Survey of awareness about the risk factors of low back pain among operating room personnel of Shiraz hospitals: A cross-sectional study

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ABSTRACT

Background: and Purpose: Low back pain is one of the most common musculoskeletal disorders and one of the costly problems in the health system. The purpose of this study was to evaluate the prevalence of low back pain and its relationship with the awareness of operating room personnel about the risk factors of low back pain.

Materials and methods: This cross-sectional study was performed on 385 operating room personnel of the hospitals affiliated to Shiraz University of Medical Sciences. The data were collected through a researcher-made questionnaire. The questionnaire consisted of two parts, including the assessment of low back pain prevalence and dimensions (11 items) and the evaluation of participants' awareness regarding low back pain risk factors (17 items).

Results: The results showed that the prevalence of low back pain was 74% among operating room personnel. Also, the mean and standard deviation of the participant's awareness of low back pain factors was 24.88 ± 4.18 . Also, there was no significant relationship between the prevalence of low back pain and awareness of the personnel about the risk factors of low back pain ($p > 0.05$).

Conclusion: Due to importance of operating room in hospital, operating room managers and the authorities should promote operating room programs focusing on reducing musculoskeletal disorders and try to increase the awareness of operating room personnel about the risk factors by conducting classes and training courses.

1. Introduction

Musculoskeletal disorders are one of the most common health problems, accounting for the second leading cause of physical disability worldwide.¹ Musculoskeletal disorders are responsible for the significant burden on health care costs, leading to harmful effects on the personnel's health, quality of life, job satisfaction, and working days wasted.²

Low back pain (LBP) is the most common and costly problem among work-related musculoskeletal disorders in the healthcare system that defined as pain or discomfort in the space between the 12th rib and the inferior gluteal folds.^{3–6} Pathologically, such a disorder ranks eighth among all physical injuries, accounting for the most common cause of activity restriction among individuals younger than 45 years old^{1,7} and the second most common diagnosis in the United States.⁸ The prevalence of LBP is reported to be 15–45% among the general population worldwide.^{9,10} Of note, the prevalence of LBP is increasing among

healthcare workers, nurses, and operating room personnel with a prevalence of 40–50% per year.⁹ According to high-risk operating room activities, LBP is a common health problem among these personnel, so that the personnel in this place is more affected by musculoskeletal pain with the rate of 58–90% after one year of clinical work.^{9,11} Importantly, LBP is recognized as the most important reason for quitting the job in operating room personnel.¹²

Factors leading to LBP include carrying things, standing for a long time, fixed body posture, holding equipment (such as retractors during surgery), manual material handling (such as pulling or pushing or lifting tools, patients, and heavy equipment), unpleasant physical condition, and movement limitations (during surgery and working at night shifts).¹³ Such risk factors lead to a higher prevalence of LBP in healthcare workers, specifically among the operating room personnel.¹⁴ Careful observation of the principles of ergonomics in the workplace, identification of risk factors, regular physical checkup, exercise, and regular physical activity have been identified as effective contributors

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to the reduction of LBP.¹⁵ Most importantly, the hospital environment, especially the operating room, is filled with a variety of occupational hazards and injuries that pose many risks for the personnel. Knowledge is expected to play an important role in decreasing such risks.^{16,17}

Awareness, defined as the repetition of responses previously learned, practiced, and obtained, is recognized as a tool capable of modifying behavior or, at least, making more appropriate behavior to bring oneself to the desired level of health. Increasing awareness of the risk factors of LBP can decrease the high prevalence of this disorder and prevent its subsequent complications. According to the role of awareness of healthcare personnel about the risk factors in occupational injuries and lack of similar research in Iran, the aim of this study was to survey the awareness about the risk factors of LBP among the operating room personnel of Shiraz hospitals.

2. Materials and Methods

2.1. Study design

The present descriptive cross-sectional study was conducted between May to June 2019 to on the operating room personnel of 6 hospitals affiliated to Shiraz University of Medical Sciences, including Faghihi, Namazee, Khalili, Chamran, Rajaey and Amiralmomenin hospitals.

2.2. Sample size and recruitment of study subjects

According to the similar study,¹⁸ 385 individuals were selected in this study, based on the average prevalence (50%) of LBP in operating room personnel. The sample size chosen for this study was calculated with an accuracy of 0.05 and the prevalence and confidence estimates of 95%.

2.3. Data collection

In the present study, we first determined the entire number of operating room personnel in each hospital and subsequently the personnel were chosen according to stratified random sampling. For this purpose, we referred to hospitals in various shifts following permission from the Ethics Committee, and the sampling was performed according to the criteria mentioned in different shifts after obtaining informed and written consent from the personnel. The questionnaires were distributed among the personnel and then collected at the end of the office time on the same day.

2.4. Inclusion and exclusion criteria

Participants were eligible for the study if they met the following inclusion criteria:

- 1 A minimum of 2-year experience in work
- 2 No musculoskeletal disease
- 3 Willingness to participate in the study

Participants were excluded from the study if they met one of the following exclusion criteria:

- 1 Suffering from osteoporosis or corticosteroid
- 2 Discontent to participate in the study

2.5. Research instruments

A research-made questionnaire was used to evaluate the factors related to LBP and also the awareness of LBP risk factors in personnel. The validity and reliability of the questionnaire had already been examined. During the psychometric part of this instrument, qualitative

and quantitative methods were used to determine the face validity, content and construct validity evaluation. Face validity of the qualitative was checked by interviews with 20 professors and experts in this field, resulting in a modification of 3 items and the addition of 2 items. During the quantitative face validity phase, which assessed the importance of each item by using the item impact formula, all tool items received the least impact score. This was done by filling out the initial questionnaire by 20 operating room personnel. The content validity of the qualitative section was determined by the experts' correction; 3 items were corrected and 1 item merged in the other items. Quantitative evaluation of the content validity was done by using two indices of content validity ratio and content validity index, which were 14 and 10 people from professors and experts in this field, respectively. In this phase, 2 items failed to achieve the required score and was eliminated. The construct validity assessment was done through the convergent and divergent validity, respectively, using chronic Pain Questionnaire and General Health Questionnaire distributed among 30 operating room personnel. The correlation of the mentioned instruments was investigated with the research instrument. The relationship between the research instrument with the chronic pain questionnaire, as a convergent tool and the General Health Questionnaire, as a divergent instrument, was 0.702 and -0.375 , respectively, which was statistically significant ($P < 0.05$). Reliability and internal consistency of the instrument, determined by test-retest and Cronbach's alpha coefficient, were found to be 0.78 and 0.608, respectively.

The questionnaire consisted of three sections: "Demographic information, prevalence and dimensions of LBP, assessment of awareness of LBP risk factors". In this questionnaire, the prevalence and dimensions of LBP were assessed by using 11 multiple choice questions, and the awareness section was evaluated by using 17 items with Likert spectrum "Yes, No, or I don't know". The score of LBP was found to be in the range of 0–34. The subjects were divided into three groups, including low awareness (0–10), moderate^{11–15} and high scores (16–20) based on the score number 20.¹⁸

2.6. Statistical analysis

After collecting the questionnaires, the data were entered into SPSS version 20 and then analyzed. Demographic data of the population were calculated by descriptive statistics, frequency distribution, mean, and standard deviation. Chi-square, *t*-test and correlation coefficient were used to investigate the relationship between LBP prevalence and awareness of LBP risk factors with demographic variables.

2.7. Ethics statement

The present study was conducted in accordance with the recommendations of ethical guidelines, IR.SUMS.REC.1398.263. The protocols carried out in this investigation were approved by Shiraz University of Medical Sciences.

3. Results

Three hundred eighty-five operating room personnel working in 6 hospitals affiliated to Shiraz University of Medical Sciences were studied in this study. Table 1 indicates the frequency distribution of the demographic characteristics of the population under study. 240 (62.3%) out of 385 participants were women in the study. The mean and standard deviation of age were 7.96 ± 33.25 . Most of the participants were bachelor (85.7%), had less than 10 years of working experience (60.3%), and had experienced a combination of standing, sitting and moving (30.9%) during the work. In this study, public media and social networks were identified as the largest source of information on LBP (35.3%).

The prevalence of LBP in different hospitals is shown in Table 2. 285 (74%) participants had LBP. Among people with LBP, women had the

Table 1
Determining demographic characteristics of the operating room personnel.

Variable	Frequency (%)
Gender	
Female	145 (37.7)
Male	240 (62.3)
Age	
20–29 years	155 (40.3)
30–39 years	150 (39)
40–50 years	58 (15.1)
Above 50 years	22 (5.7)
Marital status	
Single	162 (42.6)
Married	221 (57.4)
Education level	
Associate degree	45 (11.7)
Bachelor degree	330 (85.7)
Master degree	10 (2.6)
Work experience	
Less than 10 years	232 (60.3)
10–20 years	109 (28.3)
More than 20 years	44 (11.4)
Shifts	
Morning	60 (15.6)
Evening	33 (8.6)
Night	16 (4.2)
Shift on the trip	276 (71.7)
Physical condition	
Standing	208 (54)
Sitting	37 (9.6)
Moving	21 (5.5)
A combination of different physical conditions	119 (30.9)
Source of information	
Public media and social networks	136 (35.3)
Participation in scientific conferences and forums	3 (0.8)
People around	72 (18.7)
Studding	56 (14.5)
Educated in university	96 (24.9)
Others	22 (5.7)

Table 2
Prevalence of LBP in the studied hospitals.

Hospital name	Number of personnel	Type of operating room	The prevalence of low back pain Frequency (%)
Faghihi	83	General	62 (74.6)
Namazee	94	General	62 (65.9)
Khalili	49	Eye and ENT	37 (75.5)
Rajaey	85	Orthopedics-Nerves	68 (80)
Chamran	55	Orthopedics-Nerves	40 (72.7)
Amiralmomenin	19	Burn and plastic	16 (84.2)
Total	385	385	285 (74)

highest rate of LBP (76.6%), participants aged 30–39 years (40.3%), married ones (78.7%), those with more than 20 years of work experience (81.3%), and people with standing posture (78.3%). Most participants were in the general operating room (47.5%), but the highest prevalence of LBP was observed in the burn and plastic operating room (84.2%). Only 46 (16.1%) out of 285 (74.02%) patients with LBP had a history of absenteeism due to LBP (Table 2).

The prevalence of LBP exhibited a direct and significant relationship with the association degree and married people ($p < 0.05$), and public media and social networks ($p < 0.05$); however, the relationship was in the reverse direction (Table 3).

The mean and standard deviation of the participants' awareness of LBP risk factors was 4.18 ± 24.88 ; in addition, the lowest and highest levels of recorded knowledge were 14 and 34, respectively. Among the participants, 189 (49.1%), 185 (48.1%), and only 11 (2.9%) had good knowledge, moderate awareness, and low awareness regarding risk factors of LBP. In this study, the highest level of awareness was related to women, single people, people with bachelor's degree, and people with ages over 20 years with 49.5%, 50%, 50.9%, and 52.2%, respectively (Table 4).

Table 3
The relationship between low back pain and demographic characteristics of the operating room personnel.

Variable	The prevalence of low back pain Frequency (%)	The significance level
Gender	Male 101 (69.6) Female 184 (76.6)	0.128
Age	20–29 years 108 (37.8) 30–39 years 115 (40.3) 40–50 years 44 (15.4) More than 50 years 18 (6.3)	0.413
Marital status	Single 111 (67.6) Married 174 (78.7)	0.014
Education level	Associated degree 35 (77.7) Bachelor degree 246 (74.5) Master degree 4 (40)	0.041
Work experience	Less than 10 years 165 (71.1) 10–20 years 84 (77.06) More than 20 years 35 (81.3)	0.231
Shifts	Morning 46 (76.6) Evening 22 (66.6) Night 10 (62.5) Shift on the trip 207 (75)	0.496
Physical condition	Standing 163 (78.3) Sitting 22 (59.4) Moving 16 (76.1) A combination of different physical conditions 84 (70.5)	0.075
Source of information	Public media and social networks 110 (80.8) Participation in scientific conferences and forums 1 (33.3) People around 52 (72.2) studding 38 (67.8) Educated in university 72 (75) Others 12 (54.5)	0.042

Table 5 shows the level of awareness of the personnel in different hospitals. Personnel's awareness was not significantly correlated to demographic variables ($p > 0.05$). The most awareness about the risk factors of LBP was found in the staff working in the orthopedic and nerve operating room of Chamran Hospital (63.6%).

The relationship between the prevalence of LBP and the awareness of LBP risk factors is shown in Table 6. Out of 74% of LBP patients, 52.2% had a high awareness of LBP risk factors and, only 3.1% had low awareness. Out of 100 (25.9%) people who did not experience LBP in this study, 98% had moderate and desirable awareness while only 2% had a low level of awareness. Moreover, no significant relationship was found between the personnel's awareness of risk factors and the prevalence of LBP ($p > 0.05$).

4. Discussion

This study evaluated the prevalence and factors associated with LBP as well as assessed the awareness of LBP risk factors in the operating room personnel of 6 hospitals affiliated to Shiraz University of Medical Sciences. Results from this study showed moderate and desirable awareness among most participants. However, the prevalence of LBP was high in all hospitals.

LBP has been identified as one of the most important musculoskeletal disorders that can lead to absenteeism and even changing job in operating room personnel (5, 25). This indicates the inevitability of LBP due to difficult working conditions in the operating room. In the present study, similar to other studies, LBP was prevalent among operating room personnel, demonstrating that LBP is inevitable and occurs due to

Table 4

The relationship between awareness of low back pain risk factors with demographic characteristics of operating room personnel.

Variable		Awareness of low back pain risk factors			Significance levels
		Low	Moderate	High	
		Frequency (%)	Frequency (%)	Frequency (%)	
Gender	Male	7 (4.8)	68 (46.8)	70 (48.2)	0.196
	Female	4 (1.6)	117 (48.7)	119 (49.5)	
Marital status	Single	5 (3.04)	77 (46.9)	82 (50)	0.925
	Married	6 (2.7)	108 (48.8)	107 (48.4)	
Education	Associate degree	1 (2.2)	28 (62.2)	16 (35.5)	0.349
	Bachelor degree	10 (3.03)	152 (46.06)	168 (50.9)	
	Master degree	0 (0)	5 (50)	5 (50)	
Work experience	Less than 10 years	6 (2.5)	109 (46.9)	117 (50.4)	0.336
	10–20 years	2 (1.8)	58 (53.2)	49 (44.9)	
	More than 20 years	3 (6.8)	18 (40.9)	23 (52.2)	

Table 5

The awareness of operating room personnel about the risk factors of LBP in hospitals studied.

Hospital name	Awareness		
	Low	Moderate	High
	Frequency (%)	Frequency (%)	Frequency (%)
Faghihi	1 (1.2)	40 (48.1)	42 (50.6)
Namazee	6 (6.3)	43 (45.7)	45 (47.8)
Khalili	4 (8.1)	31 (63.2)	14 (28.5)
Rajaey	0 (0)	44 (51.7)	41 (48.2)
Chamran	0 (0)	20 (36.3)	35 (63.6)
Amiralmomenin	0 (0)	7 (36.8)	12 (63.1)
Total	11 (2.8)	185 (48.05)	189 (49.09)

the operating room conditions. In addition, we found that a considerable amount of (16.1%) of people with LBP had a history of absenteeism with or without medical treatment. In a study carried out in Xinjiang in 2017, *Ping Yan* et al. investigated the prevalence of work-related musculoskeletal disorders on 6674 nurses with a mean age of 7.18 ± 31.83 , demonstrating the highest prevalence rate of LBP (62.71%). In addition, our results showed that LBP was the most reason for the requested leave time of nurses (5.50%) among the musculoskeletal disorders (27). The prevalence of LBP in the study carried out by *Ping Yan* et al. was high (74.02%), which was consistent with our findings, indicating the high extent of this disorder among health care workers.

In the present study, 16.1% of the people with LBP had a history of absenteeism with or without medical treatment, which was higher than that of the study carried out by *Ping Yan* et al. This may be due to the lack of diagnosis of sick leave and the absence without physician's prescription. Our results showed that the prevalence of LBP was high in different hospitals. In addition, various prevalence levels found in different hospitals were due to the type of operating rooms of each hospital. The orthopedic and nerve operating room often had a higher rate of LBP due to the higher operating pressure. In a study conducted in Yazd in 2012, *Barkhordari* et al. investigated the prevalence of LBP

among 351 nurses, demonstrating the highest prevalence of LBP in the nurses working in orthopedic surgery and operating room, respectively (28). The results of that study were in line with those from the present study. This high incidence may be due to the increased work pressure on the personnel in this type of operating room.

Another aim of our study was to measure the awareness of operating room personnel about the risk factors of LBP. In this study, more than 97% of the participants had moderate to high levels of awareness while only a limited number had low awareness of the risk factors for LBP. In addition, public media and social networks played the highest role among the sources of information acquisition. A study, conducted by *Choubineh* et al. in 2012, evaluated the level of awareness of LBP risk factors, in which 118 nurses were evaluated in 8 hospitals of Shiraz. They showed that the awareness of nurses about LBP was not desirable and needed to be improved. In addition, they found university Education level as the most important source of information for nurses about LBP.³

According to the above, the time difference between these two studies as well as the ever-expanding cyberspace and its access to personal lives, the public media and social networks probably play a more prominent role in people's awareness of different areas. On the other hand, the awareness level of LBP in the present study was higher than that carried out by *Chubinha* et al. This could be due to different research environment and specificity of the study population, different measuring tools, as well as ease of access to relevant resources in the area of health through the development of Internet and cyberspace. The peak of LBP is in the third decade of life.⁸ The mean age of the study participants was 32 years, indicating that many participants were in their third decade of life. Meanwhile, the mean of LBP was higher in subjects of this age group than the average of LBP. Another study conducted by *Muscato* et al. in 2010, examined musculoskeletal injuries in 185 operating room personnel in Rome, Italy, with a mean age of 36.08 ± 7.08 . That study found LBP as the most important musculoskeletal disorder (29). Accordingly, the mean age of the subjects in the study performed by *Muscato* and the present study was close and above 30 years; this factor itself could have a significant role in the high prevalence of LBP in these studies.

Table 6

The relationship between awareness of LBP risk factors and prevalence of LBP in operating room personnel.

Variable		Awareness of low back pain risk factors			The significance level
		Low	Moderate	High	
		Frequency (%)	Frequency (%)	Frequency (%)	
Low back pain	Have	9 (3.1)	127 (44.5)	149 (52.2)	0.067
	Haven't	2 ²	58 (58)	40 (40)	

5. Conclusion

A high prevalence of LBP and relatively high awareness rates of LBP risk factors in operating room personnel was found in this study. There was no significant relationship between LBP and awareness of operating room personnel about LBP risk factors. Although the level of awareness was desirable, the prevalence of LBP was also high, which could be due to the gap between their awareness and practice of LBP risk factors. However, there is a need for more studies to assess the awareness of operating room personnel about the risk factors and its relation to the prevalence of LBP and the causality of the relationship between them. In addition and importantly, the managers and authorities should promote operating room programs focusing on decreasing musculoskeletal disorders and try to increase the awareness of operating room personnel about the risk factors by holding training programs.

6. Limitation

The limitations of this study include no involvement of students and operating room personnel working on private hospitals. Additionally, assessment of other risk factors, including mental status and occupational stress, could yield better results among operating room personnel. Most importantly, it is recommended future studies evaluate students and private hospitals.

Declaration of competing interest

This study was funded by Shiraz University of Medical Sciences. Also, this study was conducted in accordance with the recommendations of ethical guidelines, IR.SUMS.REC.1398.263. The protocols carried out in this investigation were approved by Shiraz University of Medical Sciences.

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