analysis of randomized controlled trials. Musculoskelet Sci Pract. 2018;34:38-46.

7. Hoy D, March L, Brooks P, Woolf A, Blyth F, Vos T, et al. Measuring the global burden Of low back pain. Best Pract Res Clin Rheumatol. 2010; 24(2):155-65.

8. Coole C, Watson PJ, Drummond A. Staying at work with back pain: patients' experiences of work-related help received from GPs and other clinicians. A qualitative study. BMC MusculoskeletDisord.2010; 11: 190.

9. Aminian O, BanafshehAlemohammad Z, Sadeghniiat Haghighi K. Comparative assessment of low back pain and its determinants among Iranian male general dentist and pharmacists. J Dent Med Tehran Univ Med Sci. 2013 26(2):108-14. [Persian]

10. Bartley EJ, Fillingim RB: Sex differences in pain: A brief review of clinical and experimental findings. Br J Anaesth. 2013 Jul;111(1):52-8.

11. Mogil JS. Sex differences in pain and pain inhibition: Multiple explanations of a controversial phenomenon. Nat Rev Neurosci. 2012;13(12):859-66.

12. Miller MM, Allison A, Trost Z, De Ruddere L, Wheelis T, Goubert L, et al. Differential Effect of Patient Weight on Pain-Related Judgements About Male and Female Chronic Low Back Pain Patients. J Pain. 2018 Jan;19(1):57-66.

13. Taylor CR, Lillis C, LeMone P, Lynn PL, Care FoNTAaSoN. 7th ed. Fundamentals of Nursing: The Art and Science of Nursing Care. Philadelphia: Wolter Kluwer/ Lippincott Wilkins; 2014.

14. Solaimanzadeh L, Jafari M, Pourhaji F, Nassehi A. Chronic low back pain and disability among nurses: a cross sectional study from Bam, Iran. Int J Musculoskelet Pain Prev. 2016;1 (1):29-33.

15. Hinmikaiye CD, Bamishaiye EI. The incidence of low back pain among theatre nurses: a case study of university of Ilorin and Obafemi awolowo university teaching hospital. International Journal of Nursing Science. 2012;2(3):23-8.

16. Karahan A, Kav S, Abbasoglu A, Dogan N. Low back pain: Prevalence and associated risk factors among hospital staff. J Adv Nurs. 2009;651(3):516-24.

17. LoiselP, Anema J. Handbook of Work Disability: prevention and Management. 1st ed. New York: Springer Science and Business Media; 2013.

18. Yip Y. A study of work stress patient handling activities and the risk of low back pain among nurses in Hong Kong. J Adv Nurs. 2001;36(6):794-804.

19. Yip YB. New low back pain in nurses: work activities work stress and sedentary lifestyle. J Adv Nurs. 2004; 46(4):430-40.

20. Johansson AC, Cornefjord M, Bergkuist L, Ohrvik J, Linton SJ. Pyschosocial stress factors among patients with lumbar disk herniation, scheduled for disc surgery in comparsion with patents scheduled for arthroscopic knee surgery. Eur Spine J. 2007;16(7):961-70.

21. Qwe KM, Nystad W, Bø K. Correlates of regular exercise during pregnancy: the Norwegian Mother and Child Cohort Stady. Scand J Med Sci Sports. 2009;19(5):637-45.

22. Kopec JA, Esdaile JM, Abrahamowiez M, Abenhaim L, Wood-Dauphinee S, Lamping DL, et al. The Quebec Back Pain Disability Scale. Measurement Properties. Spine (Phila Pa1976). 1995;20(3):341-52.

23. Sharif Nia SH, Hagh-Doust AA, Haji-Hosseini F, Hojjati H, Javan-Amoli M. The effect of occupational and psychological factors on low back pain in Amol nurses. J Rehab. 2012;12(4):93-101. [Persian]

24. Parviz N, Nasiri H, Qaderi D. [The Prevalence of Low Back Pain and Its Risk Factors in Hospital Staff of Mashhad University

Hospitals].Scientific Journal of Borehole Nursing and Midwifery Faculty of Gorgan. 2006; 3(1):22-6. [Persian]

25. Smuck M, Kao MC,Brar N, Martinez-lth A, Choi J, Tomkins-Lane CC.Dose physical activity influence the relationship between low back pain and obesity?Spine J. 2014 Feb 1;14(2):209-16. doi: 10.1016/j.spinee.2013.11.010. Epub 2013 Nov 12.