

OCCUPATIONAL LOW BACK PAIN IN PRIMARY AND HIGH SCHOOL TEACHERS: PREVALENCE AND ASSOCIATED FACTORS

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ABSTRACT

Objective: The purposes of this study were to investigate the prevalence of and risk factors for low back pain (LBP) in teachers and to evaluate the association of individual and occupational characteristics with the prevalence of LBP.

Methods: In this cross-sectional study, 586 asymptomatic teachers were randomly selected from 22 primary and high schools in Semnan city of Iran. Data on the personal, occupational characteristics, pain intensity, and functional disability as well as the prevalence and risk factors of LBP were collected using different questionnaires.

Results: Point, last month, last 6 months, annual, and lifetime prevalence rates of LBP were 21.8%, 26.3%, 29.6%, 31.1%, and 36.5%, respectively. The highest prevalence was obtained for the high school teachers. The prevalence of LBP was significantly associated with age, body mass index, job satisfaction, and length of employment ($P < .05$ in all instances). Prolonged sitting and standing, working hours with computer, and correcting examination papers were the most aggravating factors, respectively. Rest and participation in physical activity were found to be the most relieving factors.

Conclusion: The prevalence of LBP in teachers appears to be high. High school teachers were more likely to experience LBP than primary school teachers. Factors such as age, body mass index, length of employment, job satisfaction, and work-related activities were significant factors associated with LBP in this teacher population. (*J Manipulative Physiol Ther* 2014;37:702-708)

Key Indexing Terms: *Prevalence; Low Back Pain; School Teacher; Risk Factors*

Musculoskeletal disorders (MSDs) are one of the most common health problems in working population¹⁻⁵ that play a major role on the

quality of life.⁶⁻¹⁰ Previous studies demonstrated a high prevalence rate and high associated direct and indirect costs with MSDs.^{11,12}

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Many studies indicate that low back pain (LBP) is a common MSD in both the developed and developing countries and that more than half of the general population will experience LBP in their lifetime.¹³⁻¹⁸ Contrary, in Iran, the prevalence rates of LBP in school children, nurses, and pregnant women were reported to be 17%, 62%, and 84%, respectively.^{4,15,19} In a survey of 250 surgeons in Iran, Mohseni-Bandpei et al⁶ studied the prevalence of LBP and reported that 84.4% of the participants experienced LBP.

Among occupational groups, school teachers were considered to have a widely varied prevalence rate of LBP, ranging from 17.7% in Japan to 53.3% in Brazil to 59.2% in China and to 61% in the United States.^{12,20-22} Many studies demonstrated that school teachers were at more risk for developing back pain with different prevalence rates.^{12,20-23} In an epidemiologic study conducted on school teachers in China, 59.2% of school teachers reported having lower back pain.²¹ Other studies have also reported that 40% of Chinese primary school

Table 1. Sample Characteristics

	Mean (SD)	Range
Age (y)	37.99 (8.47)	22-59
Height (m)	1.66 (0.09)	1.45-1.92
Weight (kg)	70.24 (11.63)	43-110
BMI (kg/m ²)	25.34 (3.63)	15.19-35.60
Years of teaching	15.85 (10.12)	1-35
Hours of teaching per day	6.22 (2.41)	2-12

BMI, body mass index.

teachers¹³ and 34.8% of French school teachers experienced back pain.²⁴

In Brazil, Cardoso et al⁷ have investigated the prevalence of MSDs and its associations with individual characteristics and work-related factors through a cross-sectional study. In a sample of 496 teachers, the prevalence rates of pain in lower limb, upper limb, and lower back were reported to be 41.1%, 23.7%, and 41.1%, respectively. Significant associations were found between sex, age, school education level, marital status, number of children, years of practice, and the occurrence of MSDs.⁷ In a recent study conducted on 463 teachers in Turkey, 51.4% of teachers experienced MSDs.²³ A number of factors such as sex, age, emotional status, and static posture were identified as significant risk factors for MSDs in teachers.²³

In a study conducted by Yue et al,²⁵ the prevalence of neck-shoulder pain and LBP on 893 teachers in China was reported to be 48.7% and 45.6%, respectively. Statistically significant associations were found among uncomfortable back support, prolonged sitting, static posture, and the prevalence of LBP.²⁵

Different working conditions and demands of school teachers (eg, teaching, assessing students' homework, correcting examination papers, and working with computers) that require prolonged sitting or standing may be considered as a risk factor for MSDs.⁷ There are some reasons for differences in prevalence rate of LBP in teachers, such as different methodologies used, unclear operational definition for LBP, unclear prevalence periods, heterogeneity of study samples, and different sample size.

To date, there has been no published study on the prevalence of LBP in Iranian teachers. Therefore, the purposes of this study were to investigate the prevalence and risk factors for LBP in teachers and to evaluate the association of individual and occupational characteristics with the prevalence of LBP.

METHODS

Data Collection

This cross-sectional study was given ethical approval from the Medical Ethics Board at the University of Social Welfare and Rehabilitation Sciences, Tehran, Iran. Data were collected from April to September 2013. Six hundred

Table 2. LBP Prevalence for Teachers

Period of Prevalence	Primary School Teachers, Frequency (%)	High School Teachers, Frequency (%)	Total Prevalence Rate, Frequency (%)
Point prevalence	24 (11.9)	103 (31.7)	127 (21.8)
Last month prevalence	30 (14.8)	122 (37.9)	152 (26.3)
6-mo prevalence	31 (15.1)	141 (44.1)	172 (29.6)
Annual prevalence	37 (16.7)	145 (45.6)	182 (31.1)
Lifetime prevalence	41 (18.9)	178 (54.2)	219 (36.5)

fifty teachers from 22 state schools (9 primary schools with 286 teachers and 13 high schools with 364 teachers) were randomly selected and invited to participate. Teachers were included if they were currently teaching (for a period of at least 1 year) and willing to participate. The exclusion criteria were as follows: spinal deformities (eg, scoliosis), history of back surgery, malignancy, osteoporosis, back tumor, multiple sclerosis, any fracture or disorder in the low back region, trauma, and any inflammatory conditions.

Teachers were recruited from employed teachers list provided by the Educational and Training Organization of the Semnan province. After the screening process, 620 teachers were identified eligible and invited by an invitation letter to participate in the study. All participants were given written information about the aims of the study by a research coordinator allocated in each school and then were asked to sign a consent form if they were willing to take part in the study. Data were collected through face-to-face interview conducted by a research coordinator in each school. Finally, 586 teachers agreed and gave their consent to participate in this study and completed the questionnaires.

Questionnaire

Different questionnaires were used to collect data concerning (a) demographic and occupational characteristics, (b) the prevalence of LBP, and (c) possible risk factors and managements received for LBP in teacher population. Demographic characteristics consists of sex, age, height, weight, body mass index (BMI), and marital status, and occupational characteristics included years of experience, teaching hours per day, school levels, duration of sitting or standing, working posture, and duration of working with computer.

Pain intensity was recorded on visual analog scale. This scale was found to be a valid, consistent, and reproducible means to measure pain intensity,²⁶⁻²⁸ leading to its common use in different clinical research and practice.^{29,30} The scale used was the typical 100-mm horizontal line, with 0 mm indicating "No pain" and 100 mm indicating "Unbearable

pain.” The Oswestry LBP and disability questionnaire also was used for functional disability evaluation.³¹ The Oswestry LBP and disability questionnaire used in this study has already been translated into Persian language, and the reliability and validity of Iranian versions have been tested and approved.³²

Statistical Analysis

The Statistical Package for the Social Sciences (version 18; SPSS, Chicago, IL) was used for data analysis. Cross-tabulation and χ^2 were used for descriptive analysis (eg, frequency, mean, SD, prevalence rate) and to examine the relationship between 2 or more variables (eg, male vs female, different age ranges, different categories of BMI, etc), respectively. Pearson correlation coefficient was applied to assess the existence of linear relationships between variables (eg, between the prevalence of LBP and length of employment, level of job satisfaction, general health condition, etc). Also, odds ratios (ORs) and their 95% confidence intervals (CIs) were calculated by univariate and multivariate logistic regressions for LBP in relation to different variables. The level of statistical significance was set up at .05.

RESULTS

Among the 620 teachers, a response rate of 95% ($n = 586$) was obtained for data analyses. Allocation of individual research coordinators to each school was felt to have helped achieve such a high response rate. Almost 38% of respondents were from primary schools and 62% from high schools. Three hundred eighty-seven (66.4%) of the participants were female, and 197 (33.6%) were male. The sample characteristics and detailed descriptive statistics for the epidemiologic data are summarized in Tables 1 and 2, respectively. In Table 3, the management of LBP received by teachers is demonstrated. Frequencies and ORs with 95% CIs for predictive factors of lifetime prevalence of LBP applying a logistic regression model are shown in Table 4.

Prevalence Rate

The data demonstrated that point, last month, last 6 months, annual, and lifetime prevalence rates of LBP were 21.8%, 26.3%, 29.6%, 31.1%, and 36.5%, respectively. The high school teachers reported high point and lifetime prevalence (31.66%, 54.23%) compared with teachers from primary schools (11.9%, 18.9%), and they seemed to be at more risk for developing LBP ($P < .05$).

The mean \pm SD of pain intensity on visual analog scale was 30.84 ± 12.82 mm (ranging from 4 to 92 mm) for teachers with LBP. Between-group analysis demonstrated no significant difference on pain intensity between primary and high school teachers ($P > .05$). The mean \pm SD of functional disability on Oswestry LBP and disability

questionnaire for teachers with LBP was $25.39\% \pm 15.43\%$ (range, 8%-85%), which was significantly correlated with pain intensity using Pearson correlation coefficient analysis ($r = 0.28$, $P < .01$).

Female teachers seemed to be more affected than male, although this difference was not statistically significant ($P = .26$). The results also indicated that older teachers were more likely to experience LBP compared with younger teachers ($P = .00$). Body mass index was significantly associated with the prevalence of LBP ($P = .01$). Those teachers who were overweight and obese were more at risk for developing LBP compared with those who were in reference range ($P < .05$). Job satisfaction was found to be significantly associated with prevalence of LBP ($P < .05$). Those teachers who were lowly or not satisfied with their job were more likely to report LBP ($P < .001$; Table 4). It seems that length of employment was a potential risk factor for LBP in teachers. Those who had a work experience of longer than 20 years were more likely to be involved with LBP ($P < .001$). Longer period of exposure for those teachers with more than 20 years of experience may be considered as a possible cause of developing more LBP.

Rest and participation in sports activity were the most relieving factors of LBP in teachers (43.2% and 27.5%, respectively). Prolonged sitting, prolonged standing, working hours with computer, and correcting examination papers (27.4%, 25.2%, 24.3%, and 15.5%, respectively) were found to be the most aggravating factors among teachers. As demonstrated in Table 3, 262 (45%) of participants reported to have different management for their LBP. Of these, 59 (22.5%) had medications only, 47 (17.9%) received physiotherapy, 33 (12.6%) had given a combination of medications and physiotherapy, and 11 (4.2%) had undergone surgery in addition to medications and physiotherapy.

The results demonstrated that 237 (40.4%) teachers who participated in this study reported doing exercise. Although those teachers who did exercise were less likely to report LBP, no statistically significant association was found between exercise and the prevalence of LBP ($P = .26$). It appears that applying preventive strategies (eg, having a break time during working hours, performing regular exercises, using ergonomic chairs, etc) may decrease the risk of LBP occurrence.

DISCUSSION

The purposes of the present study were to investigate the prevalence of and risk factors for LBP in teachers and to evaluate how individual and occupational characteristics may affect the risk of LBP in teachers. The results demonstrate that LBP is a common complaint in school teachers and that teachers seem to have specific working conditions that may increase the prevalence rate of LBP. The point and lifetime prevalence findings were consistent

Table 3. Management of LBP for Those Teachers Who Received Treatment

Procedure/Treatment	No.	%
Medicine (pharmaceuticals)	59	22.5
Physiotherapy	47	17.9
Surgery	11	4.2
Medicine and physiotherapy	33	12.6
No treatment	112	42.8
Total	262	100

with the findings of most studies conducted on the prevalence of LBP in school teachers.^{7,13,21,23–25,33,34} Factors such as age, BMI, length of employment, and job satisfaction appeared to be associated with the prevalence of LBP among teacher in the present study. Some work-related activities such as prolonged sitting, prolonged standing, working hours with computer, and correcting examination papers were found to be associated with increased risk of developing LBP among teachers.^{21,25,35,36} Although a positive trend was seen between these factors and the prevalence of LBP, the association did not reach statistical significance (Table 4). Preventive strategies such as having a break time during working hours and performing regular daily exercises were found to be associated with decreased risk of experiencing LBP, although the associations were large enough to be statistically significant. These findings were in agreement with previous studies.^{4,19}

Many studies^{3,7,12,13,21,23,25} reported that a large number of teachers have work-related back pain. Although studies^{21,23,25,33} in which the prevalence of LBP was investigated among teachers separately were limited; however, the results of the present study demonstrate that LBP is a common complaint in school teachers. From the available epidemiologic studies,^{21,23,25,33} it appears that some personal and professional factors such as sex, age, BMI, general health condition, years of practice, and job satisfaction have been associated with the prevalence of LBP.

Musculoskeletal disorders among teachers have been positively associated with female sex in a number of studies,^{7,21} but there is no general consensus on the association between sex and prevalence of LBP.^{23,25} According to Cardoso et al,⁷ women reported higher back pain than did men.⁷ They suggested that this difference might be due to the small sample size of male vs female teachers, not to the effect of sex on LBP, as the education was a professional field that predominantly occupied by women. This finding was later confirmed by Korkmaz et al²³ and Yue et al,²⁵ who reported that the female sex is not a risk factor for LBP in teachers, whereas Chong and Chan²¹ showed a significant difference between male and female in reporting LBP. In the present study, although female teachers had higher prevalence rate of LBP compared with male teachers, no significant correlation was found between sex and the prevalence of LBP.

Most studies demonstrated that age is a risk factor for LBP incidence.^{7,21,23,25} Some studies reported a positive association between age and the prevalence of LBP.^{7,23} These studies showed that teachers older than 40 years were more likely to develop LBP, whereas a number of other studies demonstrated that younger teachers are at more risk for developing.¹³ Result of the current study demonstrated a significant correlation between age and the prevalence of LBP and revealed that older teachers (>40 years) had higher rate of LBP than did younger teachers.

Length of employment also is one of the risk factors associated with LBP among school teachers.^{7,25} Some studies reported a positive correlation between years of practice and prevalence of LBP in teachers.^{7,25,37} Data from the present study showed that the longer the years of practice, the greater the risk of having LBP. In fact, length of employment seemed to be significantly associated with the prevalence of LBP in teachers.

Data from the present study (Table 2) suggest that teaching in high school may increase the risk of LBP occurrence than teaching in the primary school, which is consistent with previous studies.^{25,34} It seems that teachers in high schools had higher work load and psychological stress than teachers in primary school, which made them more vulnerable and prone to develop LBP.²⁵

Some studies reported that low job satisfaction was associated with an increased risk for the occurrence of LBP.³⁸ Findings from the present study are consistent with the findings of a number of other studies concerning the effect of job satisfaction on LBP.^{4,39} These studies showed a strong association between low job satisfaction and the prevalence of LBP. In the present study, those teachers with low and moderate levels of job satisfaction were more likely to develop LBP than those with high level of job satisfaction.

It was reported that static postures and improper environment conditions may contribute to the development of MSDs among teachers.^{7,21,25} Some studies demonstrated that static posture and prolonged sitting could be risk factors for LBP.^{35,36} The result of this study also confirmed the greater risk of LBP occurrence in teachers who had prolonged sitting, prolonged standing, long period of working hours with computer, and correcting examination papers (Table 4).

Finding of this study demonstrated that teachers preferred to have rest and daily sports activity in order to relieve their pain intensity (Table 4). These results were consistent with previous studies.¹⁹ It was also found (Table 3) that medications and physiotherapy separately or in combination were the most preferred choices for the treatment of LBP (53.1%).

Overall, some work-related activities seem to make teachers more prone to develop LBP. Therefore, more resources should be allocated to provide strategies that minimize work-related LBP and improve teaching condition among teachers. This issue may considerably decrease social and economical costs of developing LBP in teachers.

Table 4. Adjusted ORs and 95% CIs for Predictive Factors of Lifetime Prevalence of LBP Using Enter in Single-Step Logistic Regression Model

Variables	Frequency (%) of Total Sample	Frequency (%) Affected by LBP	OR	95% CIs	P
Sex					
Female	389 (66.4)	150 (38.6)	1.14	0.8-1.62	.47
Male	197 (33.6)	67 (34.1)			
Age (y)					
≤40	368 (62.8)	113 (30.7)	0.11	0.03-0.35	.00
41-50	150 (25.6)	71 (47.3)	0.07	0.02-0.19	
>50	68 (11.6)	43 (63.2)	0.36	0.12-1.08	
BMI (kg/m ²)					
Low <2	38 (6.5)	8 (21.1)	0.62	0.25-1.54	.01
Normal 20-25	246 (41.9)	86 (34.9)	0.34	0.14-0.84	
Overweight 25-30	250 (42.7)	111 (44.4)	0.5	0.26-0.95	
Obese > 30	52 (8.9)	22 (42.3)	1.19	0.62-2.29	
General health					
Healthy	154 (26.3)	87 (56.5)	1.49	0.80-2.79	.07
Unhealthy	432 (73.7)	140 (32.4)			
Years of teaching					
<10	213 (36.4)	52 (24.4)	0.28	0.06-1.23	.00
10-20	168 (28.7)	70 (41.6)	0.12	0.07-0.19	
>20	205 (35.0)	105 (51.2)	0.22	0.13-0.36	
Do exercise					
Not exercising	349 (59.6)	156 (44.7)	0.83	0.46-1.51	.26
Exercising	237 (40.4)	71 (29.9)			
Preventing strategies (PS)					
Without PS	175 (29.9)	70 (40.0)	0.90	0.52-1.56	.42
With PS	411 (70.1)	157 (38.2)			
Pain intensifiers					
Prolonged standing	136 (23.2)	57 (41.9)	1.03	0.86-1.22	.54
Working hours with computer	124 (21.2)	55 (44.3)	0.96	0.83-1.11	
Prolonged sitting	165 (28.2)	62 (37.6)	1.24	0.93-1.38	
Correcting examination papers	108 (18.5)	35 (32.4)	0.93	0.81-1.08	
Other awkward postures	52 (8.9)	19 (35.8)			
Job satisfaction					
No	73 (12.5)	35 (47.9)	2.14	0.9-5.1	.00
Low	170 (29.1)	95 (55.6)	1.95	1.04-3.64	
Moderate	207 (35.4)	77 (37.2)	0.31	0.20-0.51	
High	135 (23.1)	20 (14.8)			

CI, confidence intervals; OR, odd ratios.

According to the finding of the current study (Table 4), teachers will benefit from performing more regular daily exercises and using preventive strategies (eg, having more break time during their working hours).

Limitations and Future Studies

The snapshot nature of cross-sectional studies does not provide a good basis for establishing causality. Thus, no causation can be implied in this study. There may be other variables that affect the relationship between the variables of interest. Another limitation is the questionnaire used. Participants may not necessarily answer with perfect accuracy. This may magnify or minimize the effects of certain variables, affecting the study's results. Apart from the limitations inherent to the design of the current study, another limitation of the current study was investigating the prevalence of LBP in both primary and high schools teachers.

It seems that teachers in different levels of teaching might have different working demands and conditions that, in turn, may be a source of bias for the results of this study.

The current study was performed on 2 separate groups of teachers including primary and high schools teachers at the Semnan province, in Iran. It was assumed that the teachers participating in this study were a representative sample of teachers in Semnan province in Iran. However, this study used a small sample of teachers in only one province, which may not be representative of Iranian teachers. Future study should clearly address this concern.

Having teachers from both primary and high schools together with different working conditions and demands might be a source of heterogeneity in study sample. Therefore, homogeneity of study population should be carefully considered in future studies. Although this study investigated the association between the prevalence of LBP

and some risk factors such as age, BMI, general health, years of teaching, and others, further study with larger and more homogenous sample is needed to confirm these associations. Also, future research with cohort or randomized controlled clinical trial designs should focus on the evaluation of different preventive strategies with a greater emphasis on monitoring the risk factors as well as evaluating the effect of ergonomic factors to reduce the impact of such a major health concern in teachers.

CONCLUSION

This study found that high school teachers appear to be more prone to LBP than primary school teachers. Certain factors such as age, BMI, length of employment, and job satisfaction were associated with the prevalence of LBP and increased the risk of LBP among teachers. Some work-related activities such as correcting examination papers, prolonged sitting, and prolonged standing and working hours with computer were found to be the most common activities for developing LBP among teachers. Some preventive strategies such as having a break time during working hours and performing regular daily exercises were found as useful preventive factors to reduce the incidence of LBP in the teacher population.

FUNDING SOURCES AND POTENTIAL CONFLICTS OF INTEREST

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Practical Applications

- Prevalence of LBP in Iranian high school teachers is high.
- Prolonged sitting and standing, working hours with computer, and correcting examination papers were the most aggravating factors. Rest and participation in sports activity were found to be the most relieving factors.
- Age, BMI, job satisfaction, and length of employment were found to be significantly associated with the prevalence of LBP in teachers.

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