PREVALENCE AND RISK FACTORS OF MUSCULOSKELETAL DISORDER (MSD) AMONG SCHOOL TEACHERS IN KLANG VALLEY

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PREVALENCE AND RISK FACTORS OF MUSCULOSKELETAL DISORDER (MSD) AMONG SCHOOL TEACHERS IN KLANG VALLEY

ABSTRACT

Musculoskeletal disorder (MSD) is commonly suffered by most workers. Many studies had been done internationally to investigate its prevalence amongst teachers. However, there are still not much study done in Malaysia. The objective of this study is to investigate the prevalence and risk factors for MSD in teachers and to evaluate its association to individual and occupational characteristics. A cross-sectional study was done on 79 respondents from two schools in Klang Valley. One is a primary school and the other is a secondary school. A questionnaire was distributed to get their demographic and occupational information. The prevalence of MSD for the past 12 months was assessed using the Standardized Nordic Questionnaire (SNQ). The body part with the highest prevalence of pain was the neck (70.89%), followed by the shoulders (58.23%) and the low back area (49.37%). Some of the risk factors identified was prolonged standing and sitting, high stress, long working hours, not taking breaks during class, years of working and age. Significant association between these risk factors and the prevalence of MSD was verified ($P < 0.05$). The teachers need to be exposed to the preventive and management strategies such as taking breaks in between classes, staying in a proper working posture and reducing repetitive movement.

Keywords: Musculoskeletal disorder, school teachers, risk factors, prevalence

KELAZIMAN DAN FAKTOR RISIKO GANGGUAN OTOT RANGKA DALAM KALANGAN GURU DI LEMBAH KELANG

ABSTRAK

Para pekerja sering mengalami gangguan otot rangka. Telah terdapat banyak kajian bagi menyiasat kelaziman penyakit ini dalam kalangan guru di peringkat antarabangsa. Akan tetapi, Malaysia masih kekurangan kajian seperti ini. Tujuan kajian ini dijalankan adalah bagi menyiasat kelaziman dan faktor risiko bagi gangguan otot rangka ini dalam kalangan guru dan menilai kaitannya dengan ciri – ciri individu serta pekerjaannya. Satu kajian keratan rentas telah dijalankan ke atas 79 orang responden daripada dua buah sekolah di Lembah Kelang. Satu ialah sekolah rendah dan satu sekolah menengah. Satu borang kaji selidik telah diedarkan bagi mendapatkan maklumat demografi dan pekerjaan responden. Kelaziman gangguan otot rangka sejak 12 bulan yang lalu telah dinilai menggunakan "*Standardized Nordic Questionnaire*" (SNQ). Bahagian badan yang mempunyai kelaziman yang tertinggi adalah bahagian leher (70.89%), diikuti oleh bahagian bahu (58.23%) dan bahagian belakang (bawah) (49.37%). Antara faktor risiko yang telah dikenalpasti adalah masa berdiri dan duduk yang terlalu lama, tekanan yang tinggi, masa kerja yang panjang, tidak berhenti rehat antara kelas, tahun bekerja dan umur. Kaitan yang tinggi antara faktor risiko ini dengan kelaziman gangguan otot rangka ($P < 0.05$) telah disahkan. Para guru perlu lebih didedahkan dengan cara – cara mencegah dan mengurus gangguan otot rangka seperti berehat antara kelas, membuat kerja dalam postur atau kedudukan badan yang betul dan mengurangkan pergerakan yang berulang.

Keywords: Gangguan otot rangka, guru sekolah, faktor risiko, kelaziman

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LIST OF SYMBOLS AND ABBREVIATIONS

LBP	:	Low back pain
MSD	:	Musculoskeletal disorder
SNQ	:	Standardized Nordic Questionnaire

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CHAPTER 1: INTRODUCTION

1.1 Background

A school is a place where children are nurtured on how to be a human being, aside from developing their intellect and preparing them for their future career (Foshay, 1991). To ensure that the children are given the best education, the policies and rules are facing constant changes. These requires the teachers to adapt and change their teaching methods to achieve every objective set.

A teacher does not only have to teach in class. They also need to take part in co-curricular activities such as sports and clubs, and managing administrative works using the computer. They are usually in a 'head down' posture as they do activities such as marking the assignments, reading and preparing the lesson plans, giving tests to the students, using the computer, and writing on the whiteboard.

Aside from that, they usually need to either stand or sit for an extended period. Due to these awkward, improper, prolonged or static postures, the teachers are exposed to getting MSD. In a study on Irish primary and secondary schools, it has been found that 10% of the teachers retired due to musculoskeletal problems (Maguire & O'Connell, 2007).

There has been low to no awareness or knowledge of the proper posture of working, preventive measures and management of the MSDs among the teachers. Suffering from MSD can lead to much serious problems like absenteeism and developing depression (Cardoso et al., 2009)

1.2 Problem statement

Although there have been many past studies on MSD caused by the working environment, only a few has been done in Malaysia that covers the MSD suffered by the school teachers. Other international literatures had found many variables that can lead to the development of MSD such as age, gender, working hours, BMI, stress and others (Mohseni et al., 2014; Ng,

Voo, & Maakip, 2019; Yue, Liu, & Li, 2012). So, the factors that affects the onset of MSD among teachers in Malaysia need to be investigated.

Moreover, ergonomics are steadily becoming the reason for someone to retire early (Schwerha et al., 2011). Current life requirements force people to work even at old age. Hence increasing the mean working age, further exposing them to risks at the workplace. Therefore, it is important to design a workplace that are free or has low risks of getting disorders so that the workers can provide their services until the set retirement age.

This study needs to be done to gauge if there is a relation between the work routine of a teacher with musculoskeletal disorder that they may suffer, and what is the underlying cause of it. The preventive and management strategies need to be highlighted to increase the teachers' awareness so they can take care of themselves better by doing small changes every day.

1.3 Research question

1. Which body part has the highest prevalence of symptoms among teachers in the past 12 months?
2. What are the factors that can influence the prevalence of MSD?
3. What are the characteristics that affect the probability of getting MSD?
4. What are the preventive measures that can be taken to reduce the occurrence of MSD among teachers?

1.4 Objective

1. To determine the prevalence and risk factors for MSD among teachers.
2. To evaluate the association of individual and occupational characteristics with the prevalence of MSD.
3. To propose preventive and management strategies for MSD.

1.5 Scope

This study focuses on the teachers in the Klang Valley area. It is limited to full time teachers that are currently teaching in either primary school or high school. They must have been a teacher for at least a year, do not smoke and consume alcohol. The respondents' minimum age is 20 years old. The body parts that will be studied are neck, shoulders, elbows, wrists/hands, upper back, low back, hips/thighs, knees and ankles/feet. The socio-demographic and working routine information of the teachers are also of interest.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

Musculoskeletal disorders (MSDs) can be defined as pain or injuries in the body's muscles, joints, tendons, ligaments and nerves. MSDs are predominantly work related and develop gradually over a period of time. These disorders can be caused either by working conditions and environment or by the nature of the work itself (Mesaria S & Jaiswal N, 2015).

MSDs are one of the prevalent health problems in the working force. MSDs highly affect the working people's quality of life, consequently, causing a significant impact on their financial strain as to compensate for lost salaries and costs (Hashim et al., 2010).

These disorders lead to a decrease in efficiency at work, mainly caused by workers quitting tasks, failing to attend works and sick leaves. They can also incur great costs in terms of medication and treatment. As reported by the National Occupational Research Agenda (NORA) of the United States of America (USA), MSD is one of the considerable health complications as it is the dominant factor to induce work-related ailments in the USA. Recent calculations on the costs associated with MSDs range from the enormous amount of $13 billion to $54 billion per annum in the USA alone (Mesaria S & Jaiswal N, 2015; Yue et al., 2012). Although the degree of effect of MSDs can differ from each country, it is agreed upon that MSDs do have a huge impact on a nation's economy considering the loss of productivity in the working force, physical disability and medical or non-medical expenses incurred either directly or indirectly (Constantino Coledam, Júnior, Ribeiro, & de Oliveira, 2018)

Working ergonomics is a crucial factor affecting the prevalence of MSDs in the working force. In the status quo, ergonomics have become an important issue in the working industry as ergonomics influence greatly the decision of a worker to retire

(Schwerha et al., 2011). Industrially progressive countries are heavily advocating extended work lives and the rise of workers mean age to adapt to the everchanging demographic. Thus, workers have to tolerate lengthier exposure to the possibilities of inadequately set work issues. Consequently, the occurrence of MSDs has been increasing as of late in industrially developed countries. MSDs represent the prominent cause of physical disability among people below the age of 45 years and the third main reason of physical disability among people above the age of 45 (McGeary, Mayer, Gatchel, Anagnostis, & Proctor, 2003). Therefore, it is essential to coordinate works properly and to create a workplace environment that can prevent the manifestation of these disorders in order to allow more workers to be capable in completing their work tasks until their retirement age (Silva, Barros, Cunha, Carnide, & Santos, 2016).

2.2 Cause of MSDs

Based on a study done by Miranda et al. (2002), the causes of musculoskeletal pain are currently acknowledged to consist of multiple factors, including the physical body anatomy, the psychological state of mind and social behaviour. For example, high demanding works, lack of support from coworkers, inadequate work management, low expertise discretion and low work fulfilments (Chiu & Lam, 2007).

From the physical anatomy perspective, self-reported MSDs associated with neck and shoulder pain was found to be constantly related to static body posture, prolonged sitting and standing, physical exercises and the lack of back support. While lower back pain was consistently linked with twisting body posture, static body posture, prolonged sitting and the lack of back support (Yue et al., 2012). Working in a non-ergonomic environment, daily physically demanding tasks and regularly lifting heavy loads may also increase the potential risk of musculoskeletal pain exponentially (Miranda et al., 2002).

From the psychological and social perspective, high level of stress was established to be one of the psychosocial variables that shows a positive connection with the symptoms of MSDs in the upper body, neck, back and limbs (Constantino Coledam et al., 2018). This psychological aspect highly affects the occurrence, intensity and duration of pain and symptoms, especially in working-age people (Vogt et al., 2003). People with existing depressive indications were also reported to have higher pain intensity and six times the chances of acute and chronic pain compared to people without the depressive syndrome (Vogt et al., 2003).

2.3 Management and prevention of MSDs

Decreased risk of MSDs were found to be connected with acting on preventive measures such as having short break intervals during working period and doing routine daily physical exercises (Mohseni Bandpei et al., 2014).

The outcomes of a study done by Ehsani et al., (2018) also verified that almost half of the research participants who perform regular exercise were unlikely to suffer from MSDs. Apparently, performing the regular practice of physical exercise is an effective preventive approach, as people who actively participated in any form of physical activities and sports were established to have decreased levels of acute symptoms in comparison to people who lead a sedentary life.

Preventive strategies also differ from male to female. Females are more inclined to use passive approaches in order to attend to pain compared to males. The higher majority of females using passive measures may be due to their perception and reaction to pain. They are far more concerned with pain and will try to manage the pain sooner in order to lessen its negative effect on everyday tasks when compared to their male's counterpart. Other preventive actions taken by females include the usage of painkillers,

taking sick leaves and consuming of herbal medicine (Cetisli Korkmaz, Cavlak, & Telci, 2011).

Regarding pain management strategies, according to a study done by Mohseni Bandpei et al. (2014), almost half of the research participants were reported to have different approaches in managing their musculoskeletal pains. From these participants, 22.5% depended on medications, 17.9% relied on physiotherapy, 12.6% adopt both methods while 4.2% of them had undergone medical surgery on top using medications and receiving physiotherapy (Mohseni Bandpei et al., 2014).

2.4 Gender factor of MSDs

Male and female are exposed to different risk elements at work, due to gender-based distinction encompassing numerous psychosocial aspects, for example, the assignment of works, gender influence in the working environment and the decision-making autonomy. These distinctions are prone to encourage gender-based contrasts in the occurrence of work-related MSDs complaints especially in the anatomical areas of the shoulder and neck (Ranasinghe et al., 2011).

The result of a study determined that the pervasiveness of MSDs was greater among females than males for the three anatomical areas; shoulder, neck and upper-back pain. The study also verified that females have a higher risk for the prevalence of constant shoulder and upper-back pain. The high frequency of musculoskeletal pain in females can be due to females having a lesser pain threshold (Chiu & Lam, 2007).

2.5 Prevalence of MSD

A newly published Scottish research done by Maguire & O'Connell (2007) established that the most typical reasons for ill-health retirement among teachers were comprised of 37% of mental disorders and 18% of musculoskeletal disorders.

Regarding the musculoskeletal disorders aspect, the occurrence was more than 30% for diagnosed musculoskeletal symptoms and disease in the area of the upper back, shoulders, neck, upper limbs, wrists, hands, lower back, lower limbs, feet, ankles and knees. While the upper back, shoulders, lower back and knees are the physical anatomy area that presented the highest disability rate (Constantino Coledam et al., 2018).

According to Paixão Cardoso Isadora de Queiroz Batista Ribeiro II et al. (2009), in a study made from a total of 496 teachers, the frequency of pain was found to be 41.1% in the lower limb area, 23.7% in the upper limb area and 41.1% in the lower back part respectively. Positive relationships were established between gender, age, level of education, years of teaching experience, marital status, the total number of offsprings and the manifestation of MSDs (Paixão Cardoso Isadora de Queiroz Batista Ribeiro II et al., 2009).

Among the working groups, teachers were found to have an extensively diverse pervasiveness rate of lower back pain (LBP), ranging from the United States of America (61%), China (59.2%), Brazil (53.3%) and Japan (17.7%). Numerous studies established that teachers were prone to risk for manifesting back pain with contrasting frequency (Atlas et al., 2007; Chong & Chan, 2010; Grant, Habes, & Tepper, 1995). Another report made on the Modified Oswestry Low Back Pain Disability questionnaire also found that teachers were suffering from back pain with a minimum disability (14.5%), moderate disability (49.4%), serious disability (6%), crippling disability (6%) and being bound in bed (5%) (Atlas et al., 2007). Statistically positive relationships were established between lack of back support, prolonged standing and sitting, static body posture and the pervasiveness of lower back pain (Yue et al., 2012). Differences might also occur in the pervasiveness rate of lower back pain among teachers due to the diverse procedure used, ambiguous working definition of lower back pain, imprecise occurrence periods, the array

of research samples and the various research sample quantity (Mohseni Bandpei et al., 2014)

To elaborate, according to Mohseni Bandpei et al. (2014), research data established that the occurrence rates of LBP were 21.8% point, 26.3% last month, 29.6% last six months, 31.1% yearly and 36.5% lifetime respectively. High school teachers were reported to have a higher point and higher lifelong prevalence (31.66%, 54.23%) in comparison to primary school teachers (11.9%, 18.9%) and they are more likely to be at higher risk to develop LBP (P b .05). Extended hours of sitting (27.4%) extended hours of standing (25.2%) prolonged working with computers (24.3%) and assessing examination papers (15.5%) were established to be the most critical factors that lead to LBP among teachers. Research also suggests that female teachers are more affected in comparison to male teachers, although the contrast was not analytically substantial (P = .26). Older teachers seemed to be more inclined to suffer from LBP in comparison to younger teachers (P = 0.00). Additionally, body mass index has a positive relationship with the occurrence of LBP (P = 0.01). Obese and overweight teachers were at higher risk to develop LBP in comparison to teachers with normal body mass index (P = 0.05). Work fulfilment also has a positive relationship with the manifestation of LBP (P = 0.05). Teachers who have low satisfaction with their work were at more risk to develop LBP in comparison to teachers who are happy with their work (P = 0.001). Furthermore, the years and duration of employment was a possible risk element for the prevalence of LBP in teachers. Teachers with working experience of more than 20 years were more likely to be at higher risk to develop LBP (P = 0.001). Extended duration of exposure to unfavourable teaching conditions can lead to the potential cause of manifesting LBP. To counter LBP among teachers, research suggests that short interval breaks and active participation in physical activities are the most effective management and prevention of LBP (Mohseni Bandpei et al., 2014).

Numerous researches showed that one of the most prevalent types of MSDs among teachers in comparison with the other working groups is neck (Cetisli Korkmaz et al., 2011; Chiu & Lam, 2007; Chong & Chan, 2010; Darwish & Al-Zuhair, 2013; Yue et al., 2012). The frequency of neck pain in teachers was found to be 60% in Hong Kong (Chiu & Lam, 2007), 57% in China (Chiu et al., 2006), 44% in Sweden (Fjellman-Wiklund & Sundelin, 1998) and 43% in Turkey (Cetisli Korkmaz et al., 2011; Ehsani et al., 2018). Neck pain are also more prevalent in female teachers in comparison to their male counterparts (Cetisli Korkmaz et al., 2011).

2.6 Teachers' tasks

Prolonged standing and sitting needed in the various working circumstances and conditions of school teachers (e.g., teaching a class, evaluating the work of students, assessing the examination papers and doing computer-related tasks) can be recognized as risk factors for developing MSDs (Paixão Cardoso Isadora de Queiroz Batista Ribeiro II et al., 2009).

Teachers perform numerous works that can lead to physical health problems. Although the task of a teacher is primarily to teach their students, their workloads also include many supporting tasks such as planning classes and exercises, grading the work of students and participating in many activities such as competitions, crafts and games. Teachers also have to get involved in many school committees. These exhausting tasks can cause most teachers to experience physical and psychological health complications (Mesaria S & Jaiswal N, 2015).

The majority of schools are equipped with non-adjustable chair, desks and furniture which do not fit students and teachers of various sizes, resulting in poor body posture and adverse physical health problems with lifelong consequences on the musculoskeletal health and its development in the future (Mesaria S & Jaiswal N, 2015).

Frequently, teaching is performed under poor conditions, in which the teachers have to actively utilise their physical, mental and emotional competence to accomplish teaching objectives. These working circumstances are taxing and demand the overexertion of effort on their psychological functions (Paixão Cardoso Isadora de Queiroz Batista Ribeiro II et al., 2009). A substantial amount of teachers are also experiencing psychosocial complications daily caused by the unfavourable working environment (Cezar-Vaz, Bonow, Almeida, Rocha, & Borges, 2015).

The unconducive working environment can be factors inducing the manifestation of MSDs as shown in the preceding studies. Consequently, long hours of exposure to these adverse working environments lead to potential health risks. These unfavourable working requirements among teachers include the overexertion of physical energy such as being constantly in upright posture during up to 95% of the teaching hours, head-down posture when writing reports or examining the work of students and regular lifting of excessive loads. Furthermore, teachers have to endure another physically strenuous work that demands them to raise their hand above their shoulder level over a long period of time, which showed a substantial relationship to upper body, shoulder and neck pain. All of the factors mentioned have the biomechanical foundation to be possible risk elements for musculoskeletal pain (Chiu & Lam, 2007; Miranda et al., 2002; Paixão Cardoso Isadora de Queiroz Batista Ribeiro II et al., 2009). Repetition of tasks and prolonged static posture in the work of a teacher can also induce repetitive strain injuries (RSIs), which is a form of MSDs that negatively affect the upper limb, lower back, shoulder and neck area (Yue et al., 2012).

The significant relationships were established between teaching level, body mass index (BMI), the presence of lifelong disease contribute to the manifestation of MSDs in teachers (Ehsani et al., 2018). The findings of the current research showed that age,

gender, overall health condition, duration of employment, lack of physical exercise and work fulfilment were significant and essential factors for the manifestation of neck pain among teachers. Furthermore, results indicated that some working circumstances such as long duration of working with computers, assessing examination papers which requires head down postures are suggestively linked with a higher risk of inducing neck pain among teachers (Ehsani et al., 2018)

2.7 Standardized Nordic Questionnaire

The Nordic Musculoskeletal Questionnaire (NMQ) was established from a scheme financed by the Nordic Council of Ministers (Kuorinka et al., 1987). The objective was to experiment and asses a regulated questionnaire procedure enabling evaluation of lower body, upper body, shoulder, neck and generic complaints for the benefit of epidemiological researches. There are currently two forms of surveys in NMQ; an overall questionnaire and a detailed questionnaire concentrating on the lower body and upper body area of shoulder or neck. The aim of the overall questionnaire is simply to survey the general traits of participants, while the detailed questionnaire concentrates on deep analysis of the physical anatomy.

CHAPTER 3: METHODOLOGY

3.1 Study design and sample

A cross-sectional study was conducted in two private schools in Gombak. One is a primary school, and the other is a secondary school. The schools are located in the suburbs area. Both schools' headmistress and principle gave written consents for the study to be done in their schools.

A total of 110 sets of questionnaires were distributed to the teachers in both schools that has met all the criteria set. The criteria are they must have at least one year teaching experience, are full-time teachers, does not smoke, and does not drink alcohol. They were given one day to complete the questionnaire in their own time. Instructions was written on the questionnaire to guide the teachers to complete it correctly.

Out of the 110 questionnaires distributed, only 79 was answered completely and correctly. 33 complete questionnaires were retrieved from the primary school, and 46 from the secondary school.

3.2 Questionnaire

There are three main components in the questionnaire that was distributed to the teachers. The questions were available in both English and Malay.

"Part A" of the questionnaire was about the respondents' personal information. The questions included were on the respondents' gender, age, marital status, level of education, family income, and their Body Mass Index (BMI).

"Part B" was more focused to get the respondents' working pattern information and daily activities. The questions asked was on the teachers' working experience, average working hours per week, average teaching hours per week, and average daily standing,

sitting, and sleeping time. The respondents were also asked whether they perform any work pauses or break while teaching in the class. Lastly, their stress level while doing tasks such as teaching preparation, teaching, marking papers, clerical works and others were gauged.

"Part C' collects the data of musculoskeletal pain that the respondents experienced, if any. A modified Standardized Nordic Questionnaire (Kuorinka et al., 1987) was used to determine the presence of musculoskeletal disorder among the teachers in the past 12 months and seven days. The body parts that were included in the SNQ was the neck, shoulders, elbows, wrists, hands, upper back, low back, hips, thighs, knees, ankles, and feet. A figure of each of the body parts positions was attached in the questionnaire for the respondents' reference. If the respondents experience any pain during the past 12 months, they needed to answer another question that asked whether they felt them during the last 7 days, and whether they were prevented from doing their normal work because of the pain.

3.3 Statistical analysis

All the responses were recorded in the IBM SPSS Statistics Version 25 and Microsoft Excel. T- tests were conducted to determine whether there is a significant difference of prevalence between the means of two groups, which may be related in a specific characteristic. It is used to statistically test the hypothesis made. The three key data values that are needed in the T- tests are the mean values from each data set (mean difference), the standard deviation of each group, and the number of data values of each group. This test gives out the t- value. This value is compared to the values in the T- Distribution Table. This will determine whether the data sets do have natural differences, or it just happened coincidentally. Meanwhile, the p- value is used to test the strength of the evidence. A p- value of < 0.05 means that the data has statistical significance.

CHAPTER 4: RESULTS

4.1 Socio-demographic characterization

The questionnaires were distributed to both schools on the same day. 54 questionnaires were given to the primary school, and a total of 33 questionnaires were returned with complete answers. Meanwhile, a total of 56 questionnaires distributed to the secondary school, and 46 questionnaires were returned with complete answers. The remaining 41 questionnaires from both schools were returned either blank or were not completed. Therefore, the primary school teacher makes up 41.77% of the sample compared to the secondary school with 58.23%.

Table 4.1 shows the characteristics of the sample. Out of the 79 respondents, 74.68% (n = 59) were females, while 25.32% (n = 20) were males. 43.04% (n = 34) of them are in their 30s, 29.11% (n = 23) are in their 20s while the other 27.85% (n = 22) are above 40 years old. Majority of them are married, have a bachelor's degree as their highest education level, and a family income between RM 2501 to RM 5000.

Almost half of the respondents have a normal BMI comprising 43.04% (n = 34), while the majority are either overweight or obese. 29.11% (n = 23) are overweight and 26.58% (n = 21) are obese, making up 55.7% of the population. Table 4.1 shows the categories based on the value of BMI.

Table 4.1: BMI categories

BMI value	BMI category
< 18.5	Underweight
18.5 – 24.9	Normal
25 – 29.9	Overweight
> 30	Obesity

("Calculate Your BMI")

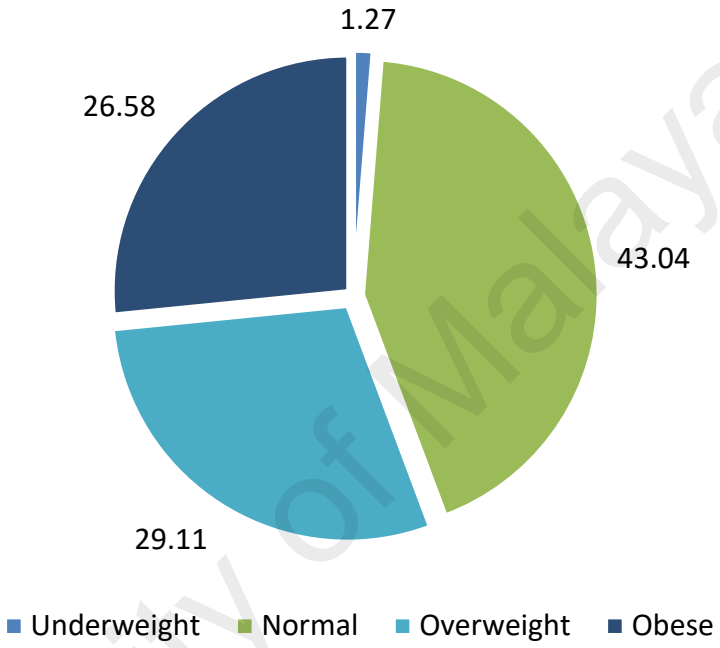

Figure 4. 1: Distribution of the BMI category of the respondents

Most of the teachers, 68.35% (n = 54) have been working as a teacher for less than 10 years. Meanwhile, 15.19% (n = 12) have been in this profession for 11 – 19 years, and 20 – 30 years. Only 1.27% (n = 1) has more than 30 years of experience.

Table 4.2: Socio-demographic characteristics of the respondents (n = 79)

Variables	n (%)
School	
Primary	33 (41.77)
Secondary	46 (58.23)
Gender	
Male	20 (25.32)
Female	59 (74.68)
Age	
20 – 29	23 (29.11)
30 – 39	34 (43.04)
40 – 49	11 (13.92)
50 – 59	10 (12.66)
60 – 69	1 (1.27)
Marital status	
Single	18 (22.78)
Married	59 (74.68)
Widowed	2 (2.53)
Education	
PhD	1 (1.27)
Master's degree	12 (15.19)
Bachelor's degree	58 (73.42)
Diploma	6 (7.59)
Certificate	2 (2.53)
Family income	
0 - 2500	20 (25.32)
2501 - 5000	35 (44.30)
5001 - 7500	13 (16.46)
7501 - 10000	7 (8.86)
> 10000	4 (5.06)
BMI	
Underweight	1 (1.27)
Normal	34 (43.04)
Overweight	23 (29.11)
Obese	21 (26.58)
Years in teaching profession	
1 - 10	54 (68.35)
11 - 19	12 (15.19)
20 -30	12 (15.19)
> 30	1 (1.27)
Working hours per week	
< 40	5 (6.33)
40 - 45	61 (77.22)
> 45	13 (16.46)
Teaching hours per week	
1 - 5	7 (8.86)
6 - 10	16 (20.25)
11 - 15	36 (45.57)
16 - 20	12 (15.19)
> 21	8 (10.13)

4.2 Prevalence of musculoskeletal pain in 12 months' time frame

Nine body parts were included in the SNQ given to the respondents. To ease the analysis of the results, these parts were divided into three categories. They are the upper limbs which consist of the shoulders, elbows and wrists/hands. The second category is the lower limbs, comprising the hips/thighs, knees and ankles/feet. Finally, the third part covers the neck, upper back and low back. This category is called the axial skeleton.

Figure 4.1 shows the prevalence of MSD in the nine parts of the body answered by the respondents. From the data obtained, it is clear that the highest MSD prevalence is the neck with 70.89% (n = 56). It is followed by shoulders with a percentage of 58.23 (n = 46), low back with 49.37% (n = 39), upper back with 45.57% (n = 36), knees with 43.04% (n = 34), hips/thighs with 32.91% (n = 26), wrists/hands with 21.52% (n = 17), ankles/feet with 17.72% (n = 14). Finally, body part with the least MSD prevalence is the elbow with only 1.27% (n = 1).

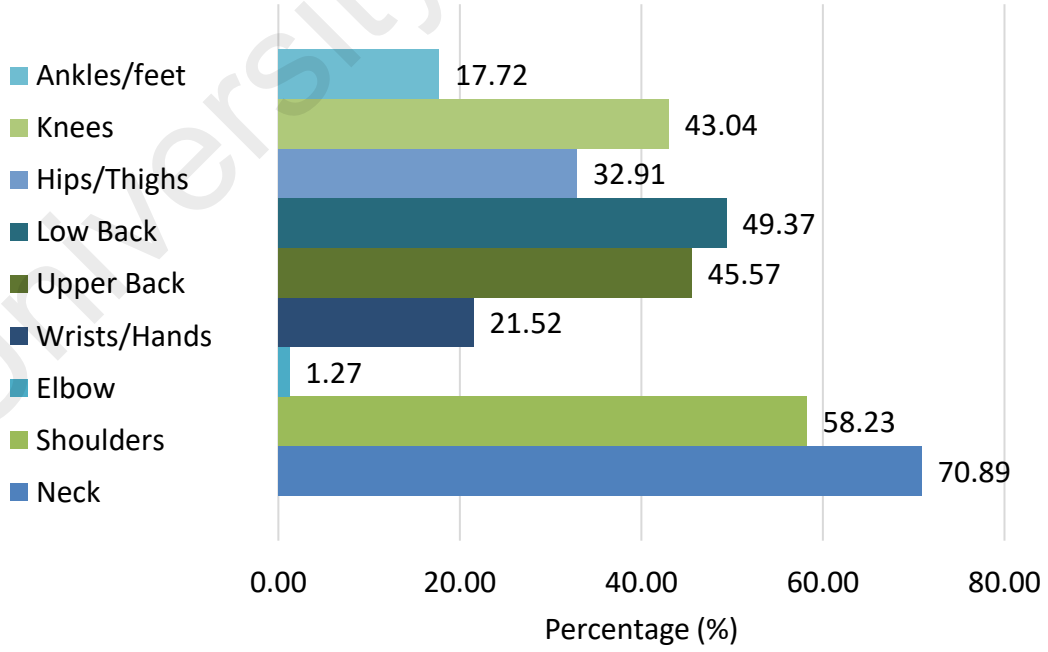

Figure 4. 2: MSD signs in nine body parts

Those who have MSD symptoms in the last 12 months were asked two more questions. The first one is whether they have been restricted from doing normal work due to the pain that they suffer. The second question is whether they felt any pain or discomfort in that body part during the last seven days. Figure 4.2 shows the comparison between the nine body parts.

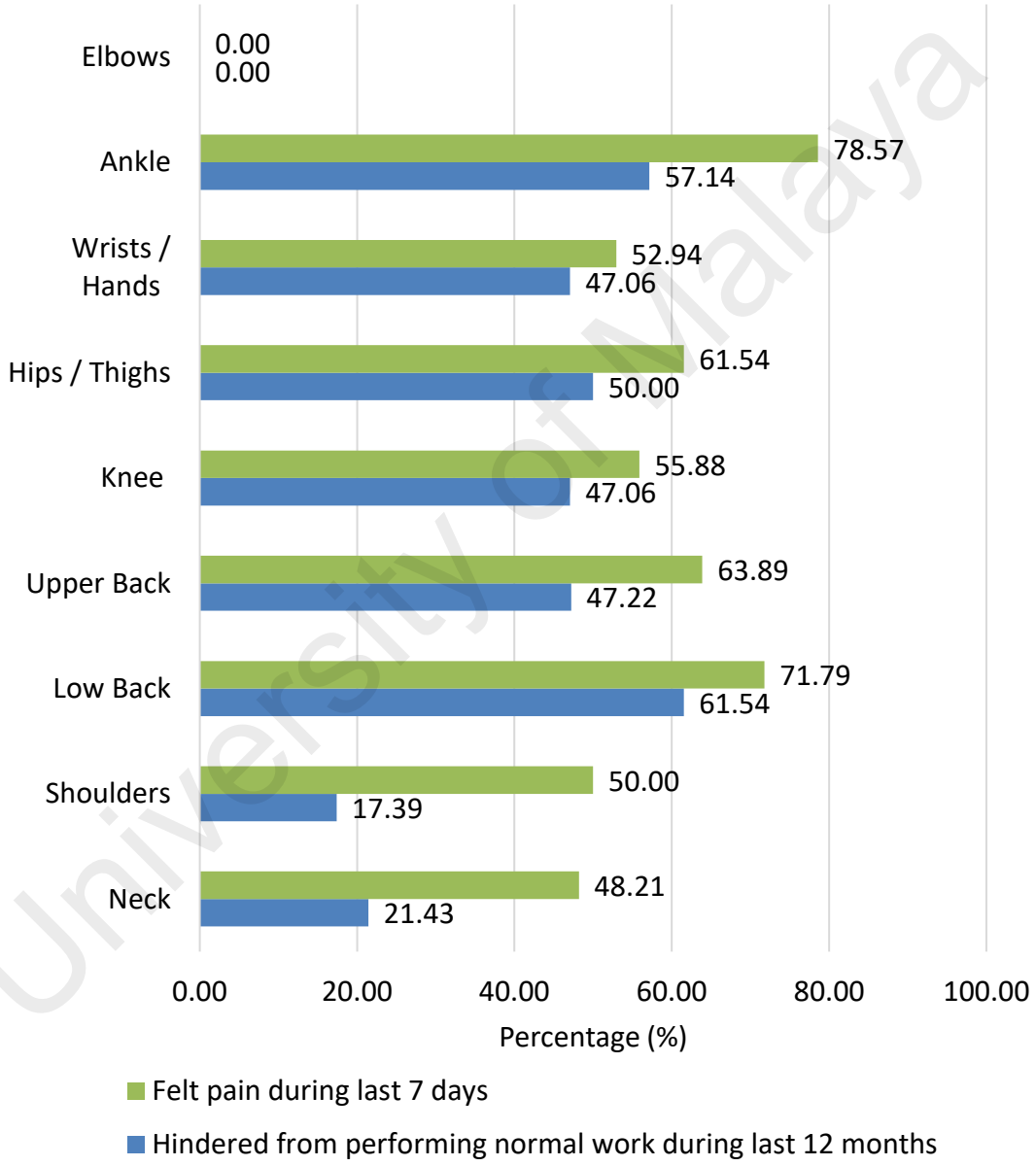

Figure 4.3: Comparison between the nine body parts on recent pain experience and hindrance from working due to pain suffered

4.2.1 Presence of pain during recent 7 days duration

Figure 4.2 shows that at the time the respondents answered the questionnaires, around half of them are, or just recently felt pain or uncomfortable in those body parts. The body part with the most percentage of prevalence is the ankle or feet, with 78.57%. Out of 14 people, 11 of them reported feeling recent pain. It is then followed by low back pain with 71.79% (n = 28), upper back with the percentage of 63.89% (n = 23) and hips or thighs part with 61.54% (n = 16).

Recent pain of the knees was reported to be 55.88% (n = 19), followed closely by the wrists or hands with 52.94% (n = 9). Meanwhile, 50% (n = 23) of the respondents that experienced pain in the shoulders during this year reported having symptoms recently. Next is the neck area with 48.21% (n = 27). Only one respondent reported having problem in the elbows, but she did not have them recently.

4.2.2 Prevention from performing normal work in 12 months duration

From Figure 4.2, it can be roughly seen that almost half of the respondents with MSD problems had been hindered from doing their normal chores because of the pain that they suffered. The body part with the highest percentage of prevalence is the low back with 61.54% (n = 24). Next is the ankles or feet with a percentage of 57.14% (n = 8).

Half of the respondents (n = 13) complained having prevented from doing their normal chores because of the pain in their hips or thighs. The upper back showed a percentage of 47.22% (n = 17). Both wrists or hands (n = 8) and knees (n = 16) had a percentage of 47.06%.

Although both neck and shoulders are among the highest prevailing pain answered by the respondents, they did not hinder the them from doing their works. Only 21.43% (n = 12) of the respondents were hindered because of their neck pain, and 17.39% (n = 8) for

shoulder pain. For the elbows, the one respondent that had elbow pain did not encounter much problem to do her daily work.

4.3 Prevalence of MSD by gender

From the total of 79 respondents, there are 20 male and 59 female respondents. To compare between these two genders, the nine body parts were divided into three group, the upper limbs, lower limbs and the axial skeleton.

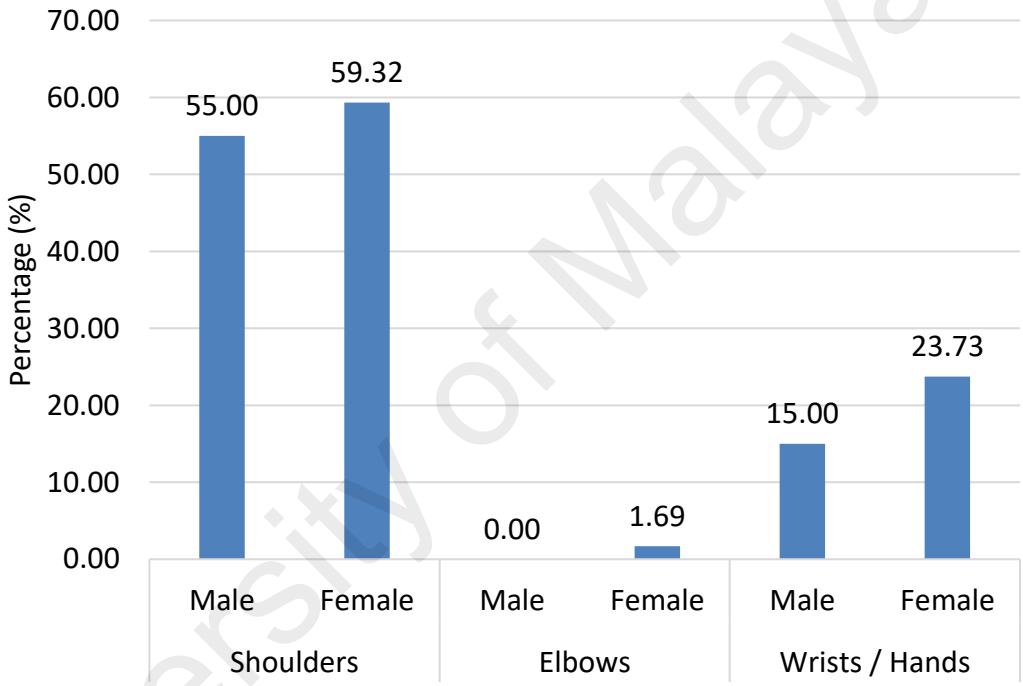

Figure 4. 4: Comparison between male and female respondents on the prevalence of MSD in the upper limbs

For the upper limbs comparison as presented by Figure 4.4, the female teachers showed a slightly higher occurrence of musculoskeletal symptoms in all three limbs compared to the male counterpart. 35 out of 59 female teachers had shoulder pain during the last 12 months, which makes up 59.32%. A difference of 4.32% percent was observed for the male respondents, where 11 out of 20 had shoulder troubles.

As for the elbows, only one case (1.69%) was recorded from the female respondents, while there were none from the male. Meanwhile, there was a difference of 8.73% in the prevalence of pain in the wrists or hands between the male and female respondents. They consisted of 14 female respondents (23.73%) and 3 male respondents (15%).

For the lower limbs, the results were opposite from the upper limbs. Male respondents showed higher prevalence of trouble in all three regions compared to the females. Male respondents with hips or thighs pain totalled up to 40% (n = 8) while the females were 30.51% (n = 18). There was not much difference between the male and female respondents in the percentage of knee pain suffered. There was 9 male (45%) and 25 females (42.37%) in total. The male respondents (n = 6) had 16.44% higher percentage of getting ankles or feet pain than the females (n = 8).

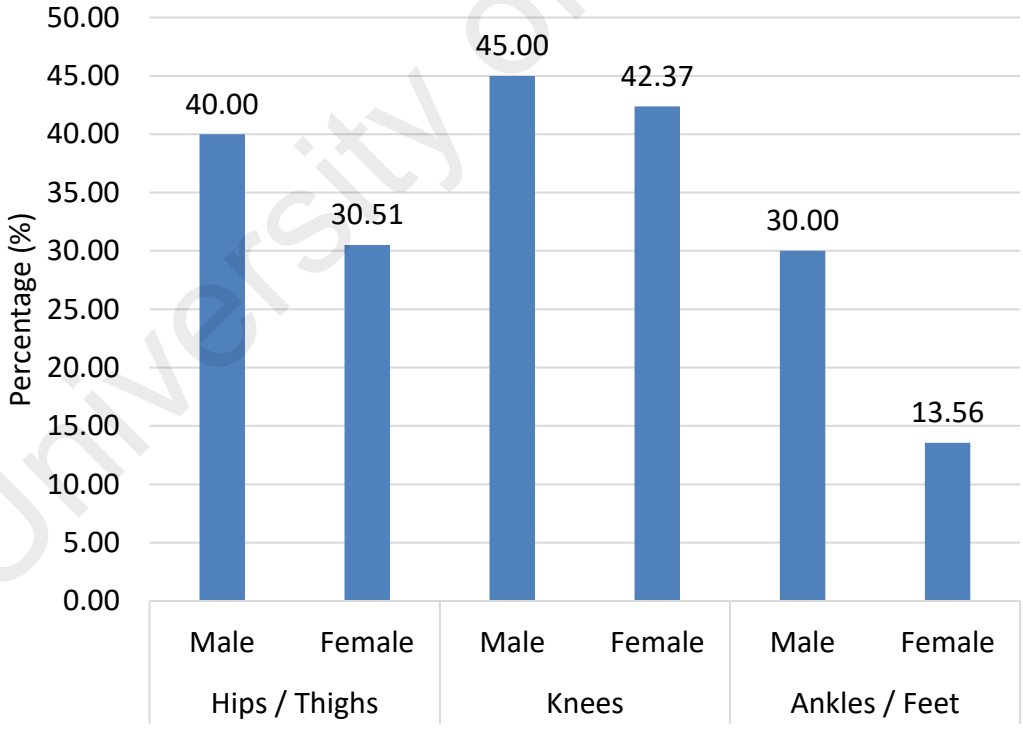

Figure 4. 5: Comparison between male and female respondents on the prevalence of MSD in the lower limbs

Next is the axial skeleton area. The male respondents had a little bit higher percentage of complaints in the neck area than the females. A total of 15 out of 20 (75%) male respondents, while 41 out of 59 (69.49%) female respondents had this problem. Meanwhile, the females had a higher chance of developing ache in the upper back region. 30 females (50.85%) were reported to suffer from this problem, as compared to the males with 30% (n = 6) prevalence. Finally, the female respondents also showed a higher probability to have discomfort in their lower back region. A difference of 5.85% can be seen between these two groups. 50.85% (n = 30) of the female respondents had lower back problem as compared to the males with 45% (n = 9).

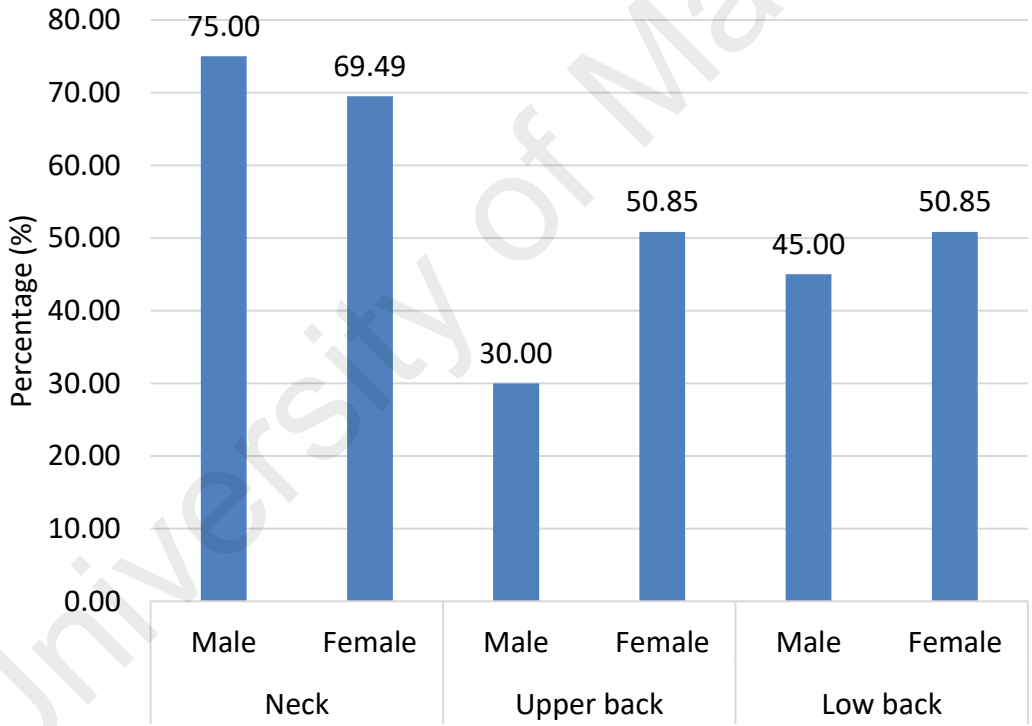

Figure 4. 6: Comparison between male and female respondents on the prevalence of MSD in the axial skeleton area

4.4 Prevalence of MSD by age group

Four of the body parts that has the highest occurrence of discomfort are the neck, shoulders, and low back area. Therefore, a comparison of these parts according to age group was done.

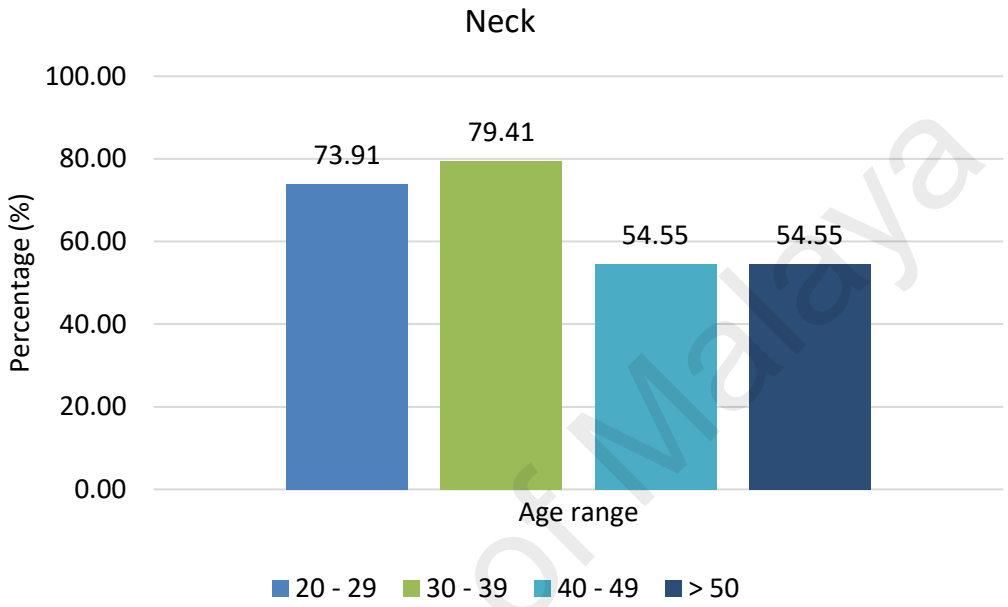

Figure 4. 7: Comparison between different age groups on the prevalence of neck pain

For the neck area, it can be seen that those who are aged below 40 years old showed a higher probability of getting aches compared to those who are above 40. The age group of 20 to 29 years old had 17 out of 23 respondents (73.91%) with neck pain and 27 out of 34 respondents (79.41%) from the age group 30 to 39 years old had the same problem. Meanwhile the age group of 40 to 49 years old and more than 50 years old had a lower occurrence of neck pain compared to the younger ones, which is 54.55% that was made up from 6 out of 11 respondents from each group.

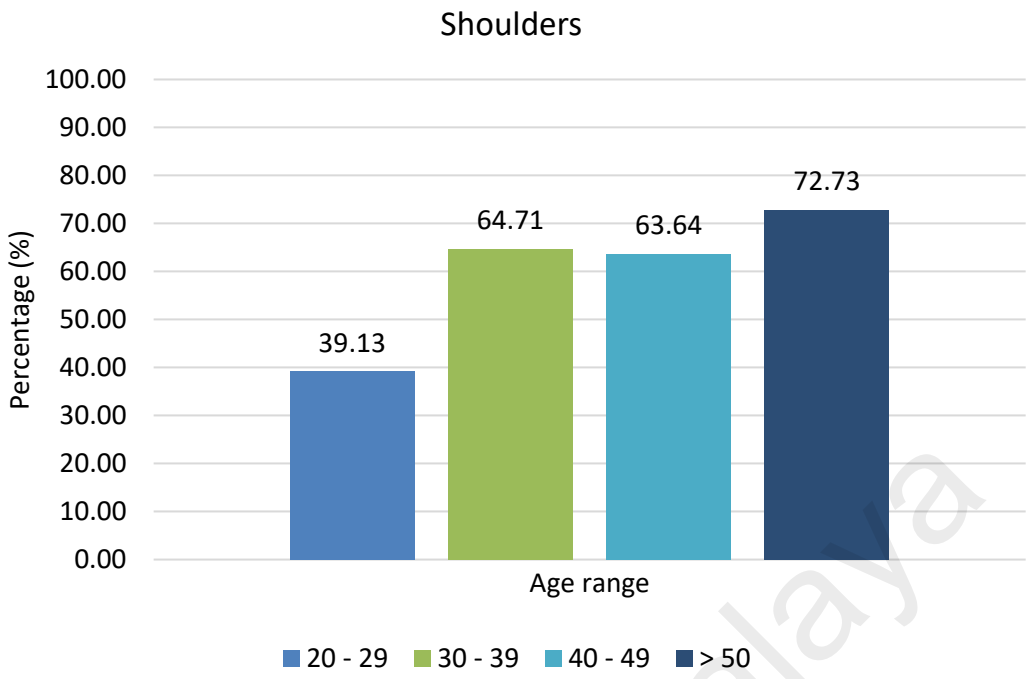

Figure 4. 8: Comparison between different age groups on the prevalence of shoulder pain

A different result was procured for the shoulders area. Accumulating 72.73% (n = 8), the 50 years and above group had the highest percentage of having shoulder pain. The second highest is the 30 to 39 years old group with 64.71% (n = 22). It is followed closely by the 40 to 49 years old age group with 63.64% (n = 7). The group with the least percentage of prevalence is the 20 to 29 years old group with total complaints of 9 out of 23 respondents (39.13%).

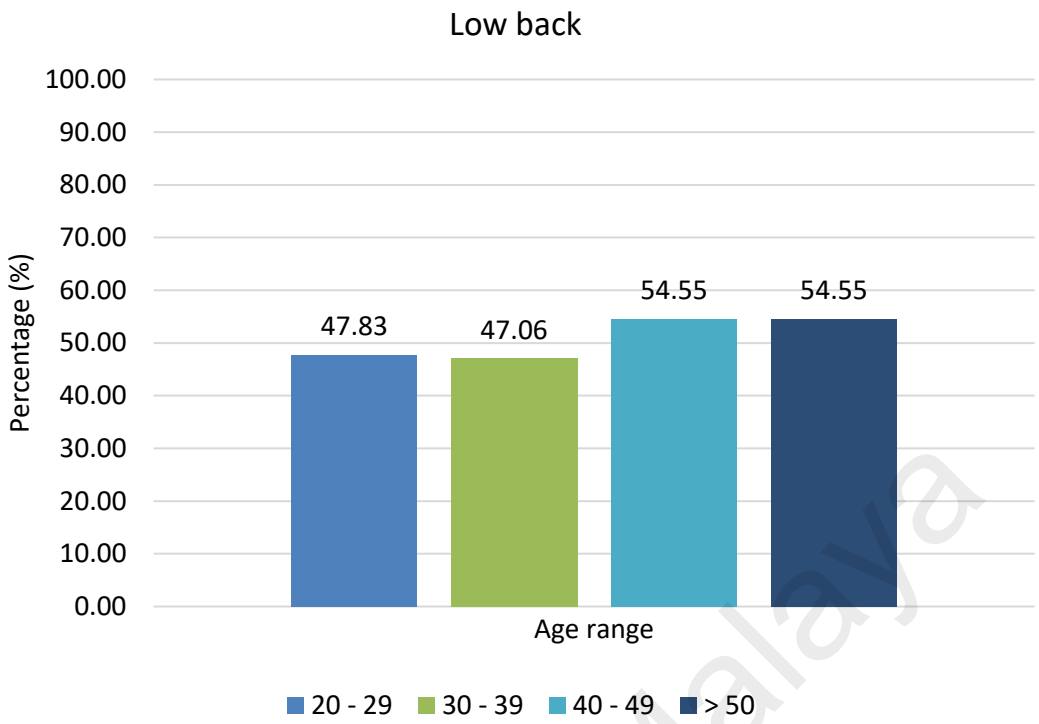

Figure 4. 9: Comparison between different age groups on the prevalence of low back pain

For the low back regions, the results acquired showed almost equal distribution of prevalence across each of the age groups. The age group of 40 to 49 years (n = 6) and above 50 years (n = 6) shares the same percentage of prevalence of low back discomfort of 54.55%. The age group 20 to 29 years old was next, with a prevalence of 47.83% (n = 11). Having a percentage of 47.06% (n = 16), the age group of 30 to 39 years old teachers had the lowest prevalence with only a slight difference from the group before them.

CHAPTER 5: DISCUSSION

5.1 Prevalence of MSD

From the data gathered, the three body parts that has the most complaints of pain or discomfort from the respondents are the neck (70.89%), shoulders (58.23%) and low back (49.37%). It is also found that around half of the respondents have had problems in one or more part of the body that limits their motion to do daily works.

5.1.1 Neck

The neck part has the highest percentage of sufferers among the teachers. This result is consistent with past studies (Cetisli Korkmaz et al., 2011; Darwish & Al-Zuhair, 2013; Fjellman-Wiklund & Sundelin, 1998) that shows a high prevalence of neck pain among teachers. This result is also higher than the study that was done in Hong Kong, which was 60% (Chiu & Lam, 2007).

The prevalence of neck pain has been associated with extended hours of standing, sitting and also awkward postures (Cetisli Korkmaz et al., 2011; Yue et al., 2012). The constant head down posture while using the computer and marking papers are among the causes of getting neck pain (Ehsani et al., 2018).

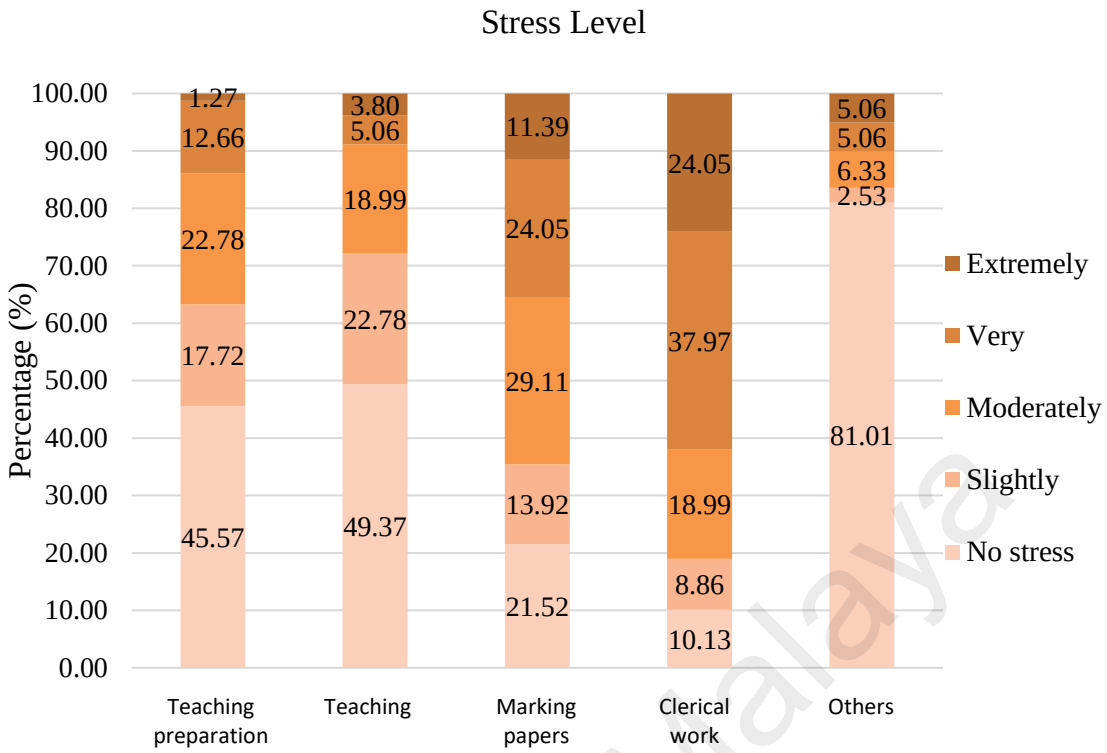

Figure 5.1: Stress level comparison across different activities

From the results of the t-test that has been done in Table 5.1, long working hours (P = 0.022) has a significant difference to the prevalence of neck pain. This may be linked to the time spent at the desk, doing clerical work as the hours of teaching in class did not have a significant difference (P = 0.156). Furthermore, clerical work gave most of the teachers high amount of stress as can be seen from Figure 5.1. Stress from doing clerical work gave a significant difference on the result obtained (P = 0.030). This was in line with a study that found there is a relationship between stress and the probability of getting MSD (Coledam et al, 2018).

However, the result of standing (P = 0.064) and sitting (P = 0.253) is contradicting to the past literature as they did not show a significant difference. This may be due to the small sample size.

Table 5.1: Relationship between work characteristic and the prevalence of neck pain

Variables	Number of samples	p-value
Years of teaching		
≤ 2 years	10	0.372
> 2 years	69	
Hours of working		
< 50 hours/week	68	0.022
≥ 50 hours/week	11	
Hours of teaching		
< 10 hours/week	23	0.156
≥ 10 hours/week	56	
Standing time		
< 5 hours/day	32	0.064
≥ 5 hours/day	47	
Sitting time		
< 5 hours/day	30	0.253
≥ 5 hours/day	49	
Work pauses		
< 5 mins/day	57	0.746
≥ 5 mins/day	22	
Regular exercise		
No	34	0.349
Yes	45	
Stress from clerical work		
Not stress	30	0.030
Stressed	49	
Stress from marking papers		
Not stress	51	0.077
Stressed	28	

5.1.2 Shoulders

The number of discomforts experienced in the shoulder among the respondents is 58.23%. This is supported by a past study that shows more than 45% of the teachers had this problem (Chong & Chan, 2010; Constantino Coledam et al., 2018; Yue et al., 2012; Zamri et al., 2017)

The development of pain in the shoulders can be related to improper posture of the teachers while doing their work at the table. The t-test in Table 5.2 proved that those who were sitting for a long period of time (P = 0.027) had a significant difference of prevalence compared to the ones that were sitting less than 5 hours a day. Besides that, this pain can also be aggravated by the frequent elevation of the arms while writing on the whiteboard.

Prolonged standing also had a significant difference (P = 0.013). This is due to improper working posture and frequent bending motion of the teachers. All the other variables had a P value higher than 0.05.

Table 5.2: Relationship between work characteristic and the prevalence of shoulder pain

Variables	Number of samples	p-value
Years of teaching		
≤ 2 years	10	0.988
> 2 years	69	
Hours of working		
< 50 hours/week	68	0.219
≥ 50 hours/week	11	
Hours of teaching		
< 10 hours/week	23	0.429
≥ 10 hours/week	56	
Standing time		
< 5 hours/day	32	0.013
≥ 5 hours/day	47	
Sitting time		
< 5 hours/day	30	0.027
≥ 5 hours/day	49	

Table 5.2: continued

Variables	Number of samples	p-value
Regular exercise		
No	34	0.791
Yes	45	
Stress from clerical work		
Not stress	30	0.260
Stressed	49	
Stress from marking papers		
Not stress	51	0.127
Stressed	28	

5.1.3 Low back

49.37% of the respondents faced problems in their lower back during the past 12 months. It is similar to previous studies that shows the high occurrence of low back pain among teachers which was in the range of 21.8% to 53% (Atlas et al., 2007; Hashim et al., 2010; Mohseni Bandpei et al., 2014).

The onset of the LBP is due to insufficient back support, static posture and extended hours of sitting. In Table 5.3, the stress while marking papers shows significant relationship (P = 0.049) to the LBP frequency. This result is comparable to past studies that shows a high correlation between stress and MSD (Constantino Coledam et al., 2018; Erick & Smith, 2013; Cardoso et al., 2009)

There was also a positive relationship between the frequency of LBP with work pauses taken during class (P = 0.038). A teacher that takes more than 5 minutes break has a lower probability of getting LBP.

Table 5.3: Relationship between work characteristic and the prevalence of low back pain

Variables	Number of samples	p-value
Years of teaching		
≤ 2 years	10	0.671
> 2 years	69	
Hours of working		
< 50 hours/week	68	0.314
≥ 50 hours/week	11	
Hours of teaching		
< 10 hours/week	23	0.945
≥ 10 hours/week	56	
Standing time		
< 5 hours/day	32	0.205
≥ 5 hours/day	47	
Sitting time		
< 5 hours/day	30	0.712
≥ 5 hours/day	49	
Work pauses		
< 5 mins/day	57	0.038
≥ 5 mins/day	22	
Regular exercise		
No	34	0.056
Yes	45	
Stress from clerical work		
Not stress	30	0.931
Stressed	49	
Stress from marking papers		
Not stress	51	0.049
Stressed	28	

5.2 Comparison between genders and age

There were many literatures that found a higher prevalence of MSD in females compared to males (Cetisli Korkmaz et al., 2011; Mohseni Bandpei et al., 2014; Ng et al., 2019). One study suggests that this was due to their lower pain tolerance (Chiu & Lam, 2007). Besides that, there are suggestions that the females have higher job stress compared to the males (Abdulmonem et al., 2014).

Table 5.4: Relationship between gender and prevalence of neck, shoulder and low back pain

Body part	Gender	Frequency (n)	p-value
Neck	Male	20	0.644
	Female	59	
Shoulders	Male	20	0.739
	Female	59	
Low back	Male	20	0.656
	Female	59	

However, the results of this study show no significant difference of the prevalence of each of the three body parts when compared according to the gender. All three regions gave a p-value of higher than 0.05. This may be due to the much lower sample of male compared to the female.

Table 5.5: Relationship between age group and prevalence of neck, shoulder and low back pain

Body part	Age	Frequency (n)	p-value
Neck	Below 40	57	0.048
	Above 40	22	
Shoulders	Below 40	57	0.271
	Above 40	22	
Low back	Below 40	57	0.573
	Above 40	22	

From Table 5.5, the age group below 40 showed a significant prevalence of neck pain as compared to the age group above 40 years old (P = 0.048). This can be caused by the more time spent in front of the computers and the use of gadgets.

5.3 Prevention and management of pain

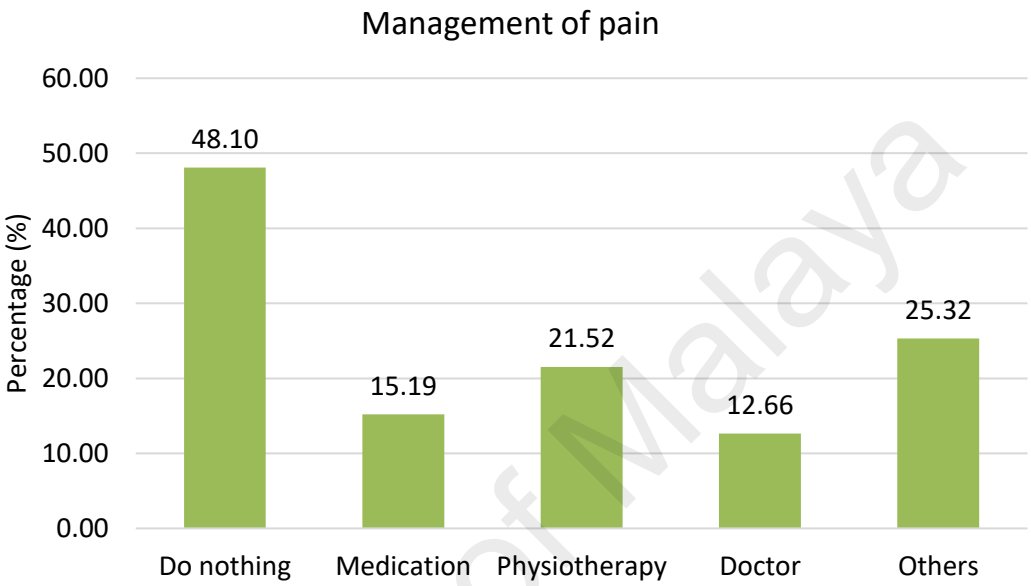

Figure 5.2: Teachers' ways of managing the pain

From the above figure, almost half of the teachers does nothing when they are having pain in any part of their body. If left untreated, these pains can get even serious and disrupt the teachers' quality of life. Meanwhile, the second highest percentage was the 'others' where they opted to traditional ways such as massaging and applying ointment. There were low percentages of teachers that seek for professional medical care to attend to their discomfort.

A few suggestions that can be made to improve the teachers' musculoskeletal health are for them to take short regular breaks between work and do simple stretching exercises. Besides that, they need to know the proper working posture, such as the right way to stand, sit, bend and lift loads. The teachers are also advised to not lift their arms too high

when writing on the whiteboard. Moreover, they must not do prolonged actions such as standing or sitting. They should also avoid from doing constant repetitive movements.

As the health status of the teachers had been identified, a preventive and management programme should be implemented at schools. It is essential for the teachers to know the risks of MSDs which are related to their occupation. It is plausible to have an officer, or a teacher placed in schools, that knows about ergonomics so that these awareness and programmes can be implemented smoothly. The management of the school can also take initiative to ease the workload of the teachers and have stress reduction programmes.

CHAPTER 6: CONCLUSION AND SUGGESTIONS

6.1 Conclusion

This study showed a high prevalence of the neck (70.89%), shoulders (58.23%) and low back (49.37%) pain. The risk factors of these MSDs are due to high stress, extended time of sitting and standing, and long working hours. There was not much difference in the prevalence of MSD between male and female. Meanwhile, the age group below 40 years old had more probability of having neck discomfort. Taking a break for about 5 minutes lowers the prevalence of MSD.

Many preventive measures can be taken to reduce the onset of MSD. They can correct their working postures, reduce repetitive movement and static postures, and do simple exercises in between work.

6.2 Recommendations for future work

A few improvements can be made for future studies. Firstly, the sample size can be increased. A much larger sample size can procure more encompassing results. Secondly, the period of the onset and persistence of the pain can be asked, so the severity of the pain can be gauged more clearly. Thirdly, the survey can be done in more diverse type of school. For example, the school in the city and rural area.

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