

## **Prevalence and risk factors of low back pain among nurses in operating rooms, Taif, Saudi Arabia**

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### **ABSTRACT**

**Background:** Low back pain (LBP) is one of the most common cause of musculoskeletal disorder related to work status and condition. Low back pain is a complex condition with several factors contributing to its occurrence.

**Objectives:** To estimate the prevalence, to identify risk factors, pattern and course of illness of LBP among nurses in operating rooms in Taif city, KSA.

**Subjects and Methods:** A cross-sectional followed by a nested case-control study was applied including nurses in operating rooms in Taif city, Saudi Arabia throughout the period January-June, 2011. Participants were divided into two groups: those with and without LBP. LBP was defined based on the following criteria: Experience pain, ache, or discomfort in his/her low back. Sample was chosen by using simple randomization technique. A pre-designed questionnaire was used for data collection. The questionnaire included demographic data, work-related factors as well as experience of LBP.

**Results:** The study included 126 health care workers in operating rooms, out of 200 invited to participate in the study, giving a response rate of 63. The mean age was  $34.03 \pm 8.02$  years. Females represent 78.6% of the participants. Almost three-quarters of them were nurses (74.6%) while the remaining 25.4% were technicians. Almost half of the participants ( $n=61$ , 48.41%) in the current study are complaining of low back pain. Female participants complaining of low back pain were significantly more than male participants ( $p=0.002$ ). There were no statistical significant differences between severity of pain score and variables of age, gender, work type, smoking, body mass index, duration of work and duration of pain ( $p > 0.05$ ).

**Conclusion:** LBP is a common health problem among health care workers working in operating room in Taif city. Back pain is both a major cause of temporary disability. Low back pain is not a major cause of sickness absence in the workplace.

**Keywords:** Low Back pain; Nurses; operating room; Saudi Arabia

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**Running title:** Back pain among nurses in operating rooms

## Introduction

Low back pain is neither a disease nor a diagnostic entity of any sort. The term refers to pain of variable duration in an area of the anatomy afflicted so often that it has become a paradigm of responses to external and internal stimuli. [1] It is one of the most common cause of musculoskeletal disorder related to work status and condition.[2] It occurs in similar proportions in all cultures, interferes with quality of life and work performance, and is the most common reason for medical consultations. [1] In Europe, 30% of the general worker population suffers from LBP. [3] It remains the leading cause of disability in persons younger than 45 years old. [4] More than one-quarter of the working population is affected by LBP each year,[5] with a lifetime prevalence of 60–80% [6] and a large percentage of LBP claims for long durations (more than 90 workdays lost). [7]

Many epidemiological studies have attempted to identify and relate risk factors to the prevalence of LBP among office workers and Individual factors Such as gender, age, educational level, body mass index (BMI), and psychosocial factors referring to job satisfaction, work stress, and anger have been examined and related to the incidence of LBP. [8]

Low back pain is a complex condition with several factors contributing to its occurrence. Most knowledge on risk factors of LBP stems from cross sectional studies which cannot evaluate the temporal sequence between a risk factor and the occurrence of pain. [8] Three different groups of potential

risk factors have been identified: [2] (a) individual factors such as body weight and age, (b) biomechanical factors such as heavy physical load, lifting, twisted postures, and vibration, and (c) psychosocial factors such as job control and job satisfaction. The increased risk for bricklayers has been attributed to inclined work postures and by repetitive lifting of bricks which weigh 5–24 kg, depending on the type and size. [9]

Fewer epidemiological studies have examined the appearance and associated risk factors of LBP among health workers. There is only one research, that studied LBP prevalence among nurses in Africa and reported a prevalence of 70%. [10] A systematic literature review was conducted to identify workplace epidemiologic studies which could be used to quantify relationships between several well-recognized biomechanical measures of back stress (related to lifting, spinal compression, and postures) and economically relevant outcome measures (such as workers' compensation claims and sickness / accident claims. [11]

Because of the potential economic and social benefits to be gained from reducing the magnitude of LBP in industry, many investigations have focused their attention on the factors that lead to injury, particularly on those activities and events associated with the onset of symptoms. [12] The major thrust of research about LBP has been to identify occupational risk factors associated with its presence and occurrence. [13]

The objectives of this study are to estimate the prevalence of, identify the risk factors of LBP among nurses in operating rooms in Taif city, Saudi Arabia.

## Subjects and methods

A cross-sectional study was applied to assess the prevalence of LBP followed by a nested case-control study to determine personal and work related risk factors associated with LBP. The study included nurses/technicians of both gender, belonging to any ethnic group, age less than 60 years and working in operating rooms. Participants were divided into 2 groups: those with and without LBP. LBP was defined based on the following criteria: Experience pain, ache, or discomfort in his/her low back. Specific causes of back pain as a result of trauma, osteoporotic fractures, infections and neoplasms were excluded from the study with X-ray Lumbosacral spine, urine RE, full blood count and ESR.

This study was conducted at two tertiary and two secondary care hospitals. The tertiary care hospitals will include: Al Hada Armed Forces Hospital belonging to Ministry of Defense and King Abdul Aziz specialized hospital belonging to MOH) and the secondary care hospitals are: Prince Mansour Hospital belonging to Ministry of Defense and King Faisal Hospital belonging to MOH).

All health care workers in operating rooms of the four hospitals were invited to participate in the study. Estimated total number in the four hospitals was (200). A frame for all illegible nurses/technicians was designed. All nurses were given serial numbers. A pre-designed questionnaire was used for data collection. The questionnaire included information regarding demographic data (e.g., age, sex, education, specialty), work-related factors (e.g., hours of work per week, type of work, duration of work in operating room etc.) as well

as experience of LBP. Approval of the regional researcher and ethics team at armed forces hospital, Taif region was obtained as well as permissions from authorities responsible for each participated hospital were obtained.

### **Data Analysis:**

SPSS 18.0 software package (SPSS, Chicago Illinois) was utilized for the statistical analysis, frequency distributions of responses, and cross-tabulations of individual, risk job factors were studied in association with reported prevalence of LBP. Group differences were further analyzed by the chi-square test and level of significance was determined at  $p < 0.05$ .

### **Results:**

#### **Baseline characteristics:**

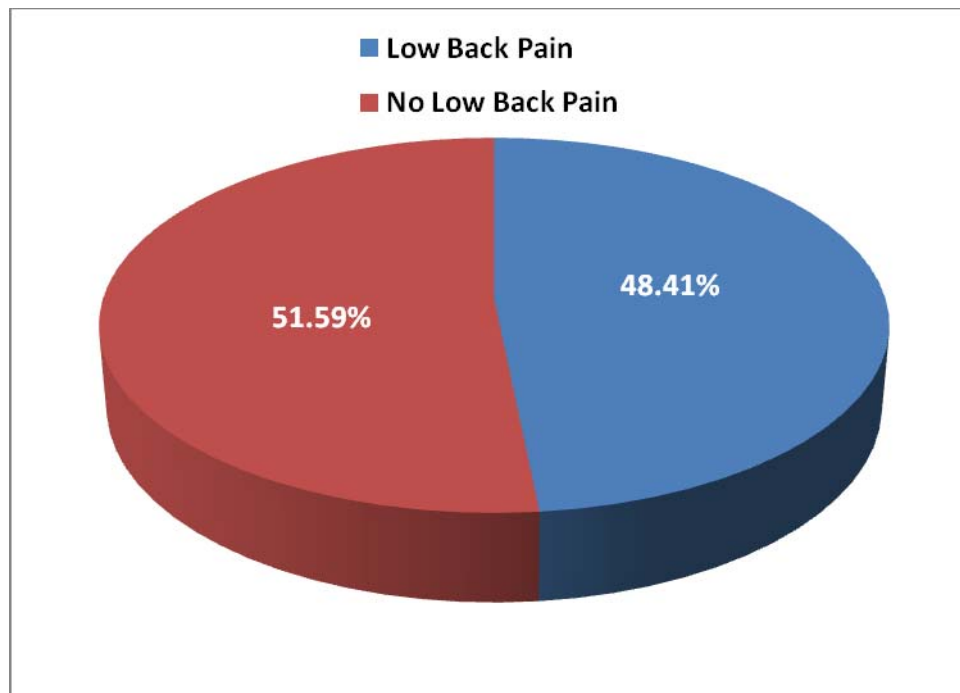
The study included 126 health care workers in operating rooms, out of 200 invited to participate in the study, giving a response rate of 63%. Table (1) presents their baseline characteristics. Their mean age was  $34.03 \pm 8.02$  years. Females represent 78.6% of the participants. Almost three-quarters of them were nurses (74.6%) while the remaining 25.4% were technicians. More than half of them were married (59.5%). The majority of them (88.1%) were never smokers. Their mean BMI was  $24.93 \pm 4.49$  while mean years of work was  $8.85 \pm 5.94$  years.

**Table 1. Baseline characteristics of health care workers participated in the study (n=126).**

Variables	Values
<b>Age;</b> Mean (SD)	34.03 (8.02)
<b>Gender;</b> no. (%)	
Male	27 (21.4)
Female	99 (78.6)
<b>Type of work;</b> no. (%)	
Nurse	94 (74.6)
Technician	32 (25.4)
<b>Marital status;</b> no. (%)	
Single	51 (40.5)
Married	75 (59.5)
<b>Smoking;</b> no. (%)	
Current smoker	6 (4.8)
Ex-smoker	9 (7.1)
Never smoke	111 (88.1)
<b>Body Mass Index;</b> Mean (SD)	24.93 (4.49)
<b>Years of work;</b> Mean (SD)	8.85 (5.94)

#### **Prevalence of low back pain:**

Figure (1) shows that almost half of the participants (n=61, 48.41%) in the current study are complaining of low back pain.



**Figure 1. Prevalence of Low Back Pain among health care workers.**

**Factors associated with low back pain:**

Table (2) shows the association between demographic and work-related characteristics of patients from one side and the prevalence of Low back pain among them from the other side. Female participants complaining of low back pain were significantly more than male participants ( $p=0.002$ ). However, no statistical significant differences were detected between those complaining of low back pain and those who do not complain regarding age, type of work, marital status, smoking history, body mass index and years of work ( $p > 0.05$ ).

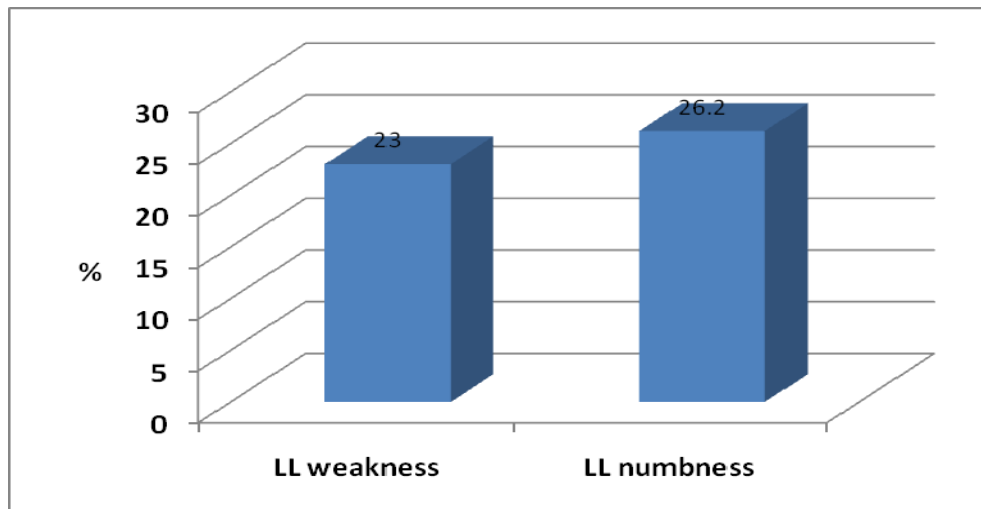


**Table 2. Factors associated with low back pain among the studied population.**

Variables	Presence of Low Back Pain		Test of Significance	P value
	Yes (n=61)	No (n=65)		
<b>Age;</b> Mean (SD)	34.43 (8.40)	33.65 (7.66)	0.55	0.59
<b>Gender;</b> no. (%)				
Male	6 (22.2)	21 (77.8)	9.44	0.002
Female	55 (55.6)	44 (44.4)		
<b>Type of work;</b> no.(%)				
Nurse	48 (51.1)	46 (48.9)	1.04	0.31
Technician	13 (40.6)	19 (59.4)		
<b>Marital status;</b> no. (%)				
Single	20 (39.2)	31 (60.8)	2.90	0.09
Married	41 (54.7)	34 (45.3)		
<b>Smoking;</b> no. (%)				
Current smoker	2 (33.3)	4 (66.7)	0.58	0.75
Ex-smoker	5 (50.0)	4 (50.0)		
Never smoke	54 (49.1)	57 (50.9)		
<b>Body Mass Index;</b> Mean (SD)	25.30 (5.16)	24.59 (3.87)	0.87	0.39
<b>Years of work;</b> Mean (SD)	9.21 (6.88)	8.52 (5.06)	3.43	0.52

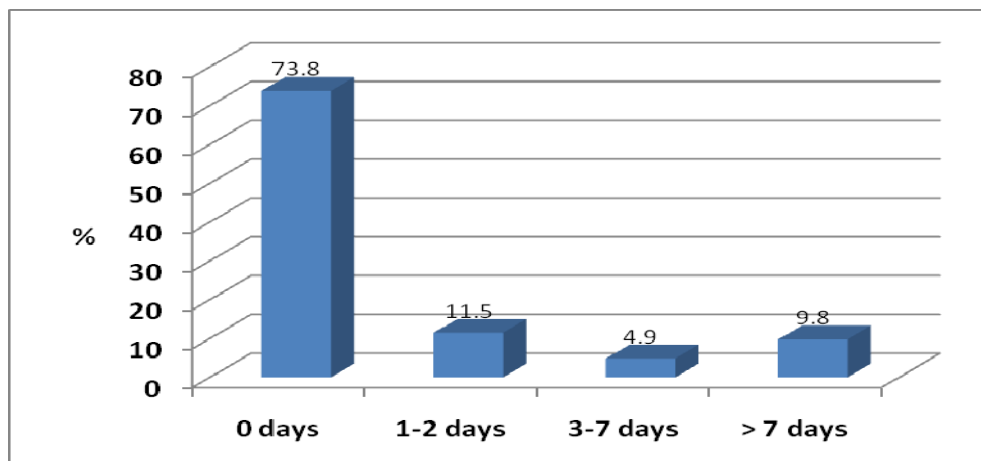
**Low back pain characteristics:**

From figure (2), it is obvious that 23% and 26.2% of participants who reported they are complaining of low back pain are also complaining of lower limb weakness and numbness, respectively.



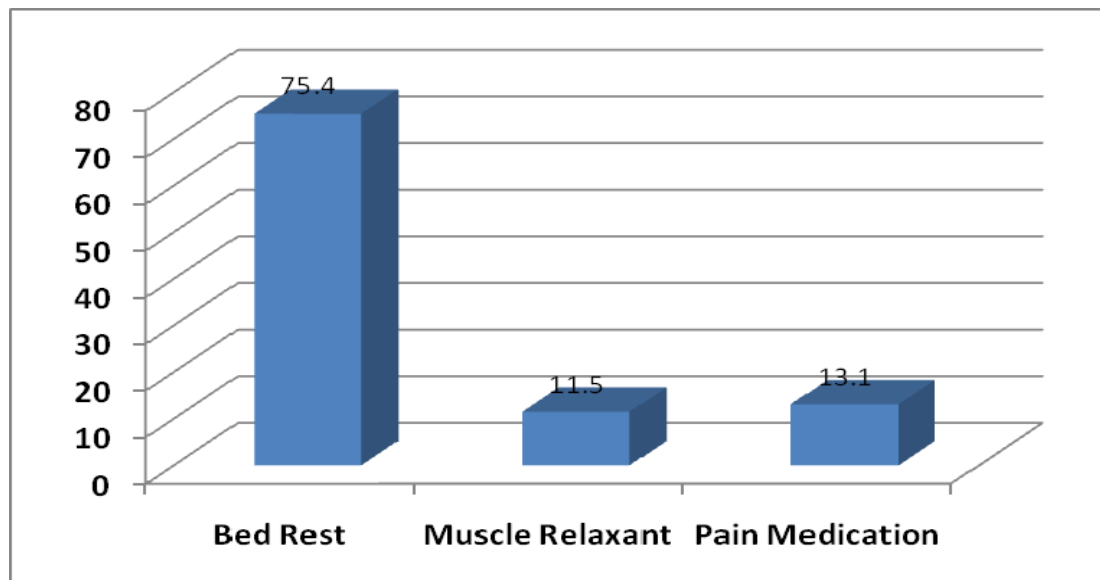
**Figure 2. Percentage of lower limb weakness and numbness among participants complaining of low back pain.**

Figure (3) shows that 73.8% of participants were not absent from work because of the low back pain. However, 11.5%, 4.9% and 9.8% of them were absent from work during the past three months for 1-2 days, 3-7 days and more than 7 days, respectively.



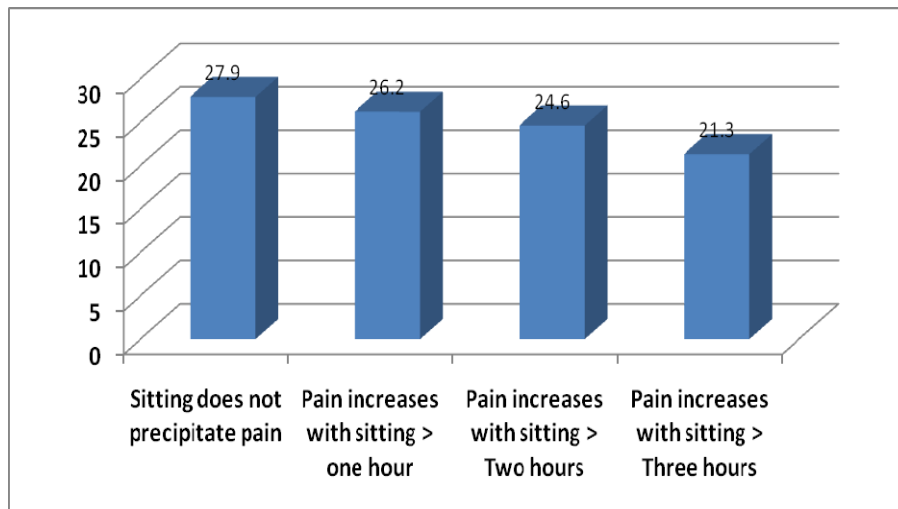
**Figure 3. Percentage of participants who were absent from work during the past three months because of low back pain**

As shown in figure (4), the majority of the participants (75.4%) tried bed rest as a treatment modality. However, 11.5% tried muscle relaxant and 13.1% tried pain medication.



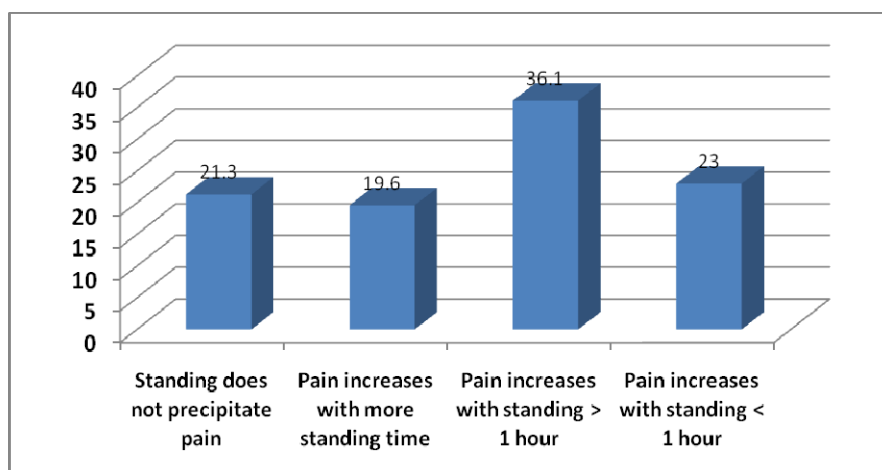
**Figure 4. Modalities of low back pain relieve as tried by the participants.**

Figure (5) shows that sitting does not precipitate pain among 27.9% of participants with low back pain. However, sitting for one hour precipitate pain in 26.2%, sitting for 2 hours precipitate pain in 24.6% and sitting for 3 hours precipitate pain in 21.3% of participants.



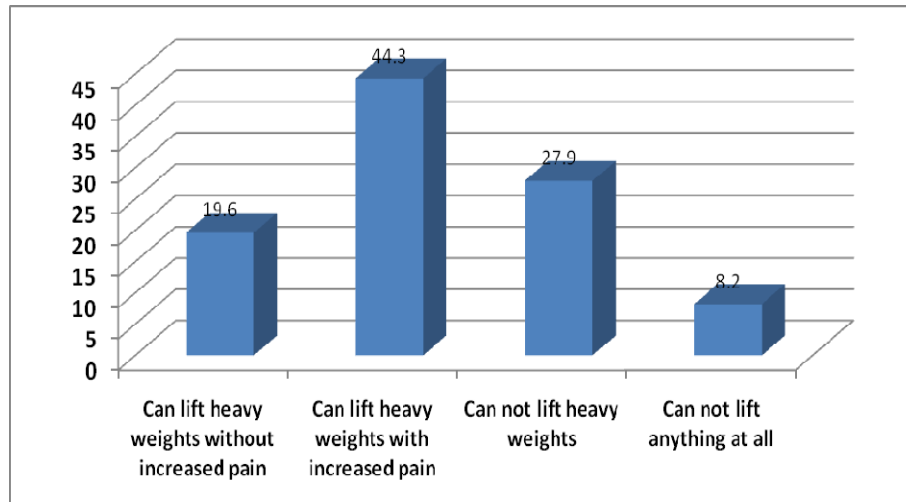
**Figure 5. Number of sitting hours that precipitate pain.**

As illustrated in figure (6), the standing does not precipitate pain in 21.3% of participants. However, 19.6% reported increased pain with longer standing. Standing for more than one hour precipitate pain among 36.1% and standing for less than one hour precipitate pain in 23.0% of participants who are complaining of low back pain.



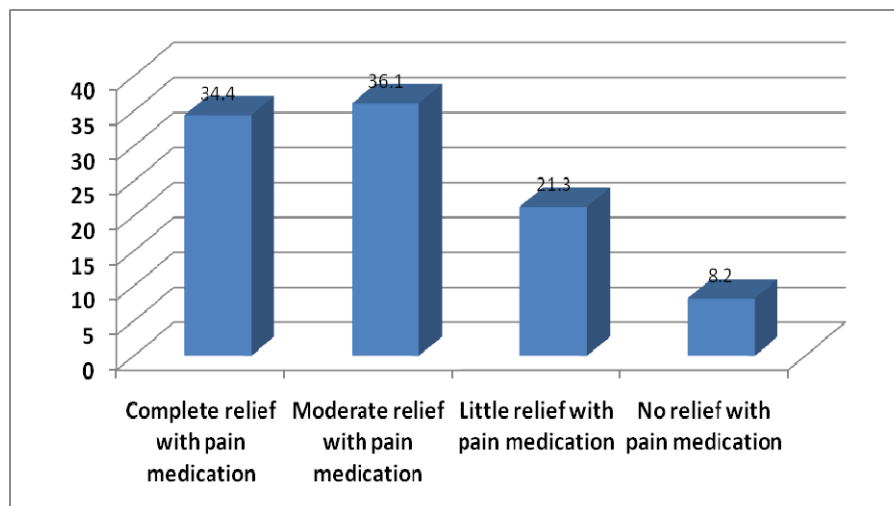
**Figure 6. Number of standing hours that precipitate pain.**

Figure (7) shows that almost 1/5<sup>th</sup> of participants with low back pain can lift weights without increased pain. However, 44.3% can lift heavy weights with increased pain, 27.9% cannot lift heavy weights and 8.2% cannot lift anything at all.



**Figure 7. Ability to lift weights and associated pain.**

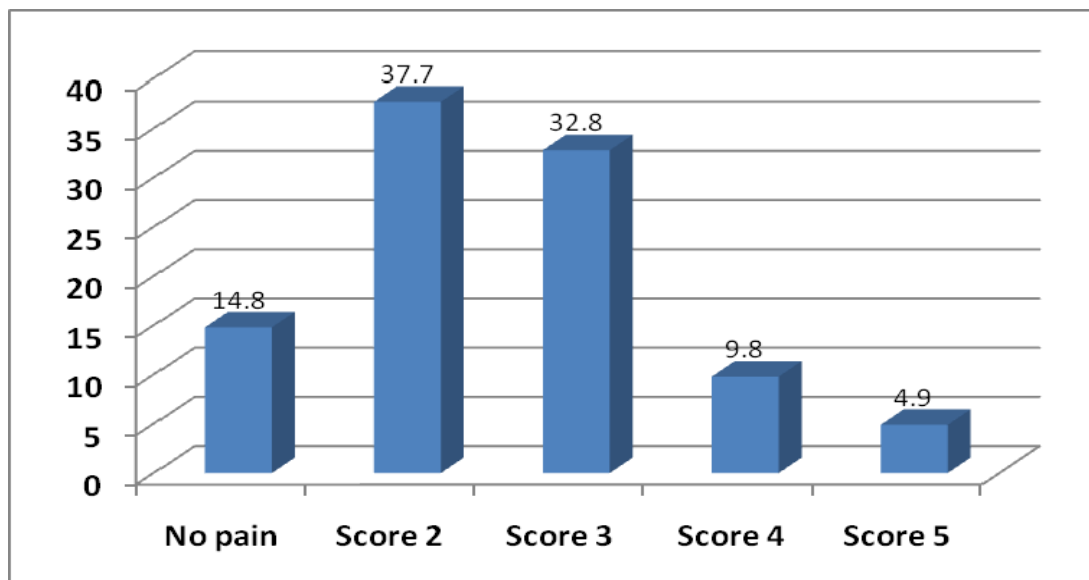
As shown in figure (8), 34.4% of participants with low back pain get complete relief of pain with pain medication, 36.1% get moderate relief, 21.3% get little relief and 8.2% get no relief with pain medication.



**Figure 8. Effect of pain medication on relief of pain.**

**Low back pain severity:**

Figure (9) shows the score of low back pain as reported by the study participants who are complaining of pain. About 70% of the participants who are complaining of pain reported that the score of pain is either 2 or 3 out of a scale of 5. However, about 15% reported a score of 4 or 5.



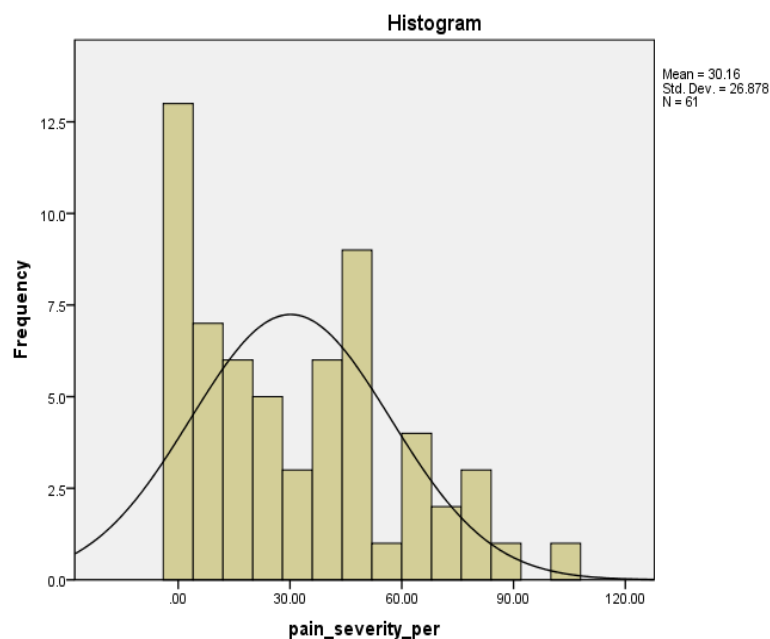
**Figure 9. Low back pain score during the past 3 months.**

Table (3) shows items that determined the severity of low back pain. Severity of pain was determined by its effect on performance of work, walking, doing household activities, shopping and sleeping at night. The range of activities percentage as reported in the current study was from 55.7% - 59.0%.

**Table 3. Factors related to pain severity as perceived by the participants.**

Items affecting pain severity	Number (%)
I can do light work for an hour	34 (55.7)
I can walk for an hour	36 (59.0)
I can do ordinary household chores	36 (59.0)
I can do the weekly shopping	34 (55.8)
I can sleep at night	34 (55.8)

Figure (10) shows the pain severity score as perceived by the participants. Items that constitute this score are: ability to work, walk, do household activities, shopping and sleep at night. Each item was getting score out of five. The total pain severity score was 25. In the current study, the mean severity score percent was 30% with standard deviation of 26.9 and the median score was 24%.

**Figure 10. Pain severity score as perceived by the participants.**

### Determinants of pain severity score

Table (4) shows no statistical significant differences between severity of pain score and variables of age, gender, work type, smoking, body mass index, duration of work and duration of pain ( $p > 0.05$ ).

**Table 4. Determinants of pain severity score among the studied population.**

Variables	Severity of LBP score		Chi square test	P value
	Less than median score	More than median score		
<b>Age;</b> <30ys > 30ys	14 (53.8) 17 (48.6)	12 (46.2) 18 (51.4)	0.17	0.68
<b>Gender;</b> Male Female	4 (66.7) 27 (49.1)	2 (33.3) 28 (50.9)	0.67	0.41
<b>Work type;</b> Nurse Technician	25 (52.1) 6 (46.2)	23 (47.9) 7 (53.8)	0.14	0.70
<b>Smoking;</b> Current Ex-smoker Never smoke	2 (100.0) 2 (50.0) 27 (49.1)	0 (0.0) 2 (50.0) 28 (50.9)	2.00	0.37
<b>Body Mass Index;</b> < 25 >25	19 (57.6) 12 (42.9)	14 (42.4) 16 (57.1)	1.31	0.25
<b>Duration of work;</b> <10 years > 10 years	21 (51.2) 10 (50.0)	20 (54.8) 13 (43.3)	0.01	0.93
<b>Duration of pain;</b> <2 years >2 years	14 (45.2) 17 (56.7)	17 (54.8) 13 (43.3)	0.81	0.37



## Discussion

This cross-sectional investigation attempted to examine the prevalence of LBP among health care workers in order to describe the occurrence of LBP. The results have shown that the almost half of health care workers were complaining of Low back pain. Most epidemiological studies have only examined the LBP prevalence in office workers and reported comparable results. [14-17] Although the design in most of these studies is also cross-sectional which established causation uncertain. In Nigeria, the 12 month prevalence of LBP among nurses was 73.53%, [18] this is considered high and was in line with that reported by Maul et al. [19] They reported high annual prevalence varying from 73% to 76% among nurses employed by a large university hospital in Switzerland.

The present study also concurs with the findings of Knibbe and Friele[20] and Smedley et al.[21] They reported slightly higher prevalence varying between 56% and 90% among nurses. In the current study, age was not significantly associated with LBP among health care workers. However, in Nigerian study, the increase in prevalence of LBP with age may not be unconnected to the report of study carried out by Charlotte and Stuart<sup>16</sup> that the susceptibility of chronic diseases increases with age; that increase could be a reflection of both physiological changes and cumulative environmental (occupation) and genetic risk factor exposure.

Despite this high prevalence, the etiology and nature of LBP are not yet well understood. Many studies have reported a strong association between musculoskeletal disorders and work related factors [22-24] and work

pressure.[25] This was also found among nurses. [26] In the present study, LBP was aggravated due to occupational hazard (standing, sitting and lifting). These results are higher than that reported by Olsen, et al (1992) [27] In a study conducted among Adolescent population. They suggested that 1 in every 3 adolescents reported experiencing LBP in their lifetime. Also, our finding was higher than those seen in European population-based studies. Specifically, Fairbank et al. ([28] and Balague et al. [29] found LBP rates of 26% and 27%, respectively.

Hofmann et al (2002) [30] performed a cross-sectional study on working conditions and prevalence of low back pain, a sample of 3,332 nurses and 1,720 clerks as reference group was investigated by a questionnaire. The data suggest a considerably higher risk of low back pain for nurses than for the reference population of clerks. Results, however, differ markedly when specific pain symptoms are considered. With respect to lumbago-sciatica and sciatica - which have to be regarded as indicators for possible disc herniation - the study group's relative risk is the most elevated (2.88 for point prevalence of lumbago-sciatica/sciatica).

In the present study, about 70% of the participants who are complaining of pain reported that the score of pain is either 2 or 3 out of a scale of 5. However, about 15% reported a score of 4 or 5. Results of another Greek study showed that the pain intensity at the time of the survey ranged from moderate to unbearable in 38% of the sufferers, whereas the majority (43%) of the recurrent episodes lasted from one day to one week. These results, combined with the fact that in 24.9%, 25.1%, 26%, and 37% of office workers with point, one-year, 2-year, and lifetime prevalence sleep

disturbances due to pain appeared, which might suggest that work productivity could be lower because of lumbar spine dysfunction. Because Greece is a country with an abundance of office workers, especially in the public sector, the financial cost of low back injury could be tremendous and might affect the Greek economy seriously. [15] These facts could be applied in Saudi society as sedentary life and office work prevail in last decades.

Among the individual risk factors, gender, age, BMI, and smoking were examined. Significant differences were detected between the groups of gender for prevalence of LBP. Females displayed higher percentages of LBP prevalence in accordance with other studies [14, 31-33].

In the current work, significant association was found between gender and prevalence of LBP. Generally, 22.2% of the total male reported LBP while 55.6% of the total female reported LBP. The reason for female preponderance in this study is unclear but it may be related to the anatomical, physiological and structural difference between males and females; also mechanical disadvantage, sprain and strain, are more common in females than males. [34, 35] Back muscle weakness, sprain and strain (low back sprain), has been implicated as a causative factor of LBP. [36-38] The same finding has been reported by Sikiru and Hanifa (2010). [18]

Smoking was not significant predictor for LBP in this present study. Moreover, exercising habits were not studied in the current study. Spyropoulos only, et al (2007)[14] reported that a small proportion, 17.9%, of their sample of Greek office workers participated in regular exercise of equal or greater than 3 times per week which suggested that office clerks were mostly non-exercising individuals. Other studies have reported that both

smoking and exercising habits were either weak predictors or non-predictors of LBP prevalence. [39, 40]

The role of different psychosocial risk factors has to be examined in further study and significant differences has to be tested in groups of health care workers regarding job satisfaction, work stress, and anger during the last days in association with LBP prevalence as some researchers suggest that the interaction between psychosocial and ergonomic factors might increase the risk of back disorders and should be taken into consideration. [41]

In the present study, 73.8% of participants were not absent from work because of the low back pain. However, 11.5%, 4.9% and 9.8% of them were absent from work during the past three months for 1-2 days, 3-7 days and more than 7 days, respectively. In a study done by Sikiru and Hanifa (2010),[18] nurses generally lost about 202 working days in 12 months (408 X 365 days) amounting to about 0.14%. This was considered very low. LBP has been identified as one of the main causes of loss of hours and days among the working class citizens. Frost and Mofett [42] reported that the time off work due to LBP in England in 1989 increased by 40% in comparison to 5.6% for other complaints. The survey showed by Triolo [43] indicated that nurses lost 750,000 days a year as a result of back pain. The reasons for low loss of working hours and days in the present study might not be unconnected to fear of premature retirement or termination of appointment by employers on the pretence of ill-health. Also, nurses and employers often reject excused duty (complete rest) due to severe shortage of staff coupled with high turn out of patients.

In summation, certain limitations appear to be present in this research. Generally, although this study is the first to examine risk factors and the prevalence of LBP in health care workers in Saudi Arabia, its results may not be generalized to include health care workers in the private and other governmental sectors. Future research might include other governmental and private health care workers and provide additional information. Moreover, since the design in this study is cross-sectional the results should be interpreted with great caution because they express only association and not causation between the risk factors and prevalence of LBP. Lastly, in future research on LBP prevalence, data gathered from exercise and smoking habits of participants could also be examined with regards to frequency and type of exercise as well as years of smoking and number of cigarettes per day. In conclusion, low back pain is a common health problem among health care workers in Taif, Saudi Arabia. Female participants complained of low back pain more than males. Back pain is both a major cause of temporary disability and a challenge to medical treatment decisions. Low back pain is not a major cause of sickness absence in the workplace.

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