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An Epidemiological Study of Low Back Pain among Thai School Teachers in Nakhon Sawan Province

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Abstract: School teachers are at risk of suffering from low back pain (LBP) problems. LBP prevalence and risk factors among high school teachers have been reported for many countries, whereas it has been limited in Thai school teachers. The aim of this study was to conduct a cross-sectional study to determine the prevalence and risk factors of LBP among a sample of 153 high school teachers from the Nakhon Sawan province. A self-reported questionnaire including personal factors, work characteristics and environment, work stress, health behavior factors, and LBP was used for collecting the data and analyzed by descriptive statistics and logistic regression.

Results showed that the 12 month prevalence of LBP was 17.6% among high school teachers. Logistic regression analysis indicated that previous diseases related to LBP (OR=14.9; 95%CI=1.08-206.54), lack of back muscle exercises (OR=7.7; 95%CI=2.25-26.95), stress from excessive workload that cannot be completed during the workday (OR=7.1; 95%CI=1.29-39.35), and stress from existing family events causing irritability (OR=7.9; 95%CI=1.39-44.98) were significant risk factors for LBP. These study findings are useful for developing a LBP prevention program for school teachers. The program should include exercises for back musculature, management and treatment of LBP, and stress management.

Keywords: An epidemiological study, Low back pain, Thai school teachers, Prevalence, Risk factors

1. Introduction

School teachers are at risk of suffering from low back pain (LBP) problems in many countries including Thailand. The prevalence of LBP among high school teachers was reported in many countries. Its prevalence during the past 12 months among these teachers in Malaysia, Brazil, China, Ethiopia, Botswana, and Saudi Arabia was 40.4, 41.1, 45.6, 53.8, 55.7, and 63.8 (Cardoso, Ribeiro, Araujo, Carvalho, & Reis, 2009; Samad, Abdullah, Moin, Tamrin, & Hashim, 2010; Yue, Liu, & Li, 2012; Beyen, Mengestu, & Zele, 2013; Darwish & Al-Zuhair, 2013; Erick & Smith, 2014), while it was 76.0% among teachers and education personnel in Thailand)Thitilertdecha, Thongthiangdee, Kaewnoppakhun, & Laoittihi, 2012(. This evidence indicates that the prevalence of LBP in Thailand was more than that of the prevalence in Malaysia, Brazil, China, Ethiopia, Botswana, and Saudi Arabia.

LBP has impacts on the living of high school teachers and education personnel, including decreased ability to work, increased direct and indirect cost, and educational system)Mohammadi, 2013; Abdulmonem, Hanan, Elaf, Haneen, & Jenan, 2014). From these impacts, it is very important to solve the LBP problem.

From literature reviews, risk factors of LBP among high school teachers and education personnel were from multi-factors including personal factors, health behavior factors, and work environment factors. Personal factors were age, number of years in teaching, obesity, previous diseases related to LBP, and having experience in an accident or back trauma from work. Health behavior factors included lifting heavy objects, awkward postures, prolonged sitting, and lack of exercise. Work environment factors were work stress, too high or low temperature in classrooms, inappropriate furniture in teachers' offices, and small workspace (Cardoso, Ribeiro, Araujo, Carvalho, & Reis, 2009; Samad, Abdullah, Moin, Tamrin, & Hashim, 2010; Korkmaz, Cavlak, & Telci, 2011; Yue, Liu, & Li, 2012; Beyen, Mengestu, & Zele, 2013; Darwish & Al-Zuhair, 2013; Erick & Smith, 2013; Abdulmonem, Hanan, Elaf, Haneen, & Jenan, 2014; Erick & Smith, 2014). These factors influence the occurring of LBP. Therefore, it is needed to determine risk factors of LBP among high school teachers. In Thailand, there has been limited research regarding the prevalence and risk factors of LBP among high school teachers. It is essential to assess the prevalence and risk factors of LBP in order to prevent the problem of LBP.

2. Objectives

The purpose of the study was to determine the prevalence and risk factors of LBP in the past 12 months among high school teachers in Nakhon Sawan province, Thailand.

3. Ethical consideration

This study was approved by the Mae Fah Luang University Human Research Ethics Committee (Reference No. 75/2015). Informed written consent was given by the participants. Participation in the study was voluntary.

4. Materials and methods

A cross-sectional study was conducted among high school teachers from two high schools in Nakhon Sawan province in Thailand. The two high schools include Nakhon Sawan School and Satree Nakhon Sawan School. Questionnaires were administered to the sample, 188 high school teachers working at the schools for at least one year, in the schools during the July and August 2015. Of these 188, a total of 153 high school teachers completed the survey, a response rate of 81.4 %.

Data were collected using a self-administered questionnaire. The questionnaire was divided into five parts: demographic data (13 items), work characteristics and environment (11 items), work stress (30 items), health behavior factors (10 items), and low back pain (14 items). Risk factors of LBP including personal factors, work environment factors, work stress, and health behavior factors were examined. The questionnaire of Panumas Phunksachart (2013) was used to assess work stress among high school teachers. The Standardized Nordic Questionnaire (SNQ) (Kuorinka et al., 1987) was modified to assess the LBP in this study. LBP reported by high school teachers was classified by a dichotomous outcome variable indicating both the presence or absence of LBP in the past 12 months.

The validity of the questionnaire was examined by five experts including two nursing instructors who were expert in research methodology, two experts in the area of occupational health and safety, and one high school teacher. The reliability of the questionnaire on work stress when tested by Cronbach's alpha was 0.89. Moreover, the reliability of the questionnaire on health behavior factors and work environment factors when tested by Kuder-Richardson (KR-20) was 0.81 and 0.79, respectively.

Descriptive statistics were used to describe characteristics of the study participants and the study variables. Cross-tabulation procedures were conducted among bivariate variables to determine odds ratios (ORs) along with a 95% confidence interval (CIs). Logistic regression analysis was then applied to identify associations between LBP in the past 12 months and possible associated risk factors, including personal factors, work stress, work and environment factors, and health behavior factors. The level of statistical significance was set at 0.05.

5. Results

5.1 Characteristics of the participants

More than a half of the participants were female (65.4%). The participants' ages ranged from 22 to 60, with a mean age of 41.8 (S.D. = 12.13). The mean BMI of the high school teachers was 22.3 kg/m^2 (S.D. = 3.61). More than a half of them (60.8%) graduated in Bachelor's degree and around a half of them (51.0%) taught students in the primary high school level and also around a half of them (49.0%) taught students in the secondary high school level. The teaching experience ranged from 1 to 37, with a mean year of 17.3 (S.D. = 11.67). Almost all (98.7%) of the subjects had never smoked cigarette and never had previous diseases related to LBP (96.7%). Most of them (91.5%) had never experienced in back trauma from work. Almost all of the participants (95.4%) had never experienced in an operation by epidural or spinal block. Almost all (94.8%) never attended on any LBP prevention training.

5.2 Prevalence of LBP in the past 12 months

The prevalence of LBP in the past 12 months was 17.6%. Of the 153 high school teachers, 27 high school teachers reported having LBP and 126 high school teachers reported no having LBP in the past 12 months (Figure 1).

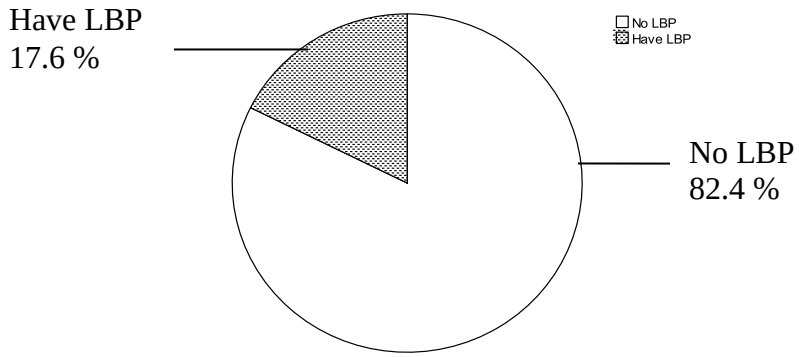

Figure 1. The Prevalence of LBP in the Past 12 Months

5.3 Risk factors of LBP in the past 12 months

In this study, any predictor variable whose bivariate test has a p- value of less than 0.10 should be considered as a candidate in a multiple logistic regression model. Thirteen covariates including 1) age (OR= 6.74; 95%CI=2.20-20.62), 2) teaching experience (OR= 5.80; 95%CI=1.66-20.29), 3) previous diseases related to LBP (OR= 21.73; 95%CI=2.32-203.38), 4) lifting objects 1-5 kilograms (OR= 5.20; 95%CI=0.66-40.45), 5) lifting objects 13-23 kilograms (OR= 0.44; 95%CI=0.18-1.04), 6) sitting with awkward postures (OR= 3.40; 95%CI=0.76-15.30), 7) standing continuously for more than 6 hours a day (OR= 0.39; 95%CI=0.16-0.92), 8) back muscle exercises (OR= 0.41; 95%CI=0.05-0.37), 9) stress from excessive workload that cannot be completed during the workday (OR= 10.66; 95%CI=2.42-46.94), 10) stress from inadequacy of devices and media (OR= 4.10; 95%CI=1.55-10.85), 11) stress from competitive work system (OR= 12.57; 95%CI=3.59-43.99), 12) stress from serious policy (OR= 3.97; 95%CI=1.50-10.51), and 13) stress from existing family events causing irritability (OR= 10.00; 95%CI=2.27-44.04) were chosen in the initial logistic regression model. Table 1 shows the association between the thirteen associated risk factors and LBP in the past 12 months-bivariate analysis.

Table 1. The Association between the Thirteen Associated Risk Factors and LBP in the Past 12 Months —Bivariate Analysis

Variables	Number (%) of LBP	Number (%) of No LBP	p-value x^2-test	Odds Ratio (95% CI)
1. Age				
>40 years	23(28.4)	58(71.6)	**<.001***	6.74(2.20, 20.62)
<= 40 years	4(5.6)	68(94.4)		1+
2. Teaching experience				
>10 years	24(24.7)	73(75.3)	**.002***	5.80(1.66, 20.29)
<= 10 years	53(94.6)	3(5.4)		1+
3. Previous diseases related to LBP				
Yes	4(80.0)	1(20.0)	**<.001***	21.73(2.32, 203.38)
No	23(15.5)	125(84.5)		1+
4. Lifting objects 1-5 kilograms				
Ever	26(19.84)	105(80.2)	**.081***	5.20(0.66, 40.45)
Never	1(4.5)	21(95.5)		1+
5. Lifting objects 13-23 kilograms				
Ever	10(12.2)	72(87.8)	**.057***	0.44(0.18, 1.04)
Never	17(23.9)	54(76.1)		1+
6. Sitting with awkward postures				
Ever	25(20.2)	99(79.8)	**.092***	3.40(0.76, 15.30)
Never	2(6.9)	27(93.1)		1+
7. Standing continuously for more than 6 hours a day				
Ever	15(13.5)	96(86.5)	**.029***	0.39(0.16, 0.92)
Never	12(28.6)	30(71.4)		1+
8. Back muscle exercises				
Never	13(46.4)	15(53.6)	**<.001***	0.41(0.05, 0.37)
Ever	14(11.2)	111(88.8)		1+
9. Stress from excessive workload that cannot be completed during the workday				
Yes	25(26.9)	68(73.1)	**<.001***	10.66(2.42, 46.94)
No	2(3.3)	58(96.7)		1+
10. Stress from inadequacy of devices and media				
Yes	21(26.6)	58(73.4)	**.003***	4.10(1.55,10.85)
No	6(8.1)	68(91.9)		1+
11. Stress from competitive work system				
Yes	24(32.9)	49(67.1)	**<.001***	12.57(3.59, 43.99)
No	3(3.8)	77(96.3)		1+
12. Stress from serious policy				
Yes	21(26.3)	59(73.8)	**.003***	3.97(1.50, 10.51)
No	6(8.2)	67(91.8)		1+
13. Stress from existing family events causing irritability				
Yes				
No	25(26.3)	70(73.7)	**<.001***	10.00(2.27, 44.04)
	2(3.4)	56(96.6)		1+

+ Reference category * Significance with $a < .10$ (to be in a logistic regression model)

In the performance of the logistic regression analysis in this study, all such variables were substituted with a dummy coding method. To find the best model, a forward stepwise method was used to determine the set of variables that best predicted the occurrence of LBP in the past 12 months. Four of the thirteen variables were retained in the last additive model without interactive effects. An interactive effect model was determined and no interaction among independent variables was

found. Table 2 presents the final model in the logistic regression analysis. The most appropriate model includes four factors of previous diseases related to LBP, lack of back muscle exercises, stress from excessive workload that cannot be completed during the workday, and stress from existing family events causing irritability. The overall accuracy of the logistic regression model was 86.9%. It was found that high school teachers who ever had previous diseases related to LBP were 14.9 times as likely to get LBP in the past 12 months than those who never had previous diseases related to LBP. Moreover, high school teachers who never exercised back muscle were 7.7 times more likely to get LBP in the past 12 months than those who ever exercised back muscle. High school teachers who ever had stress from excessive workload that cannot be completed during the workday were 7.1 times as likely to get LBP in the past 12 months than those who never had stress from excessive workload that cannot be completed during the workday. The finding also indicated that high school teachers who ever had stress from existing family events causing irritability were 7.9 times as likely to get LBP in the past 12 months than those who never had stress from existing family events causing irritability.

Table 2. Logistic Regression Analysis –The Final Model

Factors	Coefficients ($\hat{\beta}$)	S.E.	p-value	Adjusted odds ratio	95% CI
1. Previous diseases related to LBP	2.707	1.338	.043*	14.9	1.08-206.54
2. Lack of back muscle exercises	2.053	0.633	.001*	7.7	2.25-26.95
3. Work stress from excessive workload that cannot be completed during the workday	1.963	0.872	.024*	7.1	1.29-39.35
4. Work stress from existing family events causing irritability	2.068	0.887	.020*	7.9	1.39-44.98
Constant	-24.165				

* Significance with p-value <0.05
R^2 = 34.6%, Adjusted R^2 = 57.0 %

6. Discussion

6.1 Prevalence of LBP in the past 12 months

The study findings demonstrated that the prevalence of LBP in the past 12 months was 17.6%. Compared with the research findings from previous studies conducted among teachers and education personnel in four regions of Thailand which revealed a 70.6% (Thitilertdecha, Thongthiangdee, Kaewnoppakhun, & Laoittihi, 2012), the prevalence of LBP in this study is lower than that of the previous prevalence in the four regions. This could be due to the different participants in the study. In this study, the data were collected from high school teachers, whereas they were teachers and education personnel in the previous studies. Compared with other countries, the prevalence of LBP in this study is lower than that of the prevalence of LBP in the past 12 months in Malaysia (40.4%) (Samad, Abdullah, Moin, Tamrin, & Hashim, 2010), Brazil (41.1%) (Cardoso, Ribeiro, Araujo, Carvalho, & Reis, 2009), China (45.6%) (Yue, Liu, & Li, 2012), Ethiopia (53.8) (Beyen, Mengestu, & Zele, 2013), Botswana (55.7%) (Erick & Smith, 2014), Saudi Arabia (63.8%) (Darwish & Al-Zuhair, 2013), and Turkey (74.9%) (Durmus & Ilhanli, 2012). All prevalence data found in other countries tend to be higher than the finding in this study. This could be due to different kinds of definitions and questioning of LBP (Engels, van der Gulden, Senden, & van't Hof, 1996). Moreover, it may be due to different types of schools (governmental or private schools) and levels of schools (elementary or high schools) and the different types and levels of schools may cause different job characteristics and work environment. The data in this study were collected from teachers working in governmental schools and in the high school level. In other countries, the data were collected from teachers working in both governmental and private schools (Darwish & Al-Zuhair, 2013) and in the elementary school level.

6.2 Risk factors of LBP in the past 12 months

As the results indicated, previous diseases related to LBP including chronic cough, skeletal defects, spine defects, scoliosis, or osteoporosis were important risk factors of LBP. This could be explained that these symptoms and defects lead

to physical impairment and may also be antecedents to LBP (Landry, Sudha, Christopher, Yvonne, & Elham, 2008). This finding is consistent with the finding from Abdulmonem, Hanan, Elaf, Haneen, and Jenan (2014) that presence of chronic illness was associated with musculoskeletal pain. Also, the result of this study was supported by the result of Violante and colleagues (Violante, Fiori, Fiorentini, Risi, Garagnani, Bonfiglioli, & Mattioli, 2004) which found that scoliosis affected LBP.

In the recent study, lack of back muscle exercise was an important associated risk factor of LBP among high school teachers. Lack of exercise produces inadequate flexibility and weak muscles in the back, pelvis, and thighs, causing an increase of LBP (Morewitz, 2006). Exercises that stretch and strengthen the abdominal and spine muscles can help prevent back problems as such exercises increase ones flexibility. The findings from this research validate the findings of previous studies by Beyen, Mengestu, and Zele (2013) and Erick and Smith (2014) which found that LBP was related to lack of exercise among school teachers.

The findings of this study also demonstrated that stress from excessive workload that cannot be completed during the workday and stress from existing family events causing irritability were risk factors of LBP among high school teachers. School teachers are responsible to teach many students in large classrooms, to do lesson planning, and to provide learning activities. Stressful working condition affects in the back region and causes muscle tension and leads to LBP (Daraiseh et al., 2003). The result of this study is consistent with the findings from Samad, Abdullah, Moin, Tamrin, and Hashim (2010), Durmus and Ilhanli (2012), and Beyen, Mengestu, and Zele (2013) which found that stress was a risk factor related to LBP among teachers. Also, the result of this study was supported by the result of Erick and Smith (2014) which found that work stress was an important risk factors of LBP among school teachers.

7. Conclusion

Although the prevalence of LBP among high school teachers is at the low level, it is necessary to solve the problem. The study confirmed that personal factor, health behavior, and psychosocial work stress are the important risk factors of LBP among high school teachers.

8. Implications/ recommendation

The findings are useful for designing LBP preventive strategies for high school teachers; such strategies should include exercises for back musculature, management and treatment of LBP, and stress management**.**

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