

## Research Article

# Prevalence and Associated Factors of Low Back Pain among School Teachers in Mekelle City, Northern Ethiopia, 2016: A Cross Sectional Study

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## Abstract

**Background:** School teachers are among the occupational groups who are affected with low back pain. The 2010 Global Burden of Disease suggested that low back pain is amongst the top sixth disability (DALYs) causing disease and injuries. A significant body of research has reported that school teachers are at an increased risk of low back pain, with a prevalence of 44% in Addis Ababa to 57.5% in Gondar, Ethiopia. Therefore, the aim of this study was to assess the prevalence and associated factors of low back pain on school teachers in Mekelle city, Ethiopia.

**Methods:** Institution based cross-sectional study was conducted in schools of Mekelle city from March 5-April 15/2016. A total of 406 teachers were involved in this study. Simple random sampling technique was used to select respondents and all schools were included in the study. Data were entered in to EPI Info 7 and exported to SPSS version 20 software for further process and analysis. Odds ratio along with 95% CI was computed to ascertain the association between covariate and outcome variables. Statistical tests at p-value of <0.05 were considered as cut off point to determine statistical significance.

**Results:** The twelve month self-reported prevalence of low back pain among teachers was 223 (54.9%). Being female sex (AOR=1.833, 95% CI: 1.172, 2.868), smoking habit (AOR=5.452, 95% CI: 1.774, 16.753), doing regular physical (AOR=0.0486, 95% CI: 0.309, 0.767) and sleep disturbance (AOR=3.235, 95% CI: 1.319, 7.931) were predicting which made significant association with low back pain.

**Conclusion:** This study has shown that prevalence of low back pain was high among school teachers. Being female, older age, smoking habit, no physical exercise and sleep disturbance were the risk factors associated with low back pain. Hence, strategic intervention is required from the side of ministry of education in collaboration with ministry of health on the modifiable risk factors particularly regular physical exercise, avoiding smoking habit and having enough time to sleep.

**Keywords:** Low back pain; Risk factors; Musculoskeletal disorders; Mekelle city; Ethiopia

## Introduction

Low Back Pain (LBP) is one of the common Musculoskeletal Disorders (MSD) affecting many people worldwide and it is one of the most common and most expensive occupational health problems in both developed and developing countries [1,2]. Even though LBP is widely distressing population found in industrialized countries, the situation is even worse in developing countries as a result of suboptimal working environments and lack of awareness on ergonomics issue [3,4]. LBP is defined as pain and discomfort below the costal margin and above the inferior gluteus fold, with or without referred leg pain [5]. Some groups of workers are at high risk of LBP due to the nature of their occupation and teachers stand out among

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these groups [6]. The 2010, Global Burden of Disease estimated that LBP is ranked highest in terms of disability (YLDs), and sixth in terms of overall burden(DALYs) and it causes an enormous economic burden on individuals, industry and government at large [7,8]. Globally, the annual prevalence of LBP is 31% [9]. LBP among the western societies was reported to be between 20% and 62% and in Africans ranged from 14% to 72% [10]. A significant body of research has reported that school teachers are at an increased risk of LBP [3], with a prevalence of 45.6% in China [11], 55.7% in Botswana, with 67.1% of them reporting minimal disability [4], 40.4% in Malaysia [12], 44% in Addis Ababa [10], and 57.5% in Gondar [13].

The duties of teachers are not restricted to only teaching in classes, but also they anticipated preparing lessons, participating in extracurricular activities, assessing student's work, and satisfying requests from management [14-16]. These may cause teachers to suffer adverse mental and physical health problems and limits participation in social activities [12-15]. The consequence of LBP shows not only poor quality of life of individuals, but also diminishing labor productivity due to absenteeism, off-work and early retirement and intensifying medical costs [4,12,17].

Several factors have been correlated to the development of LBP in the teaching profession [14]. These factors include; incorrect working postures, prolonged writing and standing for long time in class, length

of employment, excessive work load [6,14,15]. Psychosocial factors such as low job satisfaction, and depression also has implicated as risk factors for LBP [3,6,14,18]. Socio-demographic factors, such as age, sex, lifestyle factors, such as smoking and body mass index are other associated factors for LBP [15,19,20]. Teacher's health has a substantial effect on countries development since they are valuable resources for socio-economic and cultural development of a country. Hence, increasing incidence of LBP among teachers will affect the education system of a country [10]. Even though the present swift economic development has brought changes in work environment in Ethiopia, the organization of occupational health and safety services is not yet responding to the growing demands for workers' health [21].

Despite these facts, the risk factors of LBP particularly within the teaching profession have not been given sufficient consideration in the literature. Furthermore, as far as the author's knowledge, few researches have been done in the teaching profession in Ethiopia. Hence, the aim of this study was to determine the prevalence and identify the associated factors that influence LBP. Therefore, studying this problem will help in reducing the incidence of LBP and early retirement of teachers from work which leads to enhancing the quality of education that their students receive.

## Materials and Methods

The study was conducted in schools of Mekelle, the capital city of Tigray National Regional State. Mekelle city is located in the Northern part of Ethiopia, 783 kilometers from Addis Ababa, the capital city of Ethiopia. According to the 2007 Central Statistical Agency census report, it has a population size of 215,914 and more than half of them (110,989) were females [22]. Overall, there were 88 kindergartens, 86 elementary and 24 secondary schools with a total number of 3024 teachers working there (Unpublished report). An institutional based cross-sectional study was conducted from March 5 to April 15, 2016.

### Population, sample size and sampling procedures

The source population was all teachers who teach in Mekelle city irrespective of the type of school they teach and study population was all teachers who taught in these schools during the study period. Teachers who had work experience below one year, pregnant women, and teachers with known cause of LBP like injury were excluded from this study. A single population formula ( $n = z\alpha/2^2 / (p)(1-p)/d^2$ ) was used to estimate the sample size based on the following assumptions: proportion of teachers with LBP from previous study was 53.8% [13], 95% level of confidence, 5% margin of error and 10% of non-response rate. Therefore, the total sample size was 421 participants. There were 88 kindergartens, 86 elementary and 24 secondary schools with a total number of 3024 teachers and all schools were involved in the study. Then, Probability to Proportional Size (PPS) allocation technique was used to allocate sample sizes to each school based on their number of teachers. Simple random sampling technique was used to select the study participants from each school and to avoid selection bias.

### Variables

**Outcome variable:** Low Back Pain (LBP).

### Predictor variables

**Socio-demographic characteristics:** Sex, age, marital status, religion, educational level, institution, work experience, monthly salary, Body Mass Index (BMI).

**Behavioral characteristics:** Smoking habit, alcohol drinking, sleep disturbance, doing physical exercise

**Working condition characteristics:** Prolonged standing during Prolonged standing, prolonged sitting, provision of office, type of teaching aid device.

**Psychosocial characteristics:** Feel happy at work, get angry at others, good relationship with boss, support at work.

### Measurement of variables

LBP was operationally defined as experience of aching, burning, stabbing, sharp or dull, well defined, or vague with intensity ranging from mild to severe type of pain at the lower back. Therefore, LBP was measured using respondent's self-report having at least one of the above symptoms and it was dichotomized as yes or no (1 represents yes and 0 represents for no pain).

Body Mass Index (BMI) was calculated using the following formula [ $BMI = \text{weight in kg} / (\text{height})^2(\text{m})$ ]. Electronic body scale model AQT 6520, china was used to measure the weight of the respondents and their height was measured using tape measure.

Respondents who remained in standing position during teaching for more than an hour without break were considered to have long time standing position and it was dichotomized as yes or no.

A respondent who stayed in sitting position at school performing academic activities for more than an hour without break was considered to have long time sitting and it was dichotomized as yes or no. A respondent who performed physical exercise more than 150 minutes per week was considered as one who did physical exercise and it was dichotomized as yes or no.

### Data collection toll and procedures

Questionnaire was adapted from Standardized Nordic Questionnaire (SNQ) [23]. The questionnaire was originally prepared in English language and translated in to Tigrigna language (local language) and back to English for its consistency. Data was collected using self-administered questionnaire by three trained physiotherapists after they had 2 days training. The validity and reliability of the instrument was checked through pretest among 10% (42 participants) of the total sample size in Wukro town outside Mekelle. The overall supervision was carried out daily by supervisors and the principal investigator. Ethical clearance was obtained from the ethical review board of University of Gondar, College of Medicine and Health Sciences. Then, letter of support was obtained from Tigray Regional Health Bureau (TRHB) to Mekelle city Education Bureau then to respective schools. Informed written consent was obtained from study participants after explaining the purpose and importance of the study. Confidentiality was assured by excluding respondent's name. Teachers who had severe chronic LBP were advised to visit physiotherapy department as soon as possible.

### Statistical analysis

Data were cleaned and entered into EPI Info 7 and exported to SPSS version 20 software for further process and analysis. Descriptive Statistics was presented in the form of frequency, tables, graphs, percentages, means and standard deviation. Odds ratio along with 95% CI was computed to ascertain the association between covariate and outcome variables. The assumptions for binary logistic regression were checked. The goodness of fit had tested by Hosmer-Lemeshow statistic and all variables with P-value greater than 0.05 were fitted to the multivariable model. Variables that have p-value of <0.2 at bivariate analysis (Sex, age, work experience, smoking

habit, experience of doing physical exercise, and sleep disturbance) were included in multivariable logistic regression analysis to control possible confounding factors. Statistical tests at p-value of <0.05 were considered as cut off point to determine statistical significance.

## Results

### Socio-demographic characteristics of teachers

A total of 421 questionnaires were distributed to eligible participants from whom, 406 were returned with a response rate of 96.4%, since it was self-administered technique. Of this respondents, 207 (51%) of them were males. The mean age of the respondents was 36.9 (SD  $\pm$  10.4) years with age ranging from 20 to 64 years old. Majority of the respondents, 350 (86.2%) were Orthodox Christian followers followed by Muslim 30 (7.4%). The median of monthly income was 3445 Ethiopian Birr. Body Mass Index (BMI) of most respondents, 294 (72.4%) was within the normal range (Table 1).

**Table 1:** Socio-demographic characteristics of teachers in Mekelle city, May 2016, (n=406).

Variables	Frequency (n)	Percent (%)
<b>Age</b>		
< 30	116	28.6
30-40	135	33.3
>40	155	38.2
<b>Marital status</b>		
Single	135	33.3
Married	211	52
Divorced	27	6.7
Widowed	10	2.5
Separated	14	3.4
Co-habited	9	2.2
<b>Religion</b>		
Orthodox	350	86.2
Muslim	30	7.4
Protestant	18	4.4
Catholic	8	2
<b>Educational level</b>		
Certificate	48	11.8
Diploma	191	47
BSc, degree	155	38.2
Master	12	3
<b>Institution</b>		
Kindergarten	48	11.8
Elementary	236	58.1
Secondary	122	30
<b>Work experience in years</b>		
<10	160	39.4
$\geq$ 10	246	60.6
<b>Monthly salary in ETB</b>		
$\leq$ 1400	34	8.4
1401-2350	41	10.1
2351-3550	140	34.5
3551-5000	187	46.1
>5000	4	1
<b>BMI</b>		
Underweight	64	15.8
Normal range	294	72.4
Overweight	44	10.8
Obese	4	1

### Behavioral characteristics of teachers

Of 406 respondents, 32 (7.9%) had smoking experience and 116 (28.5%) had a sleeping disorder. The mean sleeping time of the respondents was 7.4 (SD  $\pm$  1.3) hours and 222 (54.7%) respondents had less than 8 sleeping hours per day. Among the 149 respondents who had experience of physical exercise, 141 (70.5%) of them had

doing physical exercise less than five hours per a week. The mean hours of physical exercise was 4.9 (SD  $\pm$  3.2) hours per a week.

### Working environment characteristics of teachers

Nearly all respondents, 397 (97.8%) had experience of long time standing more than an hour without break. The mean standing hours per a week was 18.3 (SD  $\pm$  5.1) hours. More than half of respondents, 231 (56.9%) had experience of long time sitting more than an hour without break. The mean sitting hours per a week was 13.7(SD  $\pm$  3.9) hours. Of the respondents, 215 (53%) responded that the chairs and tables they used were suited per their height (Table 2).

**Table 2:** Working condition of teachers in Mekelle city, March 2016, (n=406).

Variables	Frequency (n)	Percent (%)
<b>Have office to stay</b>		
Yes	373	91.9
No	33	8.1
<b>Office with chairs and tables</b>		
Yes	373	91.9
No	33	8.1
<b>Types of teaching aid</b>		
Chalk and board only	298	73.4
Flip chart	101	24.9
Overhead projector	3	0.8
Lap top and LCD	4	0.9
<b>Total teaching hours per week</b>		
<30	83	20.4
30-40	293	72.2
>40	30	7.4

### Psychosocial characteristics of teachers

Out of 406 respondents, 237 (58.4%) felt happy at work while 201 (49.5%) responded that they got angry at others more often than usual. For example, 47 (23.2%) respondents got angry at family, 60 (29.9%) at colleagues and 94 (46.9) at boss. More than three fourth, 309 (76.1%) of respondents had good relationship with their boss.

### Co-morbidity characteristics of teachers

Out of the 406 respondents, 88 (21.7%) of them had recurrent severe headache, 20 (4.9%) had asthmatic problem. Among the respondents with severe headache, 50 (56.8 %) of them felt LBP during headache. Out of 20 (4.9%) respondents with asthma 8 (40 %) responded that they felt LBP during asthmatic problem.

### Prevalence of low back pain among teachers

The 12 month self-reported prevalence of LBP among teachers was 223 (54.9%) with 95% CI: 50.2%, 59.6%. The prevalence was 71 (58.2%) among secondary school teachers, 131 (55.5%) among elementary school and 21 (43.8%) among Kindergarten teachers. Out of the respondents who reported LBP in the last twelve months majority, 171 (76.8%) were not seen by a doctor or Physiotherapist (Table 3). The length of time in days that LBP prevented respondents from doing routine work at home or away from home was described in Figure 1.

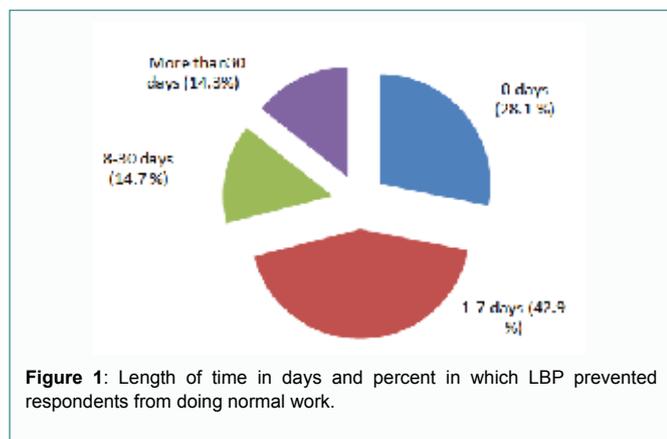
### Factors associated with LBP

Binary logistic regression analysis was initially used to determine association between LBP and different variables. Hence, LBP was significantly associated with sex, age, smoking habit, doing physical exercise, and sleep disturbance. Multivariable logistic regression analysis revealed a number of correlations between LBP and socio-demographic, behavioral and psychosocial factors. Being female was 1.8 times (AOR=1.83, 95% CI: 1.17, 2.86, p=0.008) more likely

to experience LBP when compared to being male. The odds of LBP was 2 and 2.3 among teachers whose age ranged from 30 to 40 and >40 years as compared to those who were younger than 30 years old (AOR=2.02, 95% CI: 1.06, 3.83, p=0.031) and (AOR=2.34, 95% CI: 1.02, 5.37, p=0.045) respectively. Teachers who had smoking habit were 5 times more likely to report LBP when compared to non-smokers (AOR=5.45, 95% CI: 1.77, 16.75, p=0.003). The likelihood of experiencing LBP among teachers who had regular physical exercise were less likely by 50% to report as compared to those who did not have (AOR=0.48, 95% CI: 0.30, 0.76, p=0.002). Teachers who had sleep disturbance were 3 times more likely to experience LBP when compared to those who had no sleep disturbance (AOR=3.23, 95% CI: 1.31, 7.93, p=0.01) (Table 4).

**Table 3:** Prevalence and characteristics of LBP among teachers in Mekelle city, May 2016, (n=223).

Variables	Frequency (n)	Percent (%)
<b>LBP prevented work activity at home or away from home</b>		
Yes	163	73.2
No	60	26.8
<b>LBP prevented leisure activity at home or away from home</b>		
Yes	61	27.2
No	162	72.8
<b>LBP in the last seven days</b>		
Yes	102	46
No	121	54
<b>Feel LBP during standing</b>		
Yes	181	80.8
No	42	19.2
<b>Feel LBP during sitting</b>		
Yes	54	24.1
No	169	75.9
<b>Feel LBP during sleeping</b>		
Yes	37	16.1
No	186	83.9
<b>Feel LBP during walking</b>		
Yes	21	9.4
No	202	90.6
<b>Feel LBP during doing physical exercise</b>		
Yes	8	3.6
No	215	96.4
<b>Feel LBP during forward bending</b>		
Yes	198	88.4
No	25	11.4
<b>Feel LBP during backward bending</b>		
Yes	9	4
No	214	96



**Figure 1:** Length of time in days and percent in which LBP prevented respondents from doing normal work.

**Table 4:** Factors associated with LBP among school teachers in Mekelle city 2016, Mekelle, Ethiopia, (n=406).

Variables	LBP		Crude OR (95% CI)	Adjusted OR (95% CI)
	No, n	Yes, n		
<b>Sex</b>				
Male	107	100	1	1
Female	76	123	1.732 (1.167, 2.571)	1.833 (1.172, 2.868)
<b>Age</b>				
<30	74	42	1	1
30-40	57	78	2.411 (1.448, 4.015)	2.023 (1.068, 3.833)
>40	52	103	3.490 (2.107, 5.780)	2.343 (1.021, 5.379)
<b>Work experience</b>				
<10	96	69	1	1
≥ 10	87	154	2.463 (1.641, 3.696)	1.286 (0.651, 2.539)
<b>Smoking habit</b>				
Yes	4	28	6.426 (2.210, 18.679)	5.452 (1.774, 16.753)
No	179	195	1	1
<b>Physical exercise</b>				
Yes	88	61	0.406 (0.269, 0.615)	0.486 (0.309, 0.767)
No	95	162	1	1
<b>Sleep disturbance</b>				
Yes	7	28	3.610 (1.539, 8.472)	3.235 (1.319, 7.931)
No	176	195	1	1

### Discussion

This study estimated the 12-month prevalence of LBP among school teachers in Mekelle city. This study found that, 223 (54.9%) teachers had LBP. This finding was in line with the studies conducted in Gondar town (Ethiopia) and in different studies in Botswana, where (53.8%) and (55.7 %, 52.6% respectively) of respondents had LBP respectively [4,13,16]. The prevalence of LBP found in this study was, however, relatively higher than those reported in studies conducted in Addis Ababa (Ethiopia) [10], South Cairo [24], Japan [25], China [11], Turkey [26], and Dhaka city [27], where 44%, 41%, 40.7%, 45.6%, 24.5%, 46.2% of school teachers had LBP respectively. This could be as a result of socio-economic and health service provision difference, where Ethiopia is a developing country whereas the other mentioned countries are well developed countries. As a result they could have well organized working environment, quality health service and even the teachers may have good awareness on ergonomics issue, education and training programs. Moreover, self-prevention strategy of LBP between Ethiopia and other mentioned countries might be different.

Females reported a significantly higher prevalence of LBP than males (61.8% vs. 48.3%) in this study. Females were 1.8 times more likely to experience LBP as compared to males. This finding is found to be consistent with previous studies conducted on school teachers in Gondar (Ethiopia) [13], Addis Ababa (Ethiopia) [10] and Botswana [4] in which being female was significantly associated with LBP compared to male teachers. Other study also indicates that female teachers reported a significantly higher prevalence of LBP when compared to male teachers even though there were no significance associations [3,27]. The possible reason could be that history of previous pregnancy and the involvement in house hold activities more often than males might have contributed for relatively higher prevalence. Another reason could be that in this study male teachers (67.9%) were involved in more regular physical exercise than females (32.9%).

The findings of this study indicating that increasing age increases the odds of developing LBP. Teachers who are in the age range of 30 and 40 and >40 years were 2 and 2.3 times more likely to report LBP as compared to those who were younger than 30 years old. Similar findings were also reported in a study conducted in Gondar, Ethiopia [13] and Botswana [4], where teachers whose age >40 were

2.3 and 1.56 times respectively reported more likely to develop LBP when compared to age of less than 30 years. In addition, the study conducted in Gondar also reported that the odds of having LBP among the age category of 30 to 40 years were 1.7 times as compared to age of less than 30 years [13]. Similarly, in a study carried out in Ethiopia and Slovenia among school teachers, where increasing age was found to increase the odds of LBP [10,20]. Other finding from Bentong, Pahang, and Dhaka city reported that the middle age group of teachers has reported high prevalence of LBP compared to younger age group [3,27].

One of the possible reasons for the difference between older age teachers and younger ones could be that as people get older, weakness of muscles in the lower back could happen and the intervertebral discs may not tolerate injuries. A previous study suggested that a likely reason for the higher prevalence of LBP among older teachers was that, as people get older gradual decline in muscle mass and loss of connective tissue elasticity as well as depletion of the cartilage between joints occurs [28]. In this study, smoking habit was significantly associated with LBP among school teachers. Teachers who had smoking habit were 5.4 times more likely to report LBP as compared to non-smokers. This result was consistent with the study carried out in Gondar, Ethiopia [13]. In another study, it shows that there was an increasing trend in LBP among smokers even though it was not significant [12]. A previous study suggested that the likely reason for the difference between smokers and non-smokers might be smoking damages tissues in the lower back and elsewhere in the body by slowing down circulation and reducing the flow of nutrients to joints and muscles [29].

Experience of doing regular exercise was the other factor which was associated with LBP in this study. Teachers who had experience of doing regular physical exercise were less likely by 50% to report LBP as compared to those who did not have. Similar finding has been found in a study conducted on school teachers in Gondar, Ethiopia [13] and in Botswana [4]. One of the possible reasons for the difference physical exercise may strengthens muscles of the lower back there by preventing injury. Another reason could be exercise increases blood flow to the spine, which supplies healing nutrients to the structure of the LB. Moreover, this study showed that sleep disturbance was significantly associated with LBP. Teachers who had sleep disturbance were 3.2 times more likely to experience LBP as compared to those had not. This result was consistent with the study conducted Dhaka city [27] and in Gondar, Ethiopia [13]. The possible reason for the difference could be those who got disturbance during sleeping time lack complete rest when falling asleep.

## Limitations

The presence of LBP depends solely upon the subjective self-report of the respondents and not based upon an objective clinical diagnosis. Hence, there might be possibility of recall bias which could lead to over or underestimation. Due to the nature of cross-sectional design, only association can be identified but it is impossible to establish inferences of causality.

## Conclusion

This study has shown that prevalence of LBP is high among school teachers. Teachers have been prevented from doing their normal work at home oral way from home due to LBP in the last 12 months. Being female, older age, smoking habit, doing physical exercise, and sleep disturbance were the factors associated with LBP. Hence, undertaking

regular physical exercise, avoiding smoking habits and having enough time to sleep minimizes developing low back pain among teachers. The ministry of education in collaboration with ministry of health needs to give a greater emphasis on self-preventive strategies such as work ergonomic so as to minimize absenteeism and sick leaves keeping teachers productive. Moreover, they should also work on behavioral changes like cessation of smoking and enough sleeping hours. Educational bureau should give emphasis in constructing centers and encouraging teachers to have regular physical exercise in schools. In addition, awareness creation regarding LBP also important to increase health care seeking behaviors among teachers at early time to prevent further complication.

## Declarations

### Ethics approval and consent to participate

Ethical clearance was obtained from the ethical review board of university of Gondar, College of Medicine and Health Sciences. Then letter of support was obtained from Tigray Regional Health Bureau to Mekelle city Education Bureau, then to respective schools. Informed written consent was obtained from each study participants after explaining the purpose of the study. Confidentiality was maintained by excluding respondent's names.

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## Authors' Contributions

TG, SF, EA and MK conceived and designed the study. TG was also responsible for obtaining ethical clearance and fund from the organization. TG and SW contributed in data acquisition and preliminary data analysis. TG and SW contributed towards data acquisition and preliminary data analysis. All authors were also participated in data interpretation and revising for its intellectual contents critically. TG and SW prepared the manuscript and the rest authors revised and approved for its publication in its current form.

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## References

1. Allsop L, Ackland T. The prevalence of playing-related musculoskeletal disorders in relation to piano players playing techniques and practicing strategies. *Music Perform Res.* 2010;3(1):61-78.
2. Woolf AD, Pflieger B. Burden of major musculoskeletal conditions. *Bull World Health Organ.* 2003;81(9):646-56.
3. Balakrishnan R, Chellappan ME, Thenmozhi. Prevalence of low back pain and its risk factors among secondary school teachers at Bentong, Pahang. *Int J Phys Educ Sports Health.* 2016;3(2):35-40.
4. Erick PN, Smith DR. Low back pain among school teachers in Botswana, prevalence and risk factors. *BMC Musculoskeletal Disorders.* 2014;15:359.
5. Deyo RA, Phillips WR. Low back pain: a primary care challenge. *Spine.* 1996;21(24):2826-32.
6. Mariammal T, Jaisheeba AA, Sornaraj R. Occupation influenced physical illness observed among the teachers of Thoothukudi town. *Int J Pharm Tech Res.* 2012;4(3):1274-8.

7. Hoy D, March L, Brooks P, Blyth F, Woolf A, Bain C, et al. The global burden of low back pain: estimates from the Global Burden of Disease 2010 study. *Ann Rheum Dis*. 2014;73(6):968-74.
8. Balague F, Mannion AF, Pellise F, Cedraschi C. Non-specific low back pain. *Lancet*. 2012;379(9814): 482-91.
9. Hoy D, Bain C, Williams G, March L, Brooks P, Blyth F, et al. A systematic review of the global prevalence of low back pain. *Arthritis Rheum*. 2012;64(6):2028-37.
10. Tsega Ab AT, Mitslslal KW, Bereket GM, Admas AA. Prevalence and associated factors of low back pain among teachers working at governmental primary schools in Addis Ababa, Ethiopia. *Biomed J Sci & Tech Res*. 2018;10(1):1-6.
11. Yue P, Liu F, Li L. Neck/shoulder pain and low back pain among school teachers in China, prevalence and risk factors. *BMC Public Health*. 2012;12:789.
12. Abdul-Samad NI, Abdullah H, Moin S, Mohd Tamrin SB, Hahim Z. Prevalence of low back pain and its risk factors among school teachers. *Am J Applied Sci*. 2010;7(5):634-9.
13. Beyene TK, Mengestu MY, Zele YT. Low back pain and associated factors among teachers in Gondar Town, North Gondar, Amhara Region, Ethiopia. *Occup Med Health Aff*. 2013;1:127.
14. Chong EY, Chan AH. Subjective health complaints of teachers from primary and secondary schools in Hong Kong. *Int J Occup Saf Ergon*. 2010;16(1):23-39.
15. Erick PN, Smith DR. A systematic review of musculoskeletal disorders among school teachers. *BMC Musculoskeletal Disord*. 2011;12(1):260.
16. Erick PN, Smith Dr. The prevalence and risk factors for musculoskeletal disorders among school teachers in Botswana. *Occup Med Health Aff*. 2014;92(4):178.
17. Vos T, Flaxman AD, Naghavi M, Lozano R, Michaud C, Ezzati M, et al. Years lived with disability (YLDs) for 1160 sequel of 289 disease and injuries 1990-2010: a systematic analysis for the Global Burden Disease Study 2010. *Lancet*. 2013;380(9859):2163-96.
18. Matsudaira K, Konishi H, Miyoshi K, Isomura T, Inuzuka K. Potential risk factors of persistent low back pain developing from mild to low back pain in urban Japanese workers. *PLoS One*. 2014;9(4):e93924.
19. Sa KN, Baptista AF, Matos MA, Lessa I. Chronic pain and gender in Salvador population, Brazil. *Pain*. 2008;139(3):498-506.
20. Turk Z, Vauhnik R, Micetic-Turk D. Prevalence of non-specific low back pain in schoolchildren in north eastern Slovenia. *Coll Antropol*. 2011;35(4):1031-5.
21. Kumie A, Amara T, Berhane K, Samet J, Hundal N, G/Michael F, et al. Occupational health and safety in Ethiopia: a review of situational analysis and needs assessment. *Ethiop J Health Dev*. 2016;30(1 Spec Iss):17-27.
22. Central Statistical Agency. Population and housing Census Report-Country-2007. Ethiopia; 2007.
23. Kuorinka I, Jonsson B, Kilbom A, Vinterberg H, Biering-Sorensen F, Andersson G, et al. Standardised Nordic questionnaires for the analysis of musculoskeletal symptoms. *Appl Ergon*. 1987;18(3):233-7.
24. El-Sayed EM. Work-related musculoskeletal pain among primary school teachers: a recommended health promotion intervention for prevention and management. *World J Nursing Sci*. 2015;1(3):54-61.
25. Tsuboi H, Takeuchi K, Watanabe M, Hori R, Kobayashi F. Psychosocial factors related to low back pain among school personnel in Nagoya, Japan. *Ind Health*. 2002;40(3):266-71.
26. Baskurt F, Baskurt Z, Gelecek N. Prevalence of self-reported musculoskeletal symptoms in teachers. *SDU Journal of Health Sciences*. 2011;2(2):58-64.
27. Kamrujjaman M, Akter J, Maleque A. Prevalence and factors associated with low back pain among school teachers residing in Northern Dhaka city. *MOJ Orthop Rheumatol*. 2018;10(5):333-7.
28. Korkmaz NC, Cavlak U, Telci EA. Musculoskeletal pain, associated risk factors and coping strategies in school teachers. *Sci Res Essays*. 2011;6(3):649-57.
29. Fletcher C, Peto R. The natural history of chronic airflow obstruction. *Br Med J*. 1977;1(6077):1645-8.