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## Prevalence of low back pain and its risk factors among secondary school teachers at Bentong, Pahang

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### Abstract

**Title:** Prevalence of low back pain and its risk factors among secondary school teachers at Bentong, Pahang

**Objective:** The purpose of this study is to determine the prevalence of low back pain among Secondary School Teachers and to investigate the associated risk factors at Bentong, Pahang.

**Methodology:** A self-administered questionnaire was distributed to 260 subjects through random sampling in 5 secondary schools. Seven female teachers were excluded because they never meet with the inclusion criteria, where at the end of the study only 253 subjects was included.

**Result:** In the study, I found that prevalence of low back pain is high among secondary school teachers. Female teachers reported a significantly higher prevalence of low back pain when compared to male teachers. And the middle age group of teachers has reported high prevalence of pain compare to the younger and older age group. The highest risk factor for the low back pain among teachers is prolong standing, followed by prolong sitting and working with computer.

**Conclusion:** We found a high prevalence of low back pain among school teachers with most female and middle age group people affected and they are related with highest risk factor. There is a need to develop specific strategies on ergonomics educate, regular physical exercises and occupational stress in the schools to reduce the occurrence of Work-related Musculoskeletal Disorders (WMSDs) of the low back pain among teachers.

**Keywords:** Work-related Musculoskeletal Disorders (WMSDs), low back pain, Female teachers, self-administered questionnaire etc.

### Introduction

Human back is the large posterior area of the human body, rising from the top of the buttocks to the back of the neck and the shoulders. The human back is made up of bones (the vertebrae, or spinal column, which protects your spinal cord) and muscles. The vertebrae are stacked like blocks; the spinal cord runs down the middle, and between the vertebrae nerves extend from the spinal cord to the left and right. The disks lie between the vertebrae and form spongy shock absorbers between each bone. Several layers of muscle cover the back, and ligaments and tendons support the vertebrae, supporting posture and giving the body flexibility. Back pain can be caused by problems with the muscles, the bones, or the nerves in the back [1]. The spine is made of 33 individual bones stacked one on top of the other. Ligaments and muscles connect the bones together and keep them aligned. The spinal column provides the main support for body, allowing you to stand upright, bend, and twist. Protected deep inside the bones, the spinal cord connects body to the brain, allowing movement of arms and legs. Strong muscles and bones, flexible tendons and ligaments, and sensitive nerves contribute to a healthy spine [2]. Vertebrae are the 33 individual bones that interlock with each other to form the spinal column. The vertebrae are numbered and divided into regions: cervical, thoracic, lumbar, sacrum, and coccyx. The lumbar spine refers to the lower back, where the spine curves inward toward the abdomen. It starts about five or six inches below the shoulder blades, and connects with the thoracic spine at the top and extends downward to the sacral spine. The lower the vertebra is in the spinal column, the more weight it must bear. The five vertebrae of the lumbar spine (L1-L5) are the biggest unfused vertebrae in the spinal column, enabling them to support the weight of the entire torso. The lumbar spine's lowest two spinal segments, L4-L5 and L5-S1, which include the vertebrae and discs, bear the most weight and are therefore the most prone to degradation and injury. The lumbar spine meets the sacrum at the lumbosacral joint (L5-S1).

This joint allows for considerable rotation, so that the pelvis and hips may swing when walking and running [1]. Musculoskeletal disorder (MSD) is defined by World Health Organization (WHO) as a disorder of muscle, tendons, joints and intervertebral discs, peripheral nerves and vascular system, not directly resulting from an acute or instantaneous event but installing gradually and chronically [3]. Musculoskeletal disorder (MSD) represents one of the most common and important occupational health problems in working populations [29, 30]. The issue of musculoskeletal problems in adult population is overwhelming [6]. A significant body of research has also recently suggested that school teachers are at an increased risk of musculoskeletal disorder, with prevalence rates reported at between 12% and 84% [9]. Low back pain (LBP) is widely acknowledged as an important health and socio-economic problem which plagues a large segment of the population in industrialised countries [9]. This condition often occurs as a result of cumulative trauma and can affect the bones, muscles and their attachments, as well as nerves and blood supply [9]. 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 [33]. The prevalence of LBP appears to be high among school teachers in Botswana. A wide variety of LBP risk factors were identified in this study. Female gender and previous injury were both associated with LBP presence and disability [9]. Many studies have shown that the high incidence of low back problems occurs during the productive years of life (ages 25-60) [10]. Occupational activities in the work environment, such as vibration affecting the whole body, physically strenuous work, frequent twisting or bending, standing up, and concentration demands, are the risk factors for the occurrence of low back pain [10]. Moreover, sudden unexpected loads, or lifting in combination with lateral bending or twisting, put excessive strain on the lumbar spine and as a result cause problems in this region [10]. Low back pain is correlated with postural problems such as non-isosceles, increased lumbosacral angle, slouched posture or scoliosis [10]. In addition some other occupational activities such as prolonged driving, the operation of different machines and vehicles from a sedentary or standing posture, have been associated with Low Back Pain.

## Methods and Procedures

**Study design:** A Cross sectional study – Survey method

**Study location:** Secondary schools:

- ✓ Sekolah Menengah Kebangsaan Ketari, Bentong, Pahang
- ✓ Sekolah Menengah Kebangsaan Khai Mun, Bentong Pahang
- ✓ Sekolah Menengah Jenis Kebangsaan Katholik, Bentong Pahang
- ✓ Sekolah Menengah Kebangsaan Sulaiman, Bentong Pahang
- ✓ Sekolah Menengah Kebangsaan Kuala Repas, Bentong Pahang

## Sampling

**Method of sampling:** Random sampling

**Sample size:** 253

## Inclusion Criteria

- 1) School teachers (Secondary)
- 2) Co-operative teachers
- 3) Age 25 to 55 years

- 4) Male and Female teachers
- 5) Duration of working as a teacher >1 year
- 6) Full time teachers

## Exclusion Criteria

- I. Recent surgeries
- II. Congenital insensitivity
- III. Recent injuries and fractures
- IV. Arthritis
- V. Cardiovascular problem
- VI. Past history of low back pain
- VII. Pregnant women

## Data collection

To find out the prevalence of low back pain and the associated risk factors among Secondary School Teachers in the Bentong, Pahang, survey based cross sectional study was conducted. A total two hundred and sixty teachers were participated in the study by random sampling method. Each teacher was given a consent form. Questionnaire was given to be filled by the teachers. Accepting eligibility criteria, a total two hundred and fifty three teachers were included in the study.

## Procedure

1. This survey is conducted on secondary school teachers in Bentong, Pahang.
2. An informed consent form and questionnaire was given to each Participant randomly.
3. The participants will be given 20 minutes to fill up a questionnaire form.
4. Filled questionnaire has been collected and analysed
5. After the following week, awareness was given through a pamphlet to each class at secondary schools, Bentong Pahang.

Two hundred and sixty sample of questionnaire were given to the teacher randomly. Each teacher was given informed consent form and an instruction describing the procedures of the study and objectives. Questionnaire was given to be filled by the teachers. A modified Nordic questionnaire was used for the study. After met the criteria such as age, gender, working experience more than 1 year and full time teachers, a total two hundred and fifty three teachers were included in the study. The questionnaire consists of three parts. The first part (section A) of the questionnaire was on the respondent's demographic factors which included age, gender, marital status, education level and teaching experience. The second part (section B) of the questionnaire investigated the musculoskeletal problems. A modified Nordic questionnaire was used to assess the body parts with musculoskeletal disorders and their perceptions on health risks at work. The third part (section C) of the questionnaire focused on the respondent's psychosocial factors using the General health questionnaire which measured the common mental health problems/domains of depression, anxiety, somatic symptoms and social withdrawal. The questions included were 'have you lost much sleep'? 'have you felt capable of making decisions about things'? and 'have you felt constantly under strain'? The score was based on Likert Scale with 0 for "not at all", 1 for "sometimes", 2 for "more than sometimes" and 3 for "often". The questionnaire was translated from English to the Malay language, for better understanding of the respondents

## Statistical tool

- Frequency distribution
- Percentage value

The score will be calculated to find out the population of the study by using the percentage formula. The results were presented through frequency counts percentage. Every answer in a each questions were calculated using percentage formula and find out the total percentage.

**Data analysis**

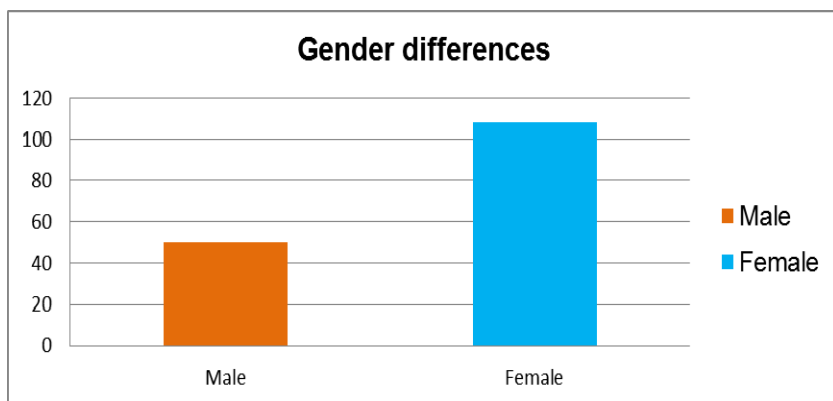
Data were collected and tabled according the gender

differences. Subjects were calculated to characterize the study population including: age group differences, duration of work, hours a week of working, recent surgeries and regular physical exercise. Percentage value on prevalence of low back pain was calculated and for those who never complaint of low back pain.

**Statistical result analysis**

**Table 1**

Gender	Male (%)	Female (%)	Total (%)
Total subjects included in the study	108/108(100.0)	145/152(95.4)	253/260 (97.3)
Total subjects complaint of pain	50/108 (46.3)	108/145(74.5)	158/253(62.5)



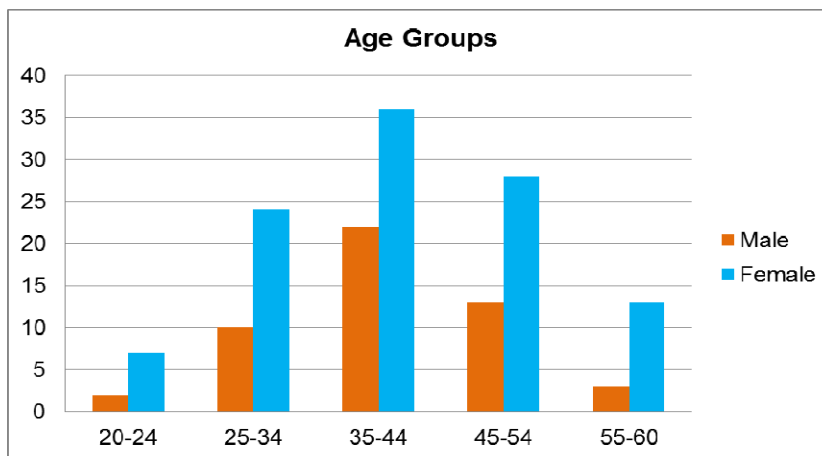
**Fig 1**

The table above shows the total subject obtained (n=260) and the number of subjects who are included in the study (n=253). Out of 253 subjects (97.3%), 158 subjects complaints of having low back pain (60.8%). From the percentage given, we

can see that female subjects are having higher complaint of pain compare to male subjects (78.8% vs. 40.7%). The figure above illustrate he the total number of male and female subject who included in the study (female=130, male=123).

**Table 2**

Age	Male (%)	Female (%)	Total (%)
20-24	2/50 (4.0)	7/108 (6.5)	9/158 (5.7)
25-34	10/50 (20.0)	24/108 (22.2)	34/158 (21.5)
35-44	22/50 (44.0)	36/108 (33.3)	58/158 (36.7)
45-54	13/50 (26.0)	28/108 (25.9)	41/158 (25.9)
55-60	3/50 (6.0)	13/108 (12.0)	16/158 (10.1)



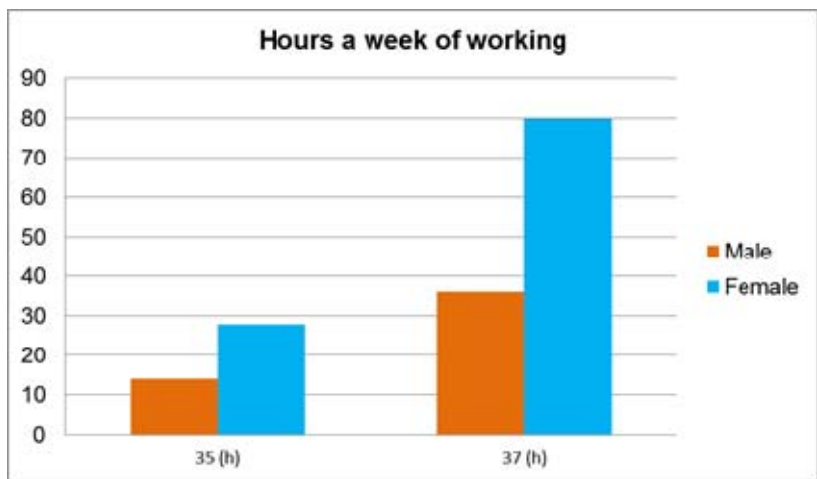
**Fig 2**

From the table 2 above we can see that the middle age group are having more pain compare to the younger age group who have lesser occurrence of pain (10.1% vs. 5.7%). Figure 2

show the higher range of subject with pain are located in middle age group (male=22, female=36) and the lowest in younger age group (male=2, female=)

**Table 3**

Hours a week of working (h)	Male (%)	Female (%)	Total (%)
35(h)	14/50 (28.0)	28/108 (25.9)	42/158 (26.6)
37(h)	36/50 (72.0)	80/108 (74.1)	116/158 (73.4)



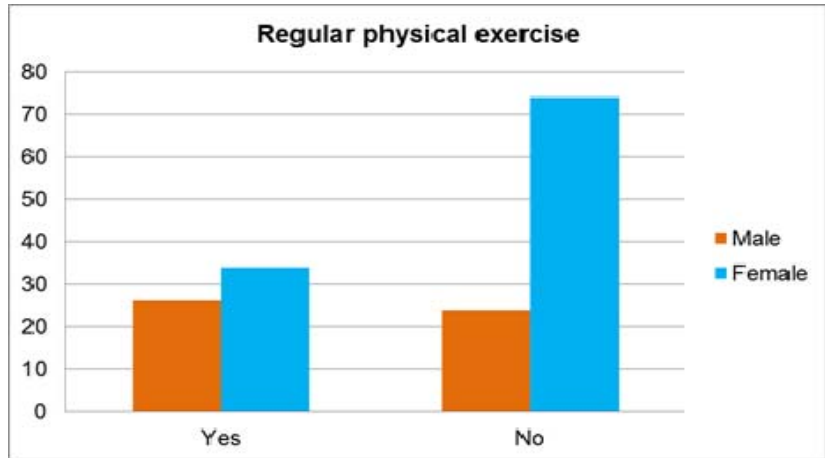
**Fig 3**

In figure 4, we can identify the number of subjects who working for about 37 hours per week is higher than those who working for about 35 hours per week. Table 4 shows that

73.4% majority of the respondents works for 37 hours a week. The least respondents works 35 hours a week with 26.6%.

**Table 4**

Regular physical exercise	Male (%)	Female (%)	Total (%)
Yes	26/50 (52.0)	34/108 (31.5)	60/158 (38.0)
No	24/50 (48.0)	74/108 (68.5)	98/158 (62.0)



**Fig 4**

Table above shows that female subjects are very less in exercise regularly compare to male (31.5% vs. 52.0%). Figure 6 shows the total male subjects (n=26) and female subjects (n=34) who exercise regularly.

**Result**

Out of 260 subjects, 253 has been included in this study (97.3%) and 158 subjects complaint of having symptoms of low back pain (62.5%). The prevalence was significantly high in female compare to male (74.5% vs. 46.3%). Low back pain between the middle age group with 35-44 years, are having more pain compare to the younger age group with 20-24 years (10.1% vs. 5.7%). With regards to the duration of working at

secondary schools, all the subjects are working for more than 1 year (100.0%). Between 35 hours and 37 hours per week of working, subjects who working for about 37 hours per week is higher than those who working for about 35 hours per week (73.4% vs. 26.6%). Subjects with low back pain, none of them had recent surgeries (0.0%). With regards to the regular physical exercise, lack of regular physical exercise has clearly been shown by the subjects. Majority of them answer “no” for regular physical exercise compare to “yes” (62.0% vs. 38.0). The majority of subjects who working for more than 1 year at secondary schools, who working for more than 37 hours compare to 35 hours per week, and lack of regular physical exercise are complaint of having symptoms of low back pain

compare to those who no complaint of pain. The majority of teachers are complaint of pain and discomfort of low back pain compare to those who no complaint of pain (62.5% vs. 37.35%). 2.7% of female subjects are complaint of low back pain but they are excluded from the study due to they are not reach the criteria. The higher risk for low back pain among secondary school teachers are standing for long duration compare to second risk factor which is sitting for long duration and third risk factor which is working with computer (23.4% vs. 19.0% and 16.5%). In the total length of time who having low back pain during the last 12 months, majority subjects answered on "more than 30 days, but not everyday" compare to the least amount of subjects who answered on "everyday" (35.4% vs. 13.3%). Majority of subjects having "moderate" low back pain compare to "mild" and "severe" pain (50.6% vs. 40.5% and 8.9%). Teaching methodology "mildly" affected to the majority of the subjects compare to "moderate" and "good" (66.5% vs. 25.9% and 7.6%).

### Discussion

This study was an attempt to investigate the prevalence of low back pain and its risk factors among secondary school teachers at Bentong, Pahang. In my study, I found there is high prevalence of low back pain among secondary school teachers. A total two hundred and sixty teachers were participate in this study. Accepting eligibility criteria, a total two hundred and fifty three teachers were included in the study. A total seven female teachers were excluded as they didn't met inclusion criteria because of being pregnant. So, totally one hundred and fifty eight teachers were complaint of low back pain and ninety five teachers no complaint of low back pain. Female teachers constitute the majority of school teachers in Bentong, Pahang and their participation in this study 57.3% compare to male teachers 42.7%. The overall low back pain prevalence of 62.5% noted in our study is higher than the prevalence of 55.7% reported from the Bostwana, Africa survey of low back pain among school teachers in Bostwana, prevalence and risk factors [9]. Parallels can be drawn to other studies where 53.3% of Filipino [13], 53.8% of Ethiopian [12] teachers and 59.2% of Chinese primary and secondary school teachers [14] reported having LBP. The prevalence of LBP found in this study was relatively lower than those reported in studies conducted among female secondary school Saudi (63.8%) [16], Indian (66.2%) [17], Iranian (71.9%) [18] and Turkish teachers (74.9%) [19]. A relatively high prevalence of LBP, 84.0%, was found among Slovenian physical education teachers in a previous study [20]. The LBP prevalence rate in this study was, however, higher than that reported in another Turkish study (51.4%) [21] and other studies carried out among Chinese, Brazilian and Malaysian teachers with LBP prevalence rates of 45.6%, 41.1% and 40.4%, respectively [7, 22, 13]. Lower LBP prevalence levels have also been reported in studies that were conducted among teachers in Malaysia (40.4%) [6], China (40.0%) [5] and France (34.8) [23]. Lower levels of LBP prevalence were further reported among school teachers in Japan (20.6%) [4] and Estonia (11.8%) [24]. In this study, female teachers reported a significantly higher prevalence of LBP (74.5% vs. 46.3%) when compared to male teachers among secondary school teachers at Bentong, Pahang. The result was consistent with a study in Hong Kong among secondary school teachers [1] which showed female teachers were prone (38.5%, 74.9% respectively) to develop upper limb and neck pain. A study on low back pain among school personnel in Japan also showed the same result (23.2%) of a higher prevalence among women [4]. Previous studies suggested that gender differences occurred

because women were more likely to report any pain problem than men as women tended to have a lower pain threshold than men [1]. This study showed a higher prevalence of low back pain problem among middle age group (36.7%) compare to younger and older age group (5.7% and 10.1%). Teachers who complaint of low back pain are those who working for more than 1 year at secondary school teachers, Bentong Pahang. There are many causes of low back pain among secondary school teachers at Bentong, Pahang. The highest risk factor is prolong standing (23.4%). Physical exertions during teaching, prolonged standing in an inappropriate way for several hours inside the class room resulted in back pain and musculoskeletal pain among teachers. All teachers shared the same standing position favorable to the development of lower back pain. Standing up is not the only factor contributing to MSP, but other situations such as carrying material to school or to the classroom, installation of equipment/teaching resources, walking inside and outside the school may further aggravate the occurrence of pain [15]. Prolong seating or working with computer was ranked as second and third major risk factor. This included twisting such as turning from the board to the class and back again. Prolonged sitting also occurred when teachers marked and prepared work on computers. Working with computer made one more prone to other musculoskeletal problems, such as neck pain and upper limb pain. Besides, the teachers have to crane their necks while typing; making the shoulders and backs more tense thus resulting in pain [15]. Inappropriate furniture and lifting load also risk factor of low back pain. The lack of chairs and tables their size and shape which are not appropriate for teachers develop positions unfavorable to the musculoskeletal system. In appropriate chairs make teachers sit without back support, with excessive flexion of knees and hips and flexion of the trunk to write and read texts on the table or even for student roll call, and without support for upper limbs resulted in the development of different kinds of physical illness [15]. Poor posture and improper techniques of lifting or carrying are the two very common causes of low back pain. Meanwhile, lifting heavy loads which ranked as the main contributing factor involved materials such as books, overhead projectors and other equipment [25]. Lack of physical exercise is one of the risk factor of low back pain. Regular physical exercise was the other variable which had adverse effect on low back pain. Teachers who did regular physical exercise were 0.52 times less likely to develop low back pain when compared to those who did not [AOR=0.52, 95% CI: 0.34, 0.82 [12]. This finding was in line with the study conducted in Athens, Greece on physical education teachers (PET) [26]. The possible explanation might be shortened and weak muscles can cause low back pain as they can cause misalignment of spine. Exercises can strengthen, lengthen and make muscles of back strong to support and keep spine in perfect alignment for proper functioning [12]. This study showed that respondent's psychosocial factors using the General health questionnaire which measured the common mental health problems/domains of depression, anxiety, somatic symptoms and social withdrawal. In this study, majority of the subjects not affected by psychological problem. Some of them answered "sometimes" they lost much sleep, felt constantly under strain, and feeling unhappy/depressed. Other studies had proved that high mental pressure showed a significant psychosocial risk factor for musculoskeletal disorder among school teachers [4] and Japanese nurses [27]. Other occupations that showed a high prevalence of low back pain also demonstrated the relationship with psychological or psychosocial factors [1].

### Conclusion

This study showed that the prevalence of low back pain among secondary school teachers at Bentong, Pahang was high with 62.5%. Women are more likely to report of low back pain than men. Higher prevalence of low back pain among middle age group compare to younger and older age groups. Prolong standing were perceived by respondents as the main activity which resulted in the development of low back pain with 23.4%. The statistical results showed that highest risk factor was the main contributor to low back pain. It was concluded that higher risk factor has a statistical relationship with low back pain. There is a need to develop specific strategies on ergonomics educate, regular physical exercises and occupational stress in the schools to reduce the occurrence of Work-related Musculoskeletal Disorders (WMSDs) of the low back pain among teachers.

### Limitation of the study

- The first limitation of this study was the limited sample size.

The sample size our study are too small. The total participants are only 260 teachers. Out of 260, 253 teachers (108 males and 145 females) were eligible for inclusion criteria. Compared with the previous studies done, nearly 272 teachers were eligible for the inclusion criteria. All previous studies population who were included is from a specific area of country or from the bigger schools.

- The second limitation was gender. Male teachers are less and more female teachers are included in the study.
- The third limitation was working experience.
- Fourth limitation is this study was focused on one district from Pahang.

### Research recommendation

My study suggests that prolong standing is the main risk factor which caused low back pain and its very prevalent among school teachers in Malaysia. It is therefore beneficial to develop strategic programs to reduce the risk factor of low back pain among school teachers. To those who would like to do further studies on this topic, do comparison of the prevalence and risk factors for low back pain between primary and secondary school teachers. Besides that, try to find out is that low back pain radiates elsewhere in the body.

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