American Journal of Medical Sciences and Medicine, 2020, Vol. 8, No. 6, 217-228
Available online at http://pubs.sciepub.com/ajmsm/8/6/3
Published by Science and Education Publishing
DOI:10.12691/ajmsm-8-6-3

The Prevalence and its determinants of Low Back Pain among Female Secondary School Teachers in Eastern region at Makkah city, Saudi Arabia, January 2020

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Received October 09, 2020; Revised November 10, 2020; Accepted November 17, 2020

Abstract **Background:** Low back pain (LBP) is a major cause of disability, interfere with quality of life and work performance. Very limited studies have been carried in Saudi Arabia among teachers. **Objectives:** To estimate the prevalence and identify the determinants of LBP among female secondary school teachers in Eastern region at Makkah city. **Subjects and methods:** A cross-sectional analytic study was conducted among female secondary school teachers in Makkah city (eastern region) throughout the scholastic year 2019-2020 (December- January). A self- administered valid Arabic questionnaire was used in data collection. **Results:** The study included 207 female teachers. Most of them (60.4%) aged between 40 and 49 years. History of having low back pain during the last week (Point prevalence) was 62.8% whereas total prevalence of LBP during the last 12 months was77.8%. Multivariate logistic regression analysis revealed that married teachers were 86% at lower risk for LBP compared to singles (Adjusted odds ratio "AOR":0.14, 95% confidence interval "CI": 0.02-0.83, p=0.030. Teachers with more number of teaching hours/week (>20) were at almost double-risk for having LBP compared to those with 1-10 hours/week (AOR: 2.13, 95%CI: 1.63-24.02, p=0.036). Teachers with history of chronic diseases were at greater risk for developing LBP compared to those without chronic diseases (AOR: 4.21, 95%CI: 1.03-17.19, p=0.045). Feeling anxious within the last two weeks was accompanied by significant increased risk for LBP (AOR: 3.77, 95%CI: 1.46-9.75, p=0.006). Similarly, complaining of upper back pain, neck pain, throat infection was significantly associated with greater risk of LBP (AOR: 5.62, 95%CI: 2.18-14.48, p<0.001). Considering normal BMI subjects as a reference category, obese teachers were at 6-folded risk for LBP (AOR: 6.41, 95%CI: 1.83-22.43, p=0.004). **Conclusion:** Low back pain is a very common problem, affecting most of female secondary school teachers in Eastern Region of Makkah city, with adverse impact on sleeping quality and work performance. Such a common medical problem needs to be further studied in our community.

Keywords: *Low Back Pain, prevalence, female Secondary School Teachers, Saudi Arabia*

Cite This Article: Ghufran Hesham Kheshaifaty, and Saud Hasan Surbaya, "The Prevalence and its determinants of Low Back Pain among Female Secondary School Teachers in Eastern region at Makkah city, Saudi Arabia, January 2020." *American Journal of Medical Sciences and Medicine*, vol. 8, no. 6 (2020): 217-228. doi: 10.12691/ajmsm-8-6-3.

1. Introduction

1.1. Background

Low back pain (LBP) is very common health problem worldwide defined as discomfort sensation localized below the costal margin and above the inferior gluteal folds, with or without sciatica. [1]

It is one of the most common musculoskeletal disorders requiring medical attention, frequent sick leave, absence of work, decrease work performance, less productivity. It can be classified into acute (less than 4 weeks), sub-acute (lasting between 4 and 12 weeks), chronic (persist for more than 12 weeks). [2]

There are many etiologies of low back pain divided into Mechanical e.g. lumbar strain, degenerative disease, herniated disc, spinal stenosis, osteoporosis, fractures, spondylolisthesis, spondylolysis, congenital and non-mechanical e.g. infection, neoplastic, inflammatory, Paget. Referred pain e.g. renal, gastrointestinal, pelvic organ, aortic aneurysm. [2]

Majority of the cases of LBP seen in primary healthcare centers (PHCCs) (>85%) are nonspecific back pain that mean there is no underlying pathology mainly due to musculoskeletal, while only less than 1% of patient seen in PHCCs will have a serious systemic pathology. [2]

LBP is considered to be one of the top 10 complaint and injuries with highest number of (Disability-Adjusted Life Years(DALYs), as estimated by the Global Burden of Disease (GBD) 2010. [3]

The prevalence of LBP in KSA is ranging from 53.2% to 79.17%.[4] In the United States, 149 million of daily works are estimated to be lost every year because of low back pain, with estimated costs of US$ 100 to 200 billion a year (of which two-thirds is due to lost wages and lower productivity). [3]

Therefore, LBP is a major cause of disability, interfere with quality of life and work performance. [5]

Studies in this field are found internationally and on a national level. Despite the presence of studies about prevalence of low back pain according to their countries and cultural background, knowledge is still lacking in Saudi Arabia among teachers with only few studies regarding the prevalence of LBP among teachers are found in the country.

1.2. Literature Review

The Alnaami et al. in their study published in BMC musculoskeletal disorder journal in 2019 reported an overall 1-year prevalence of LBP among health care workers (HCWs) in southwestern region in Saudi Arabia of 73.9% (95% confidence interval "CI": 70.7–77.0). Multiple logistic regression analysis showed that factors independently associated with LBP were the followings: working in secondary and tertiary hospitals (Adjusted odds ratio "AOR" = 1.80, 95% CI:1.25–2.59), mostly in the age group 30–40 years (AOR = 1.87, 95% CI:1.26–2.75), obesity (AOR = 1.72, 95% CI:1.04–2.83), long standing (AOR = 1.61,95% CI:1.01–2.56) and positive history of back trauma (AOR = 10.44, 95% CI:3.79–28.78). On the other hand, practicing regular physical exercise was a significant protective factor (AOR = 0.61, 95% CI: 0.42–0.89). [6]

Bin Homaid et al. study published in Annals of Occupational and Environmental Medicine journal in 2016 discussed the results of a survey distributed to 134 operation rooms (OR) staff in king Abdullah medical city in Makkah, Saudi Arabia where 120 (84%) of staff completed a self-administered questionnaire about LBP. They found the prevalence of 74.2%. The highest prevalence was among anesthesiologist and anesthesia technicians. The OR risky activities were found to be strongly associated with the LBP. [7]

Another study which was a cross sectional analysis study done in the Charles V. Keating emergency and trauma center, Halifax, Nova Scotia, Canada, and written by Edwards et al. in a period of six years of administrative data. It concludes that a prevalence of 3.17% of patients visiting the emergency department were complaining of back pain. From those, 60.8% were diagnosed as non-specific/mechanical low back pain with no potential nerve root involvement and 6.7% with potential nerve root involvement. While 9.9% represents those with low back pain due to secondary factors. [8]

In a study done among secondary school teachers in Kanpur, India by Gupta G et al, a total of 321 full time teachers, aged between 26 and 65 years showed that 27% of teachers complained of acute LBP, while yearly prevalence represents 23.1%. A 58% of those with LBP had minimal disability, while 35.8% had moderate disability and 5% had severe disability.

The study concludes that despite the low prevalence of LBP in those teachers, the caused disability affects more than one-third of their routine performance and general psychological well-being. [9]

In a cross-sectional study done in Botswana among teachers, out of the total 1747 teachers investigated for suspected LBP, the prevalence over 12 months was 55.7%, 67.1% of them complained of minimal disability. The logistic regression analysis results revealed factors significantly associated to LBP were female gender [AOR: 1.51, 95% CI: 1.14-2.00], previous back injury [AOR: 9.67, 95% CI: 4.94-18.93], abnormal arm position [AOR: 1.81, 95% CI: 1.24-2.62] and stressful job demands [AOR: 1.40, 95% CI: 1.02-1.93]. Female gender [AOR: 2.67, 95% CI: 1.52-3.99] and previous back injury [AOR: 3.01, 95% CI: 1.92-4.74] were also positively associated with LBP disability. On the other hand, Regular physical exercise was negatively associated with LBP [AOR: 0.63, 95% CI: 0.43-0.93]. The study concludes that prevalence of LBP is high among school teachers in Botswana. This study suggests that no single specific preventative or intervention strategy will help in reducing these conditions. As such, to help reduce the prevalence, progression and burden of LBP among Botswana teachers, a greater emphasis should now be placed on ergonomics education, regular physical exercise and occupational stress. [10]

1.3. Rationale

- Throughout my experience, Low back pain is a common health problem globally affecting quality of life.
- Few similar studies were conducted among female secondary school teachers at the holy city of Makkah Al-Mokarramah (Up to the researcher knowledge)

1.4. Aim of the Study

To determine the extent of LBP among female secondary school teachers in Makkah city "eastern region". Hence to attempt to decrease its prevalence and to manage effectively this common complaint.

1.5. Objectives

- To estimate the prevalence of LBP among female high school teachers in Eastern region at Makkah city, 2020.
- To identify the determinants of LBP among female secondary school teachers in Eastern region at Makkah city, 2020.

2. Methodology (Materials and Methods)

2.1. Study Design

It is a cross-sectional analytic study.

2.2. Study Area

The holy city of Makkah Al-Mokarramah is located in the western edge of Saudi Arabia. In the center of this city,

there is the holy mosque where Al-Ka'aba is located representing Qibla for all Muslims around the globe when they pray. Ministry of education (MOE) in Makkah is divided into 8 sectors and eastern sector is one of them. A total of 17 Female secondary schools belong to it. The researcher has chosen eastern sector randomly using simple randomization.

2.3. Study Population

Female secondary school teachers in Makkah city (eastern region)

2.4. Inclusion Criteria

- All secondary school teachers in the schools of the eastern region in Makkah city.
- Members of school administration who are basically teachers and holding a degree in teaching.
- All nationalities.

2.5. Exclusion Criteria

- Teacher who were on leave.
- Those who didn't practice teaching for the last 5 years.

2.6. Sample Size

As provided officially by the Ministry of Education Administration in Makkah, the total number of female teachers in secondary schools in the eastern region of Makkah during 1438-1439 is 418 teachers.

By using Raosoft statistical program, the sample size was calculated. The prevalence of 67% was chosen according to a study which showed that 67% of the teachers having LBP, [11] and the confidence interval was 95% with a margin of error 5%.The minimal sample size required for the study was calculated to be 188 teachers. To avoid loss of cases, a total sample of 207 teacher is planned to be included in the study.

2.7. Sampling Technique

Simple random technique was applied using Random number generator to choose the number and what are the schools to be included in the study until reaching total number of 207 teachers. Accordingly, 7 schools were chosen randomly with total number of 241 teachers.

2.8. Data Collection Tool (Instrument)

A self- administered questionnaire, was translated to Arabic language then translated back to English, it was tested by pilot study and then validated by 2 consultants of Family Medicine.

Questionnaire includes a cover page where all needed information by the participant is available, composed of number of questions divided into different parts, this questionnaire focuses on identifying the risk factors most likely attributing to lower back pain and exploring the daily activities of teachers and their lifestyle.

2.9. Data Collection Technique

The questionnaire was distributed among female secondary school teachers from different schools selected randomly covering eastern region in Makkah city in one month duration. Questionnaire includes a cover page where all needed information by the participant is available. The questionnaire was handled by the researcher to the directors of 3 schools on the beginning of the 1st week and to directors of 4 schools on the beginning of the 2nd week. The directors handled questionnaires to their teachers and the researcher went 3 days later to collect them back from the directors. A third visit to the schools was done on the 3rd week in order to compensate for any missing questionnaires.

Educational materials were provided with questionnaire as a gift. All hard copies were stored in a safe locked place. In case of any query the researcher left their email on the back of the questionnaire, mostly the questionnaire had closed ended questions in the form of multiple choice questions or yes or no options.

2.10. Study Variables

2.10.1. Dependent Variable

Low Back Pain.

2.10.2. Independent Variables

Age, gender, nationality, education, marital status, occupation, subject, income, Body Mass Index (BMI), comorbidities, stress, smoking, lifting heavy object, standing hours, sitting hours, exercise, number of children, number of pregnancies, housemaid at home, trauma, years of work, number of classes/week, extracurricular activities, school design, facility available in the school.

2.11. Data Entry and Analysis

Data were analyzed using the Statistical Program for Social Sciences (SPSS) software version 25.0. Categorical variables were expressed in frequency and percent while quantitative variables were expressed in mean and standard deviation. Categorical variables were compared with chi square test or Fischer exact test in case of small frequencies. Multivariate logistic regression analysis was performed including variables significant from univariate analysis and results expressed as adjusted odds ratio (AOR) and 95% confidence interval (CI). Statistical significance was considered at $p < 0.05$.

2.12. Pilot Study/Pretesting

A pilot study was conducted in one of secondary schools in Eastern region in Makkah, which is not included in the 7 schools selected for the study, using same data collection techniques, and apply full methodology to check for gaps and defects. Some few gaps were identified and modified.

2.13. Budget, Fund or Grant

This study is self-funded.

3. Results

Most of female teachers participated in the study (60.4%) aged between 40 and 49 years whereas 23.7% aged 39 years or below. Majority of them (77.9%) were married, reside in Makkah (92.8%) and had Bachelor degree (93.3%). The income of 35.8% of teachers ranged between 11000 and 14999 SR/month whereas that of 28% was 15000 SR/month and above. Number of children ranged between 4 and 6 among 45.9% of the participants whereas number of pregnancies/abortion ranged between 4 and 6 among 41.5% of them. Table 1.

About half of the female teachers (49.8%) had housemaid as seen in Figure 1. Majority of them (92.3%) had comfortable bed.

Table 1. Socio-demographic characteristics of female secondary school teachers, Eastern region, Makkah city

Socio-demographic characteristics	Frequency	Percentage
Age (years)		
≤39	49	23.7
40-49	125	60.4
≥50	33	15.9
Marital status		
Single	22	10.6
Married	161	77.9
Divorced	15	7.2
Widowed	9	4.3
Level of education		
Diploma	5	2.4
Bachelor	193	93.3
Postgraduate	9	4.3
Income (SR/month)		
<9000	25	12.0
9000-11000	50	24.2
11000-14999	74	35.8
≥15000	58	28.0
Place of residence		
Inside Makkah	192	92.8
Outside Makkah	15	7.2
Number of children		
None	39	18.8
1-3	65	31.4
4-6	95	45.9
>6	8	3.9
Number of pregnancies/abortion		
None	44	21.3
1-3	64	30.9
4-6	86	41.5
>6	13	6.3

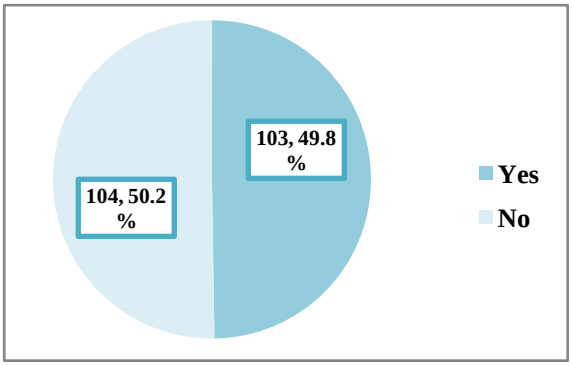

Figure 1. History of having housemaid among female secondary school teachers, Eastern region, Makkah city

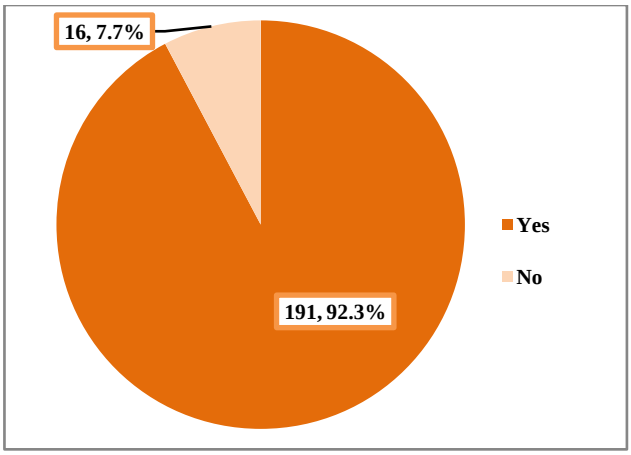

Figure 2. History of having comfortable bed among female secondary school teachers, Eastern region, Makkah city

3.1. Work-related Characteristics

Years of working in teaching ranged between 6 and 10 years among 32.9% and between 16 and 20 years among 25.6% of teachers. Majority of teachers (93.7%) used private car as a method of transportation to the school. Distance between home and school ranged between 5 and10 km among 29.5% of teachers whereas it exceeded 15 km among 24.6% of them. Slightly more than half (51.7%) of teachers worked in school buildings consisting of between 3 and 5 floors. However, majority of them (95.2%) used stairs. Nearly two-third (64.3%) of the participants had between 11 and 20 classes/week and 59.4% had between 11 and 20 teaching hours/week. Extracurricular activities were reported by 69.6% of teachers. Almost two-thirds of teachers had 3-5 standing hours/working day (65.2%) and <3 sitting hours/working day (63.7%). About two-thirds of teachers (61.8%) used comfortable furniture at work. History of lifting heavy objects was mentioned by 58.9% of teachers; mostly in a frequency of 1-5 times/week (79.5%) and less than 3 Kg (52.5%).

3.2. Personal Habits

From Figure 3, it is obvious that more than half of the teachers (55.6%) never practiced any sports/week whereas 36.2% practiced sports between one and two hours/week. Smoking was reported among 4.8% of the participants as shown in Figure 4.

3.3. Mental Healt

About two-thirds of teachers (64.1%) had history of low mood within the last two weeks (Figure 5) and 64.7% had history of loss of interest in doing hobbies in the last 12 months. Figure 6

Also, 66.7% felt anxious within the last 2 weeks as demonstrated from Figure 7.

3.4. Body Mass Index

From Figure 8, overweight and obesity were reported among 35.7% and 31.9% of the teachers, respectively.

Table 2. Work-related characteristics of female secondary school teachers, Eastern region, Makkah city

	Frequency	Percentage
Years of work		
1-5	15	7.2
6-10	68	32.9
11-15	29	14.0
16-20	53	25.6
>20	42	20.3
Method of transportation to the school		
On foot	1	0.5
Private car	194	93.7
Public transportation	12	5.8
Distance between home and school in km		
<5	50	24.2
5-10	61	29.5
11-15	45	21.7
>15	51	24.6
Number of used floors at school		
1-2	100	48.3
3-5	107	51.7
Using method inside the school		
Elevator	10	4.8
Stairs	197	95.2
Number of classes/week		
1-10	35	16.9
11-20	133	64.3
>20	39	18.8
Number of teaching hours/week		
1-10	52	25.1
11-20	123	59.4
>20	32	15.5
Extracurricular activities		
Yes	144	69.6
No	63	30.4
Standing hours at work/day		
<3	26	12.6
3-5	135	65.2
>5	46	22.2
Sitting hours at work/day		
<3	132	63.7
3-5	67	32.4
>5	8	3.9
Are furniture used at work comfortable?		
Yes	128	61.8
No	79	38.2
History of lifting heavy objects		
Yes	122	58.9
No	85	41.1
If “yes” for lifting heavy objects: How many times per week? (n=122)		
1-5	97	79.5
6-10	19	15.6
>10	6	4.9
If “yes” for lifting heavy objects: How much is the weight? (n=122)		
Less than 3 kg	64	52.5
3-5 kg	52	42.6
6-10 kg	6	4.9

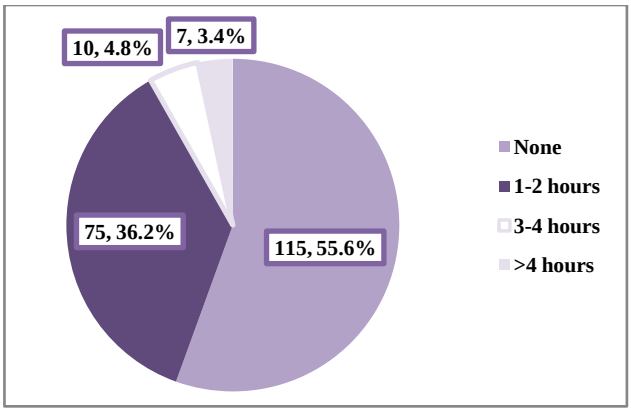

Figure 3. Frequency of sports activity among the participants per week

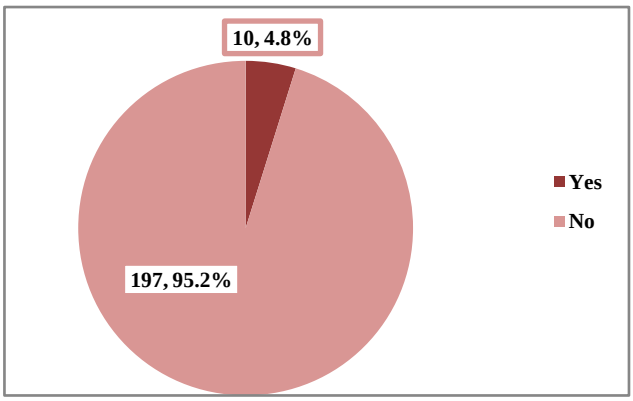

Figure 4. History of smoking among the participants

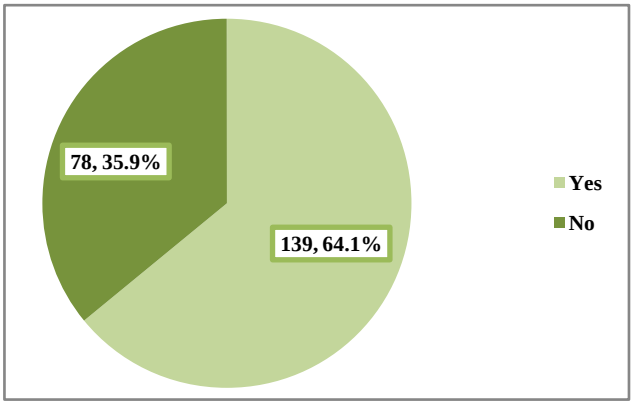

Figure 5. History of low mood within the last two weeks

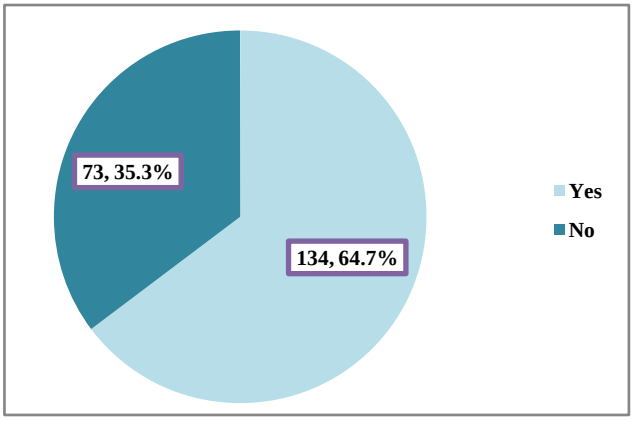

Figure 6. History of loss of interest in doing hobbies in the last 12 months among the participant

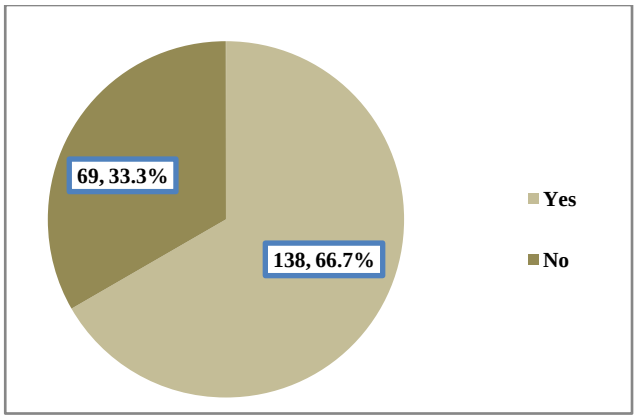

Figure 7. History of feeling anxious within the last 2 weeks among the participants

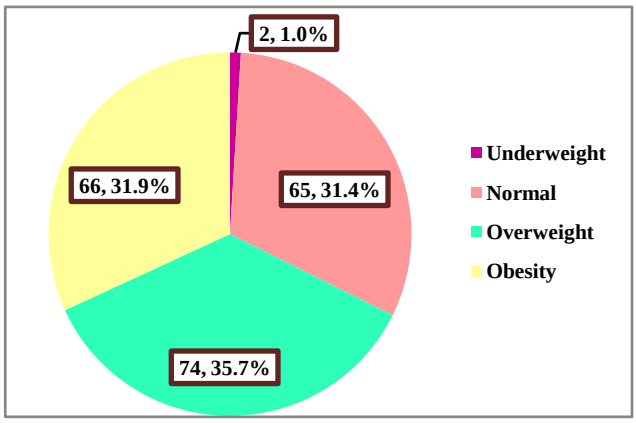

Figure 8. Body mass index of the participants

3.5. Medical History

History of vitamin D deficiency was observed among almost half of the teachers (48.3%) whereas about one-third of them (33.8%) did not know their vitamin D status Figure 9.

History of trauma to the back in the last month was reported by 6.8% of the teachers as clear from Figure 10.

History of complaining of upper back pain, neck pain and throat pain in the last month was reported by 62.3% of teachers Figure 11.

History of chronic diseases was observed among almost one-quarter of teachers (26.1%). (Figure 12)

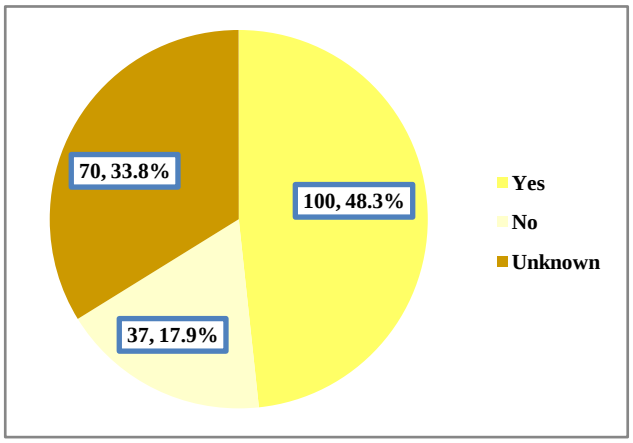

Figure 9. History of vitamin D deficiency among the participants

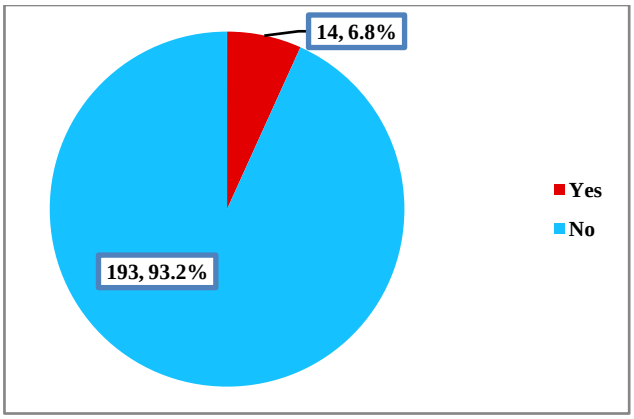

Figure 10. History of trauma to the back in the last month.

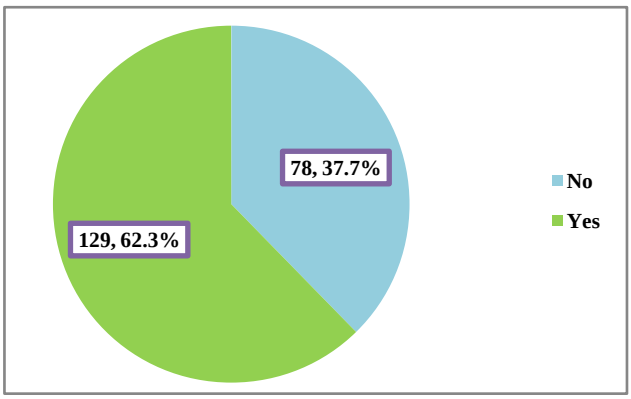

Figure 11. History of complaining of upper back pain, neck pain and throat pain in the last month

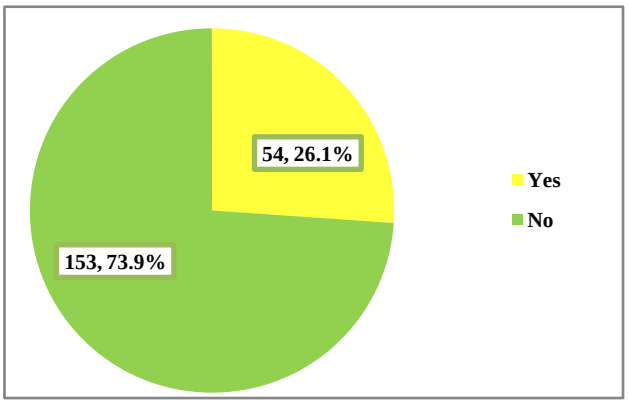

Figure 12. History of chronic illness among the participants

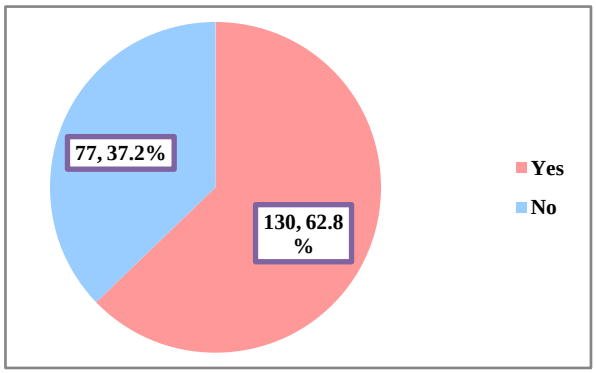

Figure 13. History of having low back pain during the last week (Point prevalence) among female secondary school teachers, Eastern region, Makkah city

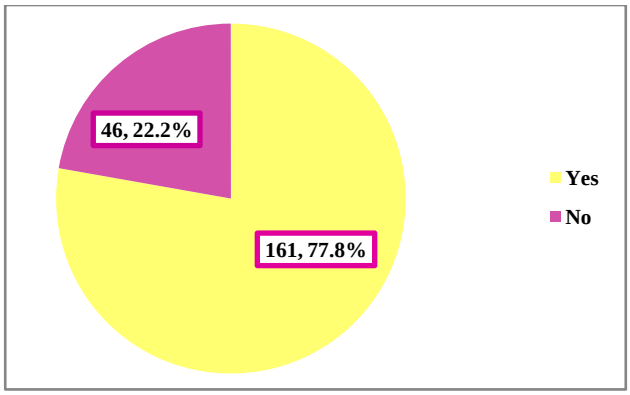

Figure 14. History of having low back pain during the last 12 months among female secondary school teachers, Eastern region, Makkah city

3.6. Low Back Pain

As shown from Figure 13, history of having low back pain during the last week (Point prevalence) among female secondary school teachers was 62.8%.

History of having low back pain during the last 12 months among female secondary school teachers, Eastern region, Makkah city was reported by 77.8% of them as illustrated in Figure 14.

3.7. Factors Associated with Low Back Pain in the Last 12 Months

3.9.1. Socio-demographic Factors

Majority of single teachers (90.9%) compared to 77.6% of married and 33.3% of widowed teachers had LBP in the last 12 months, p=0.004. Other studied socio-demographic factors (age, level of education, income, place of residence, number of children, number of pregnancies/abortions, having housemaid, and having comfortable bed) were not significantly associated with history of LBP in the last 12 months among the participants. (Table 3)

3.9.2. Work-related Factors

Teachers who had >20 classes/week were more likely to report LBP in the last 12 months (94.9%) compared to those who had less classes per week, p=0.011. Teachers who used more floors at schools or having more teaching hours per week were more prone to have LBP than others. However, the difference was borderline insignificant, p=0.053. Teachers who stand for more than 5 hours per day at work were more likely to have LBP compared to those who stand for less than 3 hours/day (93.5% versus 73.1%), p=0.015. Teachers who sit less than 3 hours/day were at greater risk for LBP than those who sit>5 hours per day (81.8% versus 50%). However, this difference did not reach the significance level, p=0.059. Majority of teachers who reported no comfortable furniture at school (94.9%) compared to 67.2% who reported having comfortable furniture at school developed LBP in the last 12 months, p<0.001. Teachers with history of lifting heavy objects were at higher risk for LBP than their counterparts (84.4% versus 68.2%), p=0.006. Other work-related characteristics of teachers were not significantly associated with LBP in the last 12 months as shown in Table 4.

Table 3. Socio-demographic factors associated with low back pain among female secondary school teachers in the last 12 months

	Low back pain		p-value
	No N=46 N (%)	Yes N=161 N (%)	
Age (years)			
≤39 (n=49)	9 (18.4)	40 (81.6)	
40-49 (n=125)	28 (22.4)	97 (77.6)	0.634*
≥50 (n=33)	9 (27.3)	27 (72.7)	
Marital status			
Single (n=22)	2 (9.1)	20 (90.9)	
Married (n=161)	36 (22.4)	125 (77.6)	
Divorced (n=15)	2 (13.3)	13 (86.7)	0.004*
Widowed (n=9)	6 (66.7)	3 (33.3)	
Level of education			
Diploma (n=5)	1 (20.0)	4 (80.0)	
Bachelor (n=193)	43 (22.3)	150 (77.7)	0.993*
Postgraduate (n=9)	2 (22.2)	7 (77.8)	
Income (SR/month)			
<9000 (n=25)	3 (12.0)	22 (88.0)	
9000-11000 (n=50)	11 (22.0)	39 (78.0)	
11000-14999 (n=74)	22 (29.7)	52 (70.3)	0.190*
≥15000 (n=58)	10 (17.2)	48 (82.8)	
Place of residence			
Inside Makkah (n=192)	44 (22.9)	148 (77.1)	
Outside Makkah (n=15)	2 (13.3)	13 (76.7)	0.310**
Number of children			
None (n=39)	5 (12.8)	34 (87.2)	
1-3 (n=65)	16 (24.6)	49 (75.4)	
4-6 (n=95)	23 (24.2)	72 (75.8)	0.482*
>6 (n=8)	2 (25.0)	6 (75.0)	
Number of pregnancies/abortions			
None (n=44)	7 (15.9)	37 (84.1)	
1-3 (n=64)	17 (26.6)	47 (73.4)	
4-6 (n=86)	19 (22.1)	67 (77.9)	0.633*
>6 (n=13)	3 (23.1)	10 (76.9)	
having housemaid			
No (n-104)	21(20.2)	83 (79.8)	
Yes (n=103)	25 (24.3)	78 (75.7)	0.480*
having comfortable bed			
No (n=16)	4 (25.0)	12 (75.0)	
Yes (n=191)	42 (22.0)	149 (78.0)	0.493**

*Chi-square test, **Fischer exact test.

3.10. Personal Habits

- Sports activity: There was no statistically significant association between frequency of sports activity among fe male teachers and history of LBP in the last 12 months as it is clear from Table 5.
- Smoking: From Table 6, it is realized that teachers` smoking had no statistical significant association with history of LBP in the last 12 months.

Table 4. Work-related factors associated with low back pain among female secondary school teachers in the last 12 months

	Low back pain		p-value
	No N=46 N (%)	Yes N=161 N (%)	
Years of work			
1-5 (n=15)	4 (26.7)	11 (73.3)	
6-10 (n=68)	10 (14.7)	58 (85.3)	
11-15 (n=29)	8 (27.6)	21 (72.4)	
16-20 (n=53)	16 (30.2)	37 (69.8)	
>20 (n=42)	8 (19.0)	34 (81.0)	0.280*
Method of transportation to the school (n=206)			
Private car (n=194)	42 (21.6)	152 (78.4)	0.267**
Public transportation (n=12)	4 (33.3)	8 (66.7)	
Distance between home and school in km			
<5 (n=50)	17 (34.0)	33 (66.0)	
5-10 (n=61)	10 (16.4)	51 (83.6)	
11-15 (n=45)	7 (15.6)	38 (84.4)	0.093*
>15 (n=51)	12 (23.5)	3 (76.5)	
Number of used floors at school			
1-2 (n=100)	28 (28.0)	72 (72.0)	0.053*
3-5 (n=107)	18 (16.8)	89 (83.2)	
Using method inside the school			
Stairs (n=197)	44 (22.3)	153 (77.7)	0.610**
Elevator (n=10)	2 (20.0)	8 (80.0)	
Number of classes/week			
1-10 (n=35)	7 (20.0)	28 (80.0)	
11-20 (n=133)	37 (27.8)	96 (72.2)	
>20 (n=39)	2 (5.1)	37 (94.9)	0.011*
Number of teaching hours/week			
1-10 (n=52)	9 (17.3)	43 82.7)	
11-20 (n=123)	34 27.6)	89 (72.4)	0.053*
>20 (n=32)	3 (9.4)	29 (90.6)	
Extracurricular activities			
Yes (n=144)	27 (18.8)	117 (81.3)	
No (n=63)	19 (30.2)	44 (69.8)	0.069*
Standing hours at work/day			
<3 (n=26)	7 (26.9)	19 (73.1)	
3-5 (n=135)	36 (26.7)	99 (73.3)	
>5 (n=46)	3 (6.5)	43 (93.5)	0.015*
Sitting hours at work/day			
<3 (n=132)	24 (18.2)	108 (81.8)	
3-5 (n=67)	18 (26.9)	49 (73.1)	
>5 (n=8)	4 (50.0)	4 (50.0)	0.059*
Are furniture used at work comfortable?			
Yes (n=128)	42 (32.8)	86 (67.2)	
No (n=79)	4 (5.1)	75 (94.9)	<0.001**
History of lifting heavy objects			
Yes (n=122)	19 (15.6)	103 (84.4)	0.006*
No (n=85)	27 (31.8)	58 (68.2)	
If “yes” for lifting heavy objects: How many times per week? (n=122)			
1-5 (n=97)	17 (17.5)	80 (82.5)	0.418*
6-10 (n19)	2 (10.5)	17 (89.5)	
>10 (n=6)	0 (0.0)	6 (100)	
If “yes” for lifting heavy objects: How much is the weight? (n=122)			
Less than 3 kg (n=64)	11 (17.2)	53 (82.8)	0.539*
3-5 kg (n=52)	8 (15.4)	44 (84.6)	
6-10 kg (n=6)	0 (0.0)	6 (100)	

*Chi-square test, **Fischer exact test.

Table 5. Association between frequency of sports activity among female secondary school teachers and low back pain in the last 12 months

Frequency of sports activity	Low back pain		p-value
	No N=46 N (%)	Yes N=161 N (%)	
None (n=115)	23 (20.0)	92 (80.0)	0.716
1-2 hours (n=75)	19 (25.3)	56 (74.7)	
3-4 hours (n=10)	3 (30.0)	7 (70.0)	
>4 hours (n=7)	1 (14.3)	6 (85.7)	

Table 6. Association between history of smoking among female secondary school teachers and low back pain in the last 12 months

History of smoking	Low back pain		p-value
	No N=46 N (%)	Yes N=161 N (%)	
Yes (n=10)	2 (20.0)	8 (80.0)	0.610*
No (n=197)	44 (22.3)	153 (77.7)	

* Fischer exact test.

3.11. Body Mass Index

Majority of obese female teachers (92.4%) compared to none of underweight teachers and 67.7% of normal subjects had LBP in the last 12 months, p<0.001.

3.12. Medical and Psychiatric History

Female teachers with history of chronic diseases were more likely to report LBP in the last 12 months than others (92.6% versus 72.5%), p=0.001. Also, those with known history of vitamin D deficiency were more prone to LBP in the last 12 months than those who had no Vitamin D deficiency (85% versus 56.8%), p=0.002. Teachers who had low mood within the last two weeks and those who had loss of interest in doing hobbies in the last 12 months were more likely to have LBP in the last 12 months compared to their counterparts (86.8% and 85.8% versus 62.8% and 63%, respectively), p<0.001. Similarly, female teachers who felt anxious within the last two weeks and those who were complaining of upper back pain, neck pain, throat infection were more likely to have LBP in the last 12 months compared to their counterparts (89.1% and 89.9% versus 55.1% and 57.7%, respectively), p<0.001. LBP was more reported among female teachers with history of trauma to the back in the last month compared to their counterparts (100% versus 76.2%), p=0.026. Table 8

Table 7. Association between body mass index of female secondary school teachers and low back pain in the last 12 months

Body mass index	Low back pain		p-value
	No N=46 N (%)	Yes N=161 N (%)	
Underweight (n=2)	2 (100)	0 (0.0)	<0.001
Normal (n=65)	21 (32.3)	44 (67.7)	
Overweight (n=74)	18 (24.3)	56 (75.7)	
Obesity (n=66)	5 (7.6)	61 (92.4)	

Table 8. Association between medical and psychiatric history of the female teachers and history of low back pain in the last 12 months

	Low back pain		p-value
	No N=46 N (%)	Yes N=161 N (%)	
History of chronic illness			
Yes (n=54)	4 (7.4)	50 (92.6)	0.001
No (n=153)	42 (27.5)	111 (72.5)	
History of vitamin D deficiency			
Yes (n=100)	15 (15.0)	85 (85.0)	
No (n=37)	16 (43.2)	21 (56.8)	0.002
Unknown (n=70)	15 (21.4)	55 (78.6)	
History of low mood within the last two weeks			
Yes (n=129)	17 (13.2)	112 (86.8)	
No (n=78)	29 (37.2)	49 (62.8)	<0.001
Loss of interest in doing hobbies in the last 12 months			
Yes (n=134)	19 (14.2)	115 (85.8)	
No (n=73)	27 (37.0)	46 (63.0)	<0.001
Feeling anxious within the last two weeks			
Yes (n=138)	15 (10.9)	123 (89.1)	
No (n=69)	31 (44.9)	38 (55.1)	<0.001
Complaining of upper back pain, neck pain, throat infection			
Yes (n=129)	13 (10.1)	116 (89.9)	<0.001
No (n=78)	33 (42.3)	45 (57.7)	
History of trauma to the back in the last month			
Yes (n=14)	0 (0.0)	14 (100)	
No (n=193)	46 (23.8)	147 (76.2)	0.026**

** Fischer exact test.

3.13. Multivariate Logistic Regression Analysis

Multivariate logistic regression analysis revealed that married teachers were 86% at lower risk for LBP compared to singles (Adjusted odds ratio "AOR":0.14, 95% confidence interval "CI": 0.02-0.83, p=0.030. Teachers with more number of teaching hours/week (>20) were at almost double-risk for having LBP compared to those with 1-10 hours/week (AOR: 2.13, 95%CI: 1.63-24.02, p=0.036). Teachers with history of chronic diseases were at greater risk for developing LBP compared to those without chronic diseases (AOR: 4.21, 95%CI: 1.03-17.19, p=0.045). Feeling anxious within the last two weeks was accompanied by significant increased risk for LBP (AOR: 3.77, 95%CI: 1.46-9.75, p=0.006). Similarly, complaining of upper back pain, neck pain, throat infection was significantly associated with greater risk of LBP (AOR: 5.62, 95%CI: 2.18-14.48, p<0.001). Considering normal BMI subjects as a reference category, obese teachers were at 6-folded risk for LPB (AOR: 6.41, 95%CI: 1.83-22.43, p=0.004). Standing hours/day, standing hours at work/day, use of comfortable furniture at work, history of vitamin D deficiency, history of low mood within the last two weeks, loss of interest in doing hobbies in the last 12 months, and history of trauma to the back in the last month were not significantly associated with history of LBP in the last 12 months. (Table 9)

Table 9. Predictors of Low back pain among female secondary school teachers: Multivariate logistic regression analysis

	B	SE	AOR (95%CI)	p-value
Marital status				
Single (n=22)a				
Married (n=161)	-1.956	0.904	0.14 (0.02-0.83)	0.030
Divorced (n=15)	-1.596	1.297	0.20 (0.02-2.58)	0.219
Widowed (n=9)	-3.256	1.748	0.04 (0.01-1.19)	0.063
Number of teaching hours/week				
1-10 (n=52)				
11-20 (n=123)	-0.842	0.592	0.43 (0.14-1.37)	0.155
>20 (n=32)	1.356	0.930	2.13 (1.63-24.02)	0.036
History of chronic illness				
Yes (n=54) a	1.437	0.718	4.21 (1.03-17.19)	0.045
No (n=153)				
Feeling anxious within the last two weeks				
Yes (n=138) a	1.327	0.485	3.77 (1.46-9.75)	0.006
No (n=69)				
Body mass index				
Normal (n=65)a				
Overweight (n=74)	0.200	0.498	1.22 (0.46-3.24)	0.688
Obesity (n=66)	1.858	0.639	6.41 (1.83-22.43)	0.004
Complaining of upper back pain, neck pain, throat infection				
Yes (n=129) a	1.726	0.483	5.62 (2.18-14.48)	<0.001
No (n=78)				

[a]: Reference category, B: Slop, SE: Standard error AOR: Adjusted odds ratio, CI: Confidence interval.

Terms of standing hours at work/day, use of comfortable furniture at work, history of vitamin D deficiency, history of low mood within the last two weeks, loss of interest in doing hobbies in the last 12 months, history of trauma to the back in the last month were removed from the final model.

3.14. Frequency and Characteristics of the Low Back Pain

Table 10. Frequency and characteristics of the low back pain in the last month among the participants

	Frequency	Percentage
Frequency		
None	46	22.2
1-2 times	58	28.0
3-4 times	34	16.4
5-6 times	25	12.1
>6 times	44	21.3
History of wake up at night because of back pain		
No	117	56.5
Yes	90	43.5
History of affection of work performance because of the low back pain		
No	149	72.0
Yes	58	28.0

It is clear from Table 10 that the frequency of LBP in the last month ranged between once and twice in 28% of teachers whereas it exceeded 6 times among 21.3% of

them. History of wake up at night because of back pain was mentioned by 43.5% of teachers whereas history of affection of work performance because of the low back pain was reported among 28% of them.

4. Discussion

Teaching is regarded as a highly stressful job. [12,13] Additionally, the nature of the work of school teachers involves a lot of unsafe acts and postures such as repetitive writing on board, frequent reading and assignment correction as well as sustained sitting in front of computer, and standing up in class while teaching.[14] Studies suggest a link between teaching occupation and low back pain. However, the prevalence of LBP and their associated factors and outcomes among teachers were not sufficiently studied. Therefore, the present study was carried out to estimate the prevalence and determine the predictors of LBP among female high school teachers in Eastern region at Makkah city, Saudi Arabia.

4.1. Prevalence of LBP

In the present study, the prevalence of LBP during the last 12 months among female secondary school teachers was 77.8% whereas the point prevalence (during the last week) was 62.8%. It has been documented that the teaching profession have many job demands and therefore musculoskeletal disorder develops over time and is caused by either the work demands or by the working environment. [15] This might explain the high prevalence observed in the present study. However, lower rates have been reported in similar studies carried out in India where the point and overall prevalence of LBP were 28% and 23%, respectively, [9] Japan where the total prevalence of LBP was 20.4% in male and 23.2% in female teachers, [16] Turkey, where 60.3% of teachers had work-related pain; low back pain was the commonest (74.9%). [17] and Botswana, where the prevalence of LBP among teachers over 12 months was 55.7%. [10] Difference in the prevalence of LBP between various studies could be explained by using different tools to assess LBP; in the present study we depended on a direct one question and this could partially explain the high prevalence observed in this study compared to others.

4.2. Factors Associated with LBP

In the present study, among determinants of LBP as evidenced from multivariate logistic regression analysis was marital status as married teachers were less likely to develop LBP compared to single teachers. This contrary to what has been reported among Iranian general adult population [18] and nurses [19] as well as active duty military population in USA. [20] However, it agrees with what has been reported in Taiwan. [21] This is interesting and call for further study to explain this association, which in uncommon.

In the present study and in accordance with numerous studies, [22,23,24,25,26] obese teachers were at higher risk for LPB compared to those with normal BMI. This finding could be explained by both biomechanical and metabolic mechanisms. [27]

In the current study, teachers with more number of teaching hours/week were at higher risk for having LBP, even after controlling for confounders. However in univariate analysis, teachers with more standing hours, less sitting hours and those who reported no comfortable furniture at work were at higher risk for LBP. Gupta and Sharma (2018) [9] reported that teaching is a monotonous work, therefore most likely associated with LBP, particularly among teachers working in large classes, which consequently decreases their working capacity. Therefore, Tuomi K, et al reported that once the first signs of decreasing work ability are noticed, early preventive measures should be started for better outcomes. [28]

Teachers with history of chronic diseases were at greater risk for developing LBP compared to those without chronic diseases in the current study. Other studies observed a relation between chronic cardiovascular diseases/hypertension and low back pain. [29,30] However, the etiology of this relation is not yet understood; however, it could be attributed to relatively sedentary life produced by these diseases.

Some psychological factors have been identified as determinants for LBP in the present study such as feeling anxious, low mood and loss of interest in doing hobbies. However, after controlling for confounding, only feeling anxious was related to the development of LBP. Yilmaz et al. (2012) has reported that psychological elements at work environment contribute significantly to LBP, as teachers usually work in a stressful environment with lack of educational resources, limited rewards, exposure to unpredictable students` behaviour and relationship with administration and colleagues. [31]

The present study revealed an association between complaining of upper back pain, neck pain, or throat infection from one side and LBP from the other side. However, history of trauma to the back in the last month was significant only in univariate but not in multivariate analysis. In Botswana, previous back injury and abnormal arm position were significant predictors for LBP among teachers. [10]

4.3. Effects of LBP

In the present study, the frequency of LBP in the last month among female teachers was once to twice in 28% whereas it exceeded 6 times among 21.3% of them. Additionally, history of wake up at night because of back pain was mentioned by 43.5% of teachers which result in insufficient sleep quality whereas history of affection of work performa nce because of the low back pain was reported among 28% of them. These figures indicate burden of LBP on some aspects of quality of life and work performance of the affected teachers, which impacts negatively their role as role model for students. [32] Therefore, prompt action is needed to reduce this burden. In a similar Indian study, although the prevalence of LBP was low, it adversely impacted more than one-third of teacher`s routine performance and general psychological well-being. [9] Also in Botswana, 67.1% of teachers complained of minimal disability. [10]

Although this study, up to our knowledge, is the first to investigate the prevalence and risk factors of LBP among female teachers in Makkah Region, it has some few limitations including the cross-sectional design, which does not specify the temporal relationship between LBP and its associated factors. Also, conduction of the study among only female teachers is considered a study limitation. Conduction of the study in only Eastern Region of Makkah could impacts the generalizability of results over the entire population of teachers in whole Makkah. Finally depending on one subjective self-reported question to indicate LBP is considered a clear limitation of the study.

5. Conclusion

Low back pain is a very common problem, affecting most of female secondary school teachers in Eastern Region of Makkah city. Single teachers, those with more number of teaching hours/week, history of chronic diseases, those reported feeling anxious within the last two weeks, complaining of upper back pain, neck pain, or throat infection and obese teachers were more likely to have LBP compared to their counterparts. Histories of wake up at night because of back pain as well as affection of work performance because of the low back pain were reported by a considerable proportion of female teachers.

6. Recommendations

Based on results of the present study, the followings are recommended:

1. Special attention should be paid to the school environment and scheduling of teachers` working hours.
2. Care must be given to psychological health and mental well-being of teachers.
3. Measure should be taken to keep teachers` normal weight through education, encouragement to practice exercise and consuming healthy diets.
4. Further longitudinal study on larger scale and including male teachers is warranted.

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