UNIVERSITI PUTRA MALAYSIA

EVALUATION OF THE RISK FACTORS CONTRIBUTED TO MUSCULOSKELETAL PAIN AMONG MEDICAL STUDENTS IN FACULTY OF MEDICINE AND HEALTH SCIENCES, UNIVERSITI PUTRA MALAYSIA 2013

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ABSTRACT

Background: Musculoskeletal pain is the pain that affects the bones, joints, muscles, or surrounding structures. Musculoskeletal pain is one of the most common causes of severe pain and disability that affects millions of people around the world, including Malaysia. University students are commonly affected by musculoskeletal pain thus a research in this field is needed to reduce the burden of it.

Objectives: To determine the prevalence and risk factors of musculoskeletal pain among medical students in FHMS, UPM.

Methods: A cross-sectional study was done among 506 respondents using a questionnaire that consists of 3 sections: anthropometric, socio-demographic, ergonomic characteristics respectively. The study was conducted in FMHS, UPM and achieved 83% response rate.

Results: The prevalence of musculoskeletal pain among the respondents for the past 12 months is 51.4% Common musculoskeletal pain areas are neck (80.3%), lower back (70.2%) and the upper arms and/or shoulder (63.3%) respectively. Majority are normal in nutritional status (71.9%). Most of the respondents are 20 years old (27.1%), The percentage of female (40.1%) was more than male (59.9%).The highest ethnicity percentage are Malays (63.2%). Most of the respondents use computer for 1-3 hours per day (53.3%).There is no association between musculoskeletal pain and nutritional status (p=0.920), age (p=0.108), and ethnicity (p=0.240) respectively. There is an association musculoskeletal pain and gender (p=0.002) and hours of computer usage per day (p=0.005)

Conclusion: 218 out of 424 respondents (51.4%) who participated in this study had musculoskeletal pain for the past 12 months. Chi-square test showed that there is a significant association between gender and hours of computer usage per day. However there is no association between nutritional status, age, and ethnicity.

Keyword: *Musculoskeletal pain, anthropometric, sociodemographic, ergonomic, prevalence, associated factors*

PENILAIAN KEPADA FAKTOR-FOKTOR RISIKO YANG MENYUMBANGKAN KEPADA SAKIT OTOT DI KALANGAN MAHASISWA PERUBATAN DI FACULTI PERUBATAN DAN SAINS KESIHATAN (FPSK), UNIVERSITI PUTRA MALAYSIA (UPM), 2013

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Latar Belakang: Sakit otot adalah sakit yang menjejaskan tulang, sendi, otot, atau stuktur sekeliling otot adalah salah satu daripada penyebab utama kesakitan teruk dan kekurangupayaan yang mempengaruhi jutaan orang di dunia, termasuklah Malaysia. Mahasiswa selalunya mendapat sakit otat jadi kajian dalam bidang ini perlu dijalankan agar dapat mengurangkan bebannya.

Objectif: Untuk menentukan kelaziman dan faktor risiko sakit otot di kalangan mahasiswa perubatan di FPSK, UPM.

Keadah: Kajian rentas telah dijalankan di kalangan 506 responden menggunakan soalkaji yg mengandungi 3 bahagian : faktor antropometri, demografi and ergomoni berturut-turut. Kajian ini dijalankan di FPSK, UPM dan mendapat kadar respon sebanyak 83%.

Keputusan: Kelaziman sakit otot di kalangan responden sejak 12 bukan yang lepas ialah 51.4%. Bahagian yang sering mengalami sakit otot ialah leher (80.3%), belakang bawah (70.2%) dan lengan serta/atau bahu (63.3%) Majoriti responden mempunyai status nutrisi yang normal (71.9%). Kebanyakan responden adalah berumur 20 tahun(27.1%), Peratus wanita (59.9%) adalah lebih tinggi daripada lelaki (40.1&).Peratus etnik paling tinggi ialah Melayu (63.2%). Kebanyakan responden menggunakan komputer selama 1-3 jam (53.3%).Tiada perkaitan antara sakit otot dengan status nutrisi (p=0.920), umur (p=0.108), dan etnik (p=0.240). Ada perkaitan antara sakit otot dan janti (p=0.002) serta tempoh penggunaan komputer sehari (p=0.005)

Kesimpulan: 218 daripada 424 responden (51.4%) yang terlibat dalam kajian ini pernah mempunyai sakit otot sejak 12 bulan yang lepas. Ujian "chi-square" menunjukan perkaitan yang signifikan antaration sakit otot dengan jantina serta tempoh penggunaan komputer . Bagaimanapun, tiada perkaitan antara status nutri, umur, dan etnik.

Kata kunci: *Sakit otot, anthropometri, sociodemografi, ergonomi, kelaziman, faktor berkaitan*

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CHALIDA BUNTHAN A/P E TOOI

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CHAPTER 1

INTRODUCTION

1.1 Background

Musculoskeletal pain is the pain that affects the bones, joints, muscles, or surrounding structures or can be a result of the overdose, repetitive strain, and work-related musculoskeletal disorder. People with musculoskeletal pain had limitations in their daily lives (Paananen *et al.,* 2010). While physical inactivity due to chronic musculoskeletal pain has been indicated to increase the relative incidence and poorer prognoses (McPhail *et al*., 2012).Thus, musculoskeletal pain is one of the most common causes of severe pain and disability that affects millions of people around the world, including Malaysia.

According to a cross-sectional study by Lorusso *et al.* (2009), the risk factors such as duration of computer usage daily and poor workstation were significantly higher among students. Neck, wrist, shoulder and arm pain are common. A higher prevalence of musculoskeletal pain was reported among university students with longer period of computer usage daily. Exposure to computer-related work increases the musculoskeletal pain significantly throughout the study course.

Clinical features seen in people with muscle pain include local symptoms of pain or widespread and persistent pain, tenderness, peripheral nerve irritation, weakness, limited movement and stiffness (Elliot *et al.,* 2009). These symptoms gradually increased with greater tissue injury and inflammation, with an increase in the anatomical site affected. These symptoms aggravated by stress related to work or personal, poor control of over work, a relationship that is difficult and stressful time. Due to continuous exposure and tissue injury develops, symptoms may not be sufficiently reduced by rest, and constant pain may persist.

The musculoskeletal pain is not only affects the performance of an individual; it is also a burden for the country because it requires treatment and lots of wages associated with it. The economic burden of musculoskeletal pain is second only to that of cardiovascular disease (International Association for the Study of Pain, 2010). Jacobs *et al.* (2011) reported that, the total estimated cost of treatment for musculoskeletal disease in the United States was $849 billion, equal to 7.7%of national gross domestic product. Despite of this high cost, funding for research to minimize pain and suffering created by this situation is less than 2% of the National Institute of Health budget every year.

1.2 Problem Statement

The factors that have been shown contributing to musculoskeletal pain are anthropometric characteristics such as weight and height, demographic factors such as age, gender and ethnicity. Moreover, ergonomic factors such as hours of computer usage also have been shown contributing to musculoskeletal pain. Common examples of ergonomic risk factors are found in jobs requiring repetitive, forceful, or prolonged exertions of the hands; frequent or heavy lifting, pushing, pulling, or carrying of heavy objects; and prolonged awkward postures. This is not only affects the performance of an individual, but it is also an economic burden to the country as it requires treatment and lots of wages associated to it (International Association for the Study of Pain, 2010).

As the prevalence of older age group with musculoskeletal pain is high (El-Metwally *et al*., 2004), we target undergraduate medical students as our subjects so that we can increase awareness and so that early intervention to be taken. Plus, increasing knowledge in the area of musculoskeletal pain needed to understand why the prevalence of musculoskeletal pain is high and why the prevalence seems to differ between male and female. The fact that musculoskeletal pain is highly prevalent and recurrent outcome has implications for the analysis needed to gain this knowledge. Students also will be acknowledge by these issue thus they will be aware of the potential of musculoskeletal pain for developing even more serious diseases related to bones, joints, muscles, or surrounding structures such as rheumatoid arthritis, myofascial pain, repetitive strain injuries, and psychological treatment for chronic musculoskeletal pain. Therefore, this study is conducted to access the risk factors of musculoskeletal pain among medical students in Universiti Putra Malaysia. The data will be able to provide information about the risk factors of musculoskeletal pain among medical students.

Demographic factors are the characteristics of a population expressed statistically as age, gender, ethnicity, education level and marital status. According to Occupational Safety and Health Administration United States, ergonomics is the science of fitting workplace conditions and job demands to the capabilities of the working population.

Realising this, the understanding of musculoskeletal pain and risk factors related to it is essential for the effort to reduce the burden it causes. For example, increasing knowledge in the area of musculoskeletal pain in neck and upper limbs is needed to understand why the prevalence of musculoskeletal pain differs between male and female. Hence, it is clearly there are need of research in the area of musculoskeletal pain and risk factors contributing to it.

1.3 Significance of the Study

This study is to determine the risks factors of musculoskeletal pain in relation with anthropometric, demographic and ergonomic factors among medical students in Faculty of Medicine and Health Sciences, Universiti Putra Malaysia. The outcome of this study will analysis needed to gain this knowledge. Students also will be acknowledge by these issue thus they will be aware of the potential of musculoskeletal pain for developing even more serious diseases related to bones, joints, muscles, or surrounding structures such as rheumatoid arthritis, myofascial pain, repetitive strain injuries, and psychological treatment for chronic musculoskeletal pain. Therefore, this study is conducted to access the risk factors of musculoskeletal pain among medical students in Universiti Putra Malaysia. The data will be able to provide information about the risk factors of musculoskeletal pain among medical students.

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1.3 Significance of the Study

This study is to determine the risks factors of musculoskeletal pain in relation with anthropometric, demographic and ergonomic factors among medical students in Faculty of Medicine and Health Sciences, Universiti Putra Malaysia. The outcome of this study will increase the awareness of students towards long term effects of these factors on musculoskeletal pain.

1.4 Objectives of the Study

1.4.1 General Objective:

Prevalence of musculoskeletal pain and the risk factors contributed to musculoskeletal pain among medical students of Universiti Putra Malaysia (UPM) are determined.

1.3.2 Specific Objective:

i. Prevalence of musculoskeletal pain among respondents is determined.

ii. The risk factors of among respondents are determined as followed:

- Anthropometric factor such as weight, height, Body Mass Inbox (BMI) and nutritional status.
- Demographic factors such as age, gender, and ethnicity
- Ergonomic factors such as hours of computer usage per day

iii. The association between anthropometric factors and musculoskeletal pain is determined via body mass index and nutritional status.

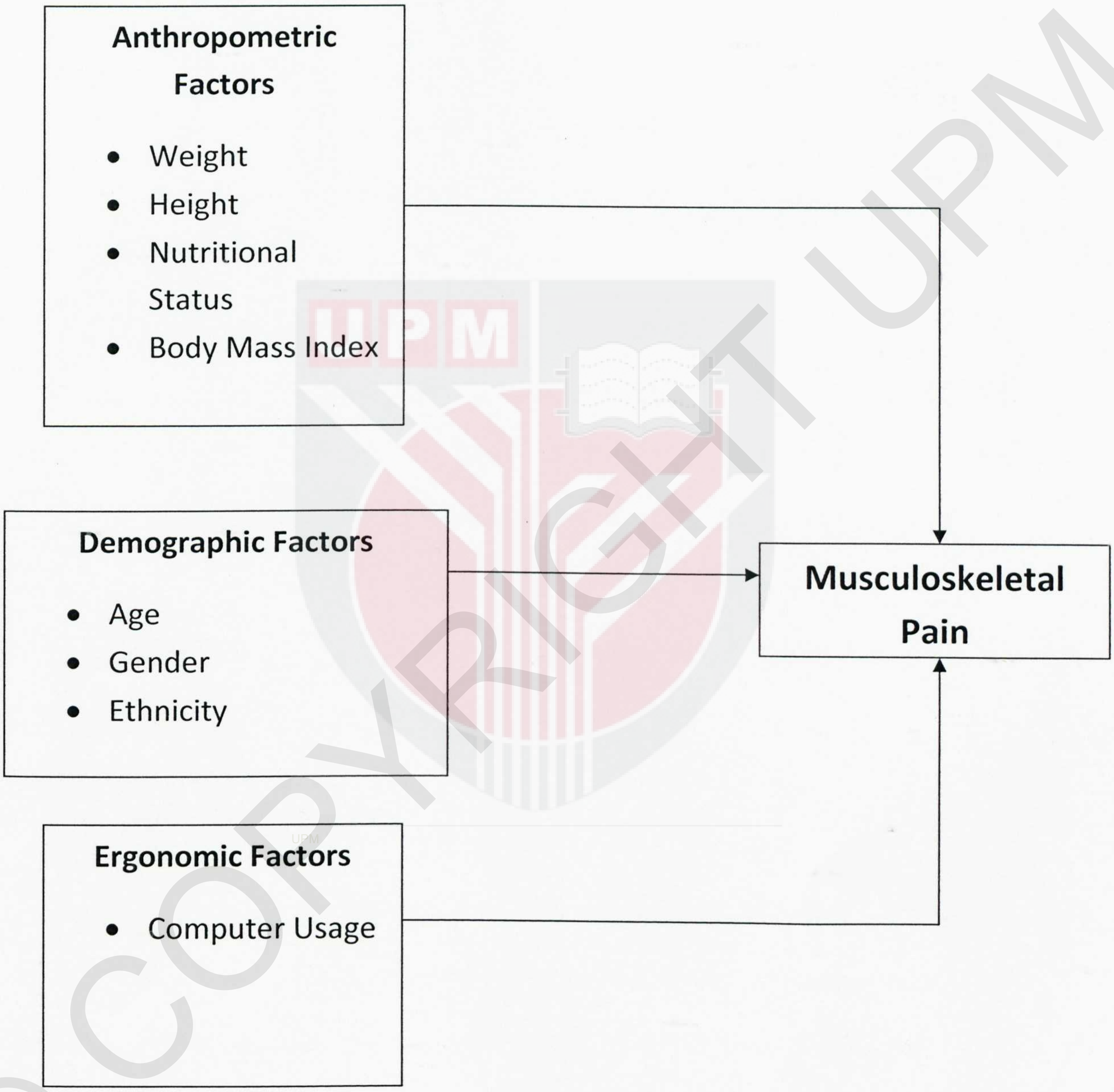
iv. The association between demographic factors and musculoskeletal pain is determined.

v. The association between ergonomic factors and musculoskeletal pain is determined.

1.5 Research Hypothesis

1. There is significant relationship between anthropometric factors with musculoskeletal pain among medical students in the Faculty of Medicine and Health Sciences, Universiti Putra Malaysia.
2. There is significant relationship between demographic factors with musculoskeletal pain among medical students in the Faculty of Medicine and Health Sciences, Universiti Putra Malaysia.
3. There is significant relationship between ergonomic factors with musculoskeletal pain among medical students in the Faculty of Medicine and Health Sciences, Universiti Putra Malaysia.

1.6 Conceptual Framework



CHAPTER 2

LITERATURE REVIEW

2.1 Pain

Bonica (1979) defined pain as is an unpleasant and emotional experience associated with actual or potential tissue damage, or described in terms of such damage. Dimensions of the pain are composed of a sensory part, affective part, and a cognitive part (Melzack, 1999). These dimensions emphasize the complexity of pain in a psychosocial framework. These dimensions of pain also support the finding regarding central sensitization and dysfunctional inhibition, denoted as dysfunctional central pain modulation (Woolf and Doubell, 1994; Woolf and Salter, 2000; Lidbeck, 2002). Pain can be discussed under several headings with emphasis on its origin, for example, physiological, inflammatory and neuropathic pain (Woolf, 1987), or nociceptive pain, peripheral or central neurodysfunctional pain, idiopathic pain (unknown pain mechanism), and physiological pain. (Lidbeck, 2002)

2.2 Musculoskeletal Pain

A generally accepted definition for the term "musculoskeletal pain" is difficult to find. Several closely related, but not equivalent, terms describing the conditions involved have been used in literature, including "musculoskeletal pain", "musculoskeletal disorders", "musculoskeletal symptoms" and "musculoskeletal conditions". An important distinction between "pain" and "symptoms", "disorders" and "conditions" is that pain does not include symptoms such as numbness or tingling. Woolf and Pfleger (2003) described musculoskeletal conditions as a diverse pathophysiology but are linked anatomically and by their association with pain and impaired physical function. They encompass of acute onset and short duration to chronic disorders, including osteoarthritis, rheumatoid arthritis, osteoporosis, and low back pain.

Musculoskeletal pain is viewed to be of public health or occupational health interests when it leads to reduced wellbeing, activity limitations, or participation restriction. Thus musculoskeletal pain is seen in the "socio-psycho-physiological framework of health and illness" (Rugulies *et al.*, 2004).

2.3 Anthropometric Factors and Musculoskeletal Pain

A research conducted by Marcus (2004) reported that musculoskeletal pain increased with increasing weight and with increasing BMI. Physical function and quality of life were also reduced in relation with increasing weight.

2.4 Demographic Factors and Musculoskeletal pain

2.4.1 Musculoskeletal pain and gender

A study conducted by Venkatesan *et al.* (2012) reported that about 88% of the respondents reported musculoskeletal complaints in the two weeks prior to completing the survey. The prevalence of musculoskeletal pain was higher in female 90% than in male students 76%. Although there was no statistically significant association between the type of computer and musculoskeletal pain, the prevalence of musculoskeletal pain was higher for students using laptop (90%) when compared to those using both desktop and laptop and desktop only (87 and 86%) respectively. There was no statistically significant correlation for musculoskeletal pain with hours of computer use per day, type of computer used and level of physical activity.

Leveile *et al*. (2005) found that the prevalence of chronic widespread musculoskeletal pain was higher in female than male while the studies conducted by Spanish National Health Surveys (SNHS) in 1993, 2001, 2003 and 2006 found that the prevalence among women was almost twice that of men (Jimenez-Sanchez *et al.*, 2010).In both gender, poor health is often associated with musculoskeletal pain. Several factors have been found as the cause of different prevalence of musculoskeletal pain in both genders. In adult female, the factors that have been associated with pain were body mass index, blood pressure and depression. While in male, the pain is associated with polyarticular radiographic osteoarthritis.

A cross-sectional study was done among 111 female students to measure musculoskeletal pain and job strain. 80.6% of the participants reported computer-related musculoskeletal complaints in the 2 weeks prior to completing the survey. 82% of the students reported spending 0-6 hours per day using a computer. 90.1% reported musculoskeletal pain. The students reported that they did not experience job strain. The majority of female students reported musculoskeletal pain during or after computer use. (Hamilton *et a.*, 2005)

2.4.2 Musculoskeletal pain and age group

Back pain also affects younger populations, such as school children and university students. The study conducted highlights a variety of back pain risk factors such as classroom posture, backpacks, computer usage and psychosocial factors in young populations. Children and university students have increase burden of back pain. (Smith *et al.*, 2007).It is reported the prevalence of musculoskeletal pain among children is highest in Spain (61%), followed by Kuwait and Norway (58% respectively). The prevalence among university students is the highest in United Kingdom(81%) followed by Australia(67%) and Turkey(55%) while the lowest is in Japan(14%).This increase in prevalence may reflect an increasing probability of physical injury among children, over time. Whereas primary school students might be expected to have a large play component in their daily life, their older colleagues in middle school and high school probably have a proportionally greater exposure to computers, and thereby a greater burden from static postures, desk work and so on. Older students might also be expected to have more books to carry around than younger ones, thus increasing the weight of their backpacks. The epidemiological rigor of university student research was however, more variable than for that conducted among school children. Although their back pain prevalence rate was shown to range from around 23% to 81%, it was generally quite high. An unusually low back pain prevalence rate was reported among nursing students in Japan however, suggesting the possibility of genuinely low prevalence rates, or, under reporting due to cultural differences.

Musculoskeletal pain was common in childhood and the most recurrent site of musculoskeletal pain was the neck. El-Metwally *et al*. (2004) found that 32.1% of the 1756 children had musculoskeletal pain. Those children with persistence musculoskeletal pain had approximately three times higher chance of getting the recurrence of pain. Children with localised musculoskeletal pain has better prognosis than those who had widespread pain. The persistence of musculoskeletal pain during childhood was highly associated with recurrence of pain later during adolescence. Multiple site of musculoskeletal pain during childhood will lead the recurrence or persistence of pain in adulthood (Paananen *et al.*, 2010)

2.5 Musculoskeletal pain and Ergonomic Factors

According to cross sectional study by Kanchanomai *et al.* (2012),reported the prevalence of cervical symptoms (22.3%) were the most frequently reported, followed by thoracic (11%) and lumbar symptoms (10.7%) associated with long time computer usage. Daily computer usage greater than three hours and too-high keyboard's position were significantly associated with high prevalence of cervical symptoms. A significant association was found between higher undergraduate year of the study and too-high keyboard's position and a high prevalence of thoracic symptoms. Higher undergraduate year of the study and daily computer use greater than three hours were significantly related to a high prevalence of lumbar symptoms. Computer usage more than 3 hours daily and keyboard position have a high association with musculoskeletal pain at cervical area.

A cohort study done in Poland (Szymanska, 2002) reported musculoskeletal pain among dentist student was around thoracic-lumbar region (60.1%), neck pain (56.3%), lower extremities (47.8%), wrist and hands (44%), right shoulder(37.3%),left shoulder (14.2%) and upper extremities (25.4%).It was shown that the majority of dentists in the study work both in standing and sitting positions next to a seated patient (39.2%), of which almost a half (51/105) always with the help of an assistant. 27.6% of respondents worked in a standing position next to a seated patient, the majority of them (40/74) without any dental assistant 22.8% worked in a sitting position next to a seated patient, of whom over a half (34/61) had dental assistance. It is well shown in this study that ergonomic factor do contribute to musculoskeletal pain.

A cross-sectional study among 31 students in Brazil was done and the results collected show the spines, knees and head and neck are commonly affected, with 90% of the students presented with postural misalignment. The furniture played an important role to fulfil the students' need and reduce their musculoskeletal pain. (Da Silva *et al.*, 2012)

A study conducted by Ndetan *et al.* (2009) is done to assess the prevalence, distribution, severity, risk factors of, and response to musculoskeletal injuries to the low back, hand, wrist, neck and shoulder among chiropractic students while attending a chiropractic college. The results reported the response rate was 64.3% with 62.6% male respondents. The overall prevalence of injuries sustained in college was 31.5%, 44.4% of which was exacerbations of prior complaints. Injuries from receiving adjustments or manipulation were most prevalent to neck/shoulder (65.7%), whereas hand/wrist injuries were most common when administering adjustments (45.6%). The risk difference among students receiving adjustments was 81.6/1000 neck/shoulder injuries, and the etiologic fraction was 76.6%. The risk difference was 170/1000 hand/wrist injuries with etiologic fraction of 96.5% among students administering adjustments.

Dental students are prone to development of musculoskeletal pain due to lack of awareness regarding correct posture, prolonged static postures and inadequate operating stools and lack of exercises. An average 2 out of 3 dental professions experience occupational pain and musculoskeletal pain account for 29.3% for early retirement age in dentists worldwide (Burke *et al.,* 1997). A study conducted at MGM Dental College by Vishwas *et al.* (2012), reported that 81% of participants experience musculoskeletal pain during clinical practice. While 88% of students reported a maximum pain in the wrist and hands during periondontics posting, and 78% reported maximum pain in the lower back and hands during endodontic procedure. The results is correlate with more work load and stress and also due repetitive forceful pinching, or gripping, a sustained non-neutral position, and use of vibrating tools. Plus, improper positioning of the patient in relation to the operator, back position, and neutral position maintenance have been found to contribute back pain.

2.5.1 Musculoskeletal Pain and Physical Activity

The cross-sectional study involving 177 students (including undergraduate and postgraduate dentist students) is done at Mashhad Dental School students Iran (Movahhed *et al.*,2013) to assess prevalence of musculoskeletal pain and correlated factors such as gender, academic grade, academic year, clinical working hour, regular exercise times and pain characteristics. As results 82% of undergraduate students and 90% of postgraduate students reported body pain in at least one region. The most prevalent pain locations were: chest/shoulder (46.9%), head/neck (41.8%), middle back (33.9%) and right hand (25.4%). Severity of reported pain was increased due to performing dental work, increased working stress and working fatigue. Regular exercise was associated with alleviated some pain characteristics.

A cross-sectional study was done among 203 Japanese female pianists from different age groups determine the prevalence of musculoskeletal symptoms. 77% of the pianists were reported that they suffered from musculoskeletal pain and discomfort at least 1 of their body parts. 40% of them were seeking medical treatment. The prevalence of musculoskeletal symptoms was found to be dependent on age. Among the student groups, the finger/hand, forearm and shoulder were commonly involved. Among senior groups, the neck/trunk, forearm, hand/finger were commonly involved. The results obtained also reported that prolonged practice >4 hours daily were found to contribute to the development of musculoskeletal symptoms among these pianists. (Shinichi *et al.*, 2006)

A study on musculoskeletal disease among undergraduate dental hygiene students (Hayes *et al.*, 2009) reported that musculoskeletal disorders were most commonly reported by students at the neck (64.29%), lower back (57.94%) and shoulder (48.41%) regions. Students who did not undertake regular exercise every week experience an increased risk of lower back pain (OR=4.88). Students undertaking 16 to 20 hours of desk-based study per week were much more likely to report neck pain (OR=19.7). While working 6 to 10 hours on a computer each week was a risk factor for shoulder (OR=7.03) and upper back pain (OR=5.29).

A cross-sectional study in 5 dental schools in Malaysia (Saad Khan *et al.*, 2013) is done to assess the prevalence of Work-related Musculoskeletal Disorder amongst dental students. Work environment and its characteristics were represented by four domains: Sitting position, instrument handling, and use or otherwise of dental loupes and frequency of working hours. In relation to sitting position of the students as part of their working environment, three variables were assessed: the use of a comfortable work stool, adjusting the work stool based on height and back position as well as having back support on the stool. 78% students indicated that the stool they used was comfortable. Adjusting the height of the chair was found to be a common practice among the 86% students. 34% students reported that their back is supported while 43% reported seldom and 14% reported never about adjusting the back support. This means that students who used a comfortable work stool with a back support were less likely to have lower back pain. For instruments handling, 98%) students had fourhanded dentistry facilities at their respective dental schools. Statistical analysis showed that students who practiced four-handed dentistry at their dental school were less likely to report symptoms in both elbow (5%) and forearm (5%). There was no association with symptoms in other body regions. For dental loupes, 81% did not use dental loupes. No statistical significance was found between use of dental loupes and prevalence of discomfort in the neck and upper back. For working hours, students with increased number of working hours per week were much more likely to report discomfort in hands and fingers.

A cross-sectional study was done among undergraduate nursing students to working nurses in Australia. The results reported that nurses are a high risk occupational group for low back pain. The respondents have taken at least one of treatment, medication, or a reduction in activity. The low back pain occurs due to bending or lifting. These results suggested that occupational exposure from nursing student to working nurse is the primary factors of the increase in low back pain. (Mitchell *et al.*, 2008)

Low back pain is a significant problem among nurses. Thus, nursing students will be the target group for intervening the preventions. A cross-sectional study was done in Australia among 170 female undergraduate nursing students. Comparisons were done across social, lifestyle, psychological and physical characteristics. The results reported that 30% of all subjects have “significant” low back pain in the more than 12 months. Targeting personal factors associated with low back pain in nursing students, rather than occupational factors in working nurses may help improve the impact of low back pain in nurses. (Mitchell *et al.*, 2009)

A cross-sectional study was done of 963 college students to evaluate standard measures of health behaviour and risk factors for back pain among college students. The result reported that 38% of college having back pain within the past year. Feeling chronically fatigued and being in an emotionally abusive relationship were the factors most strongly associated with back pain. (Gilkey *et al.*, 2010).

In other study (Jane *et al.,* 2003), it is reported there is high prevalence of low back pain (LBP) in young physiotherapy students enrolled in one Australian tertiary institute. In this study 72% students responded. LBP prevalence was 69% (lifetime), 63% (12-month), 44% (one-month), 28% (one-week). The risk of LBP increased significantly for students once they completed first year. Being aged 20 or 21 years (final year students) was significantly associated with all measures of LBP, compared with the youngest students. Exposure to tertiary study of greater than two years was associated with lifetime, 12 month and one-month LBP prevalence. Spending more than 20 hours in the past month '*sitting looking down*' was significantly associated with one-month LBP prevalence. Similar exposure to '*treating patients*' was significantly associated with one-month and one-week LBP prevalence.

2.5.2 Musculoskeletal Pain and Computer Usage

A cross-sectional study reported that 42% of the respondents have upper musculoskeletal pain or discomfort resulting from computer usage in the past 2 weeks. 41% of them report that the pain the discomfort leaded to limitation of activities. The college students reported high rates of computer usage associated with upper extremity musculoskeletal symptoms and functional limitation. (Hupert *et al.*, 2004)

Another cross-sectional study reported the risk factors like duration of computer usage daily and poor workstation were significantly higher among students of the fourth year course. Neck, wrist, shoulder and arm pain are common. The prevalence of pain of the neck and wrist area was higher in the students of the fourth year course. A higher prevalence of musculoskeletal pain was reported among university students with longer period of computer usage daily. Exposure to computer-related work increases the musculoskeletal pain significantly throughout the study course. (Lorusso *et al.*, 2009)

Another study was done among undergraduate students reported 86% experienced musculoskeletal pain and discomfort after computer usage. Typing and communicating were common computing activities. Body postures, usage patterns and upper limbs musculoskeletal pain among the students need to explored related to time changes such as time of day, weekday, and days into the semester. (Menéndez *et al.*, 2007)

This study was done to determine the computer usage patterns among 234 college students. From the results, students reported 18 hours daily of computer usage. Students reported more frequent upper extremity discomforts. The results reported that awkward postures were associated with frequent discomfort. (Cooper *et al.*, 2004)

Although neck pain is common in young adulthood, studies on predictive factors for its onset and persistence are scarce. It is therefore important to identify possible risk factors among young adults so as to prevent the development of musculoskeletal pain later in life (Kanchanomai *et al.,* 2011). Undergraduate students involved in prolonged computer work and with high numbers of years of computer use more frequently reported upper extremity symptoms. The aim of this prospective cohort study was to examine the 1-year incidence and persistence of neck pain and to explore its biopsychosocial risk factors in undergraduate students. At baseline, a self-administered questionnaire was sent to undergraduate students comprised three sections designed to gather data on individual, computer use-related, and psychosocial factors as well as neck pain. Among the risk factors reported were neck extension range of motion, right upper limb tension outcome, and positions of elbows, knees, and ankles during computer use, upper back and elbow support, positions of computer screen, keyboard, and mouse and duration of mouse use. 34% new onset neck pain is caused by the position of screen and mouse. 95% students reporting that computer screen position was not level with the eyes were at greater risk of developing neck pain than those reporting that computer screen position was level with the eyes.83% of students reporting that the mouse position was too low were at lower risk of developing neck pain than those reporting mouse position suitable. Students who reported using a computer for entertainment 70% were at lower risk of experiencing persistent neck pain.21.8% students reporting that keyboard position was too high were at greater risk of experiencing persistent neck pain.

CHAPTER 3

METHODOLOGY

3.1 STUDY LOCATION

The study was conducted at Faculty of Medicine and Health Sciences (FMHS), Universiti Putra Malaysia (UPM), Serdang, Selangor.

3.2 STUDY DESIGN

The study design of this research is cross-sectional study.

3.3 STUDY DURATION

This study was carried out for about 10 weeks in total. It is divided into two phases:

Phase 1: 25^{th}March to 5^{th} April 2013 (2 weeks)

Preparation of proposal, ethics form, and developing questionnaire

Phase 2: 14^{th} July to 6^{th} September 2013(8 weeks)

Data collection, analysis of data, presentation of data collection, preparation for final report and final presentation.

3.4 SAMPLING

3.4.1 Study population

The study involved healthy medical students of Faculty of Medicine and Health Sciences (FMHS) from First Year to Fifth Year of study.

3.4.2 Sampling population

3.4.2.1 Inclusion criteria

Healthy medical students free from any chronic disorder or any condition related to musculoskeletal pain. All medical students registered as students in the Faculty of Medicine and Health Sciences were automatically selected as respondents for this study. The study sample was sub-sampled randomly from each of the year of study.

3.4.2.2 Exclusion criteria

Foreign students, medical students with chronic injury, and medical students with congenital disease

3.4.3 Sampling frame

List of medical students' name were obtained from Academic Unit of Faculty of Medicine and Health Sciences (FMHS), UPM. Since this study require universal sample, a total of 506 respondents were required. This study managed to reach 83% of response rate by collecting questionnaires from 424 respondents.

3.4.4 Sampling unit

All medical students in Faculty of Medicine and Health Sciences (FMHS), UPM.

3.4.5 Sampling methods

Universal sampling.

3.5 INSTRUMENTS AND DATA COLLECTION

3.5.1 Instruments/ Questionnaires

The instruments used in this study were a set of pre-tested questionnaire distributed to the respondents who involve in the study conducted. The questionnaire consists of three sections. The first section was about anthropometric factors which are height, weight and body mass index (BMI). The second section of questionnaire was used to determine socio-demographic details such as gender, age, ethnicity, marital status and level of education. The third section of questionnaire was used to determine ergonomic factors together with musculoskeletal pain.

3.5.2 Data collection techniques

Consent forms were given to the respondents to obtain their consent to take part in the study. Self-administered questionnaires were allocated to the students during the data collection period from 14th July to 31st July 2013 and were required to complete the questionnaire and return back to us. The study subjects were informed that the information collected would be anonymous and participation would be totally voluntary.

3.5.3 Quality control

Proper quality control was taken to ensure the validity and accuracy of the study conducted. Pre-tested questionnaires were allocated to the respondents. The questionnaires were pre-tested among 20 medical students who are not included in the study sample. Pre-tests on 20 students were done to verify the validity of questionnaire before a big sample size is used in this study. All year of study were chosen to represent the population of students in the Faculty of Medicine and Health Sciences. Furthermore, controlling the age can focus the scope, especially in terms of ergonomics risk exposure in university environment.

3.6 DATA ANALYSIS

The data collected through the self-administered questionnaires was statistically analysed by using PASW Statistics version 21 (SPSS Inc., Chicago). Descriptive analysis (Univariate) was done using to determine percentage and frequency. Bivariate analysis was done using chi-square test to determine the significance of association between two variables.

3.7 STUDY ETHIC

Ethics approval was obtained from the Faculty of Medicine and Health Sciences (FHMS), UPM Ethics Committee before data collection. Permission to conduct the study was obtained from Ethical Committee Chairman of Faculty of Medicine and Health Sciences (FHMS). The consent forms were distributed to the respondents before the study is conducted to obtain the consent of students prior to data collection, a detailed explanation on the aim and objectives of the study was given and confidentiality was ensured.

3.8 VARIABLES

3.8.1 Dependent Variable

The prevalence of musculoskeletal pain among medical students in FHMS, UPM.

3.8.2 Independent Variable

Sociodemographic factors including age, gender, and ethnicity. Anthropometric factors include height, weight and Body Mass Index (BMI) and nutritional status. Ergonomic factors includes hours of computer usage per day and study environment.

CHAPTER 4

RESULTS

4.1 Response Rate

A total of 506 respondents from Doctor of Medicine course in FMHS, UPM were listed and 424 respondents participated in the study giving response rate 83%. This is considered satisfactory compared to the response rate of Veerapen (2007) which was 96% on a sample size of 2594 sample.

4.2 Normality

Table 1 shows weight, height, age and body mass index (BMI) are not normally distributed. This is due to the significant value of both Kolmogorov-Smirnov and Shapiro-Wilk is 0.000 which is <0.05.

Table 1: Normality of Quantitative Variables

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Weight	.139	424	.000	.902	424	.000
Height	.079	424	.000	.986	424	.000
Age	.180	424	.000	.877	424	.000
Body Mass Index	.098	424	.000	.945	424	.000

4.3 Descriptive (Univariate) Analysis

4.3.1 Prevalence of Musculoskeletal Pain

Table 2 shows the prevalence of musculoskeletal pain among the respondents for the past 12 month. 51.4% of the respondents reported the prevalence of musculoskeletal pain for the past 12 months which contributed to the majority. 206 respondents never had musculoskeletal pain for the past 12 month which contributed to 48.6%.

TABLE 2: Prevalence of Respondent's Musculoskeletal Pain

Variable	Variable Category	Frequency (n)	Percentage (%)
Musculoskeletal Pain	Yes	218	51.4
	No	206	48.6

4.3.1.1 Distribution of Respondent's Musculoskeletal Discomfort/Pain Area

Table 3 shows 218 respondents who had musculoskeletal pain in the past 12 months, majority of the respondents had musculoskeletal pain or discomfort at the neck area which contributed 80.3%. Secondly, 70.2% of the respondents had musculoskeletal pain at the lower back area. Thirdly are the upper arms and/or shoulder (63.3%). Minority of the respondents had musculoskeletal pain other name the area stated on the questionnaire which contributed to 12.4%.

TABLE 3: Distribution of Respondent's Musculoskeletal Discomfort/Pain Area

Area of Body	Frequency (n)	Percentage (%)
Fingers, Thumbs	104/218	47.7
Hand, Wrist	91/218	41.7
Forearm, Elbow	66/218	30.3
Upper arm, Shoulder	138/218	63.3
Thigh, Knee	68/218	31.2
Lower Leg	74/218	33.9
Foot, Ankle	58/218	26.6
Neck	175/218	**80.3**
Upper middle back	123/218	56.4
Lower back	153/218	70.2
Other	27/218	12.4

4.3.1 Distribution of Respondent's Anthropometric Characteristics

Table 4 shows the anthropometric values of the respondents. Median weight for the respondents is 55kg. Median height for the respondents is 160cm. Majority of the respondents are normal in nutritional status which is 71.9% while the minority of the respondents are obese, 4.0%. The data obtained shows that 305 of the respondents having normal body mass index and 17 respondents are obese.

TABLE 4: Distribution of Respondent's Anthropometric Characteristics

No.	Variable	Variable Category	Frequency	%	Median	Interquartile Range (IQR)
1	**WEIGHT**	-	-	-	55	11
2	**HEIGHT**	-	-	-	160	13
3	**BMI**	-	-	-	21.19	4.21
4	**NUTRITIONAL STATUS**	Underweight	55	13.0	-	-
		Normal	305	71.9		
		Overweight	47	11.1		
		Obese	17	4.0		

4.3.3 Distribution of Respondent's Sociodemographic Characteristics

Table 5 shows the distribution of respondents by sociodemographic characteristics. The results showed that most of the respondents are 20 (27.1%), 21 (26.4%) and 23 (25.5%). The percentage of female (59.9%) was more than male (40.1%). Malays represented the highest number of respondents with 268 (63.2%), followed by Chinese (30.9%) and Indian (3.8%). Most of the respondents are previously studying in Matriculations or Foundations (97.6%).

TABLE 5: Distribution of Respondents' Sociodemographic Characteristics (n=424)

No.	Variables	Variable Category	Frequency	%	Median	IQR
1	**AGE**	19	11	2.6	21	
		20	115	27.1		
		21	112	26.4		
		22	78	18.4		
		23	108	25.5		
2	**GENDER**	Male	170	40.1	-	-
		Female	254	59.9	-	-
3	**ETHNICITY**	Malay	268	63.2	-	-
		Chinese	131	30.9	-	-
		Indian	16	3.8	-	-
		Others	9	2.1	-	-
4	**LEVEL OF EDUCATION**	STPM/Diploma	10	2.4	-	-
		Foundation/Matriculations	414	97.6	-	-
		Bachelor Degree	-	-	-	-
		Master/PhD	-	-	-	-

5	**MARITAL STATUS**	Single	424	100	-	-
		Married	-	-	-	-
		Widowed	-	-	-	-
		Divorced	-	-	-	-
		Separated	-	-	-	-

4.3.4 Distribution of Respondent's Ergonomic Characteristics

Table 6 showed the distribution of respondent's ergonomic characteristics. The data reported that most of the respondents use computer for 1-3 hours per day which contributed to 53.3%. Minority of the respondents do not use computer contributed to 1.7%.

TABLE 6: Distribution of Respondent's Ergonomic Characteristics

Category	Category Variables	Frequency	Percentage
Hours of Computers Usage per Day (Over the Past 12 months)	None	7	1.7
	< 1 hour	58	13.7
	1-3 hours	226	53.3
	3-6 hours	89	21.0
	> 6 hours	44	10.4

4.4 BIVARIATE ANALYSIS

4.4.1 Association between Anthropometric Characteristics and Musculoskeletal Pain

Table 7 below showed the results of association of anthropometric characteristics with musculoskeletal pain. From the results, there is no association between nutritional status and musculoskeletal pain (p=0.920)

Table 7: Association between Anthropometric Characteristics and Musculoskeletal Pain

Anthropometric Factor	Musculoskeletal Pain			x^2	df	p
	Yes n (%)	No n (%)	Total n (%)			
NUTRITIONAL STATUS (n=424)						
Underweight	27 (49.1)	28 (50.9)	55 (100)	0.495	3	0.920
Normal	157 (51.5)	148 (48.5)	305 (100)			
Overweight	24 (51.1)	23 (48.9)	47 (100)			
Obese	10 (58.8)	7 (41.2)	17 (100)			

4.4.2 Association between Demographic Factors and Musculoskeletal Pain

Table 8 shows there are no significant association between age and musculoskeletal pain (p=0.108), ethnicity (p=0.240), level of education (p=0.127) and marital status. There is an association between gender and musculoskeletal pain (p=0.002). Female (62.6%) has higher prevalence of musculoskeletal pain compared to male (37.4%)

Table 8: Association between Demographic Factors and Musculoskeletal Pain

Demographic Factors	Musculoskeletal Pain			x^2	df	P
	Yes n (%)	No n (%)	Total n (%)			
AGE (n=424)						
19	7 (63.6)	4 (36.4)	11 (100)			
20	55 (47.8)	60 (52.2)	115 (100)	7.592	4	0.108
21	70 (62.5)	42 (37.5)	112 (100)			
22	40 (51.3)	38 (48.7)	78 (100)			
23	67 (62.0)	41(38.0)	108 (100)			
GENDER (n=424)						
Male	80 (47.1)	90 (52.9)	170 (100)	9.999	1	**0.002***
Female	159(62.6)	95 (37.4)	254 (100)			
ETHNICITY (n=424)						
Malay	147 (54.9)	121 (45.1)	268 (100)			
Chinese	73 (55.7)	58 (44.3)	131 (100)	4.209	3	0.240
Indian	12 (75.0)	4 (25.0)	16 (100)			
Other	7 (77.8)	2 (22.2)	9 (100)			

LEVEL OF EDUCATION (n=424)						
STPM/Diploma	8 (80.0)	2 (20.0)	10 (100)	2.326	1	0.127
Foundation/Matriculations	231 (55.8)	183 (44.2)	414 (100)			
Bachelor Degree	-	-				
Master/PhD	-	-				
MARITAL STATUS (n=424)						
Single	239 (56.4)	185 (43.6)	424 (100)	-	-	-
Married	-	-				
Widowed	-	-				
Divorced	-	-				
Separated	-	-				

4.4.3 Association between Ergonomic Factors and Musculoskeletal Pain

Table 9 shows there are association between hours of computer usage per day (p=0.005) with musculoskeletal pain. Majority of the respondents (226 respondents) use computers 1-3 hours per day. 50.9% of them reported musculoskeletal pain. 54 out of 89 respondents who used computer for 306 hours per day contributed the highest percentage of musculoskeletal pain (60.7%).

Table 9: Association between Ergonomic Factors and Musculoskeletal Pain

Ergonomic Factors	**Musculoskeletal Pain**			x^2	**df**	**p**
	Yes n (%)	No n (%)	Total n (%)			
Computer usage per day (n=424)						
None	-	7 (100)	7 (100)	14.736	4	**0.005***
< 1 hour	23 (39.7)	35 (60.3)	58 (100)			
1-3 hour	115 (50.9)	111 (49.1)	226 (100)			
3-6 hour	54 (60.7)	35 (39.3)	89 (100)			
> 6 hours	26 (59.1)	18 (40.9)	44 (100)			

CHAPTER 5

DISCUSSION

5.1 Prevalence of Musculoskeletal Pain

The data collected from this study showed that majority (51.4%) of the medical students in FMHS, UPM had musculoskeletal pain for the past 12 months. In the study done by Smith *et al* (2004) on "Musculoskeletal disorders among rural nursing students" reported that 80% of the respondents had musculoskeletal pain.

5.1.1 Musculoskeletal Pain Area

In our study, the most common area of musculoskeletal pain is at the neck area (80.3%) followed by lower back (70.2%) and upper arm and/or shoulder area (63.3%). In another study done by Smith *et al* (2004) on "Prevalence and distribution of musculoskeletal pain among Australian medical students" showed that the most frequently occurring musculoskeletal pain is at the neck area (52.8%) followed by lower back (51.6%) and shoulder (46.5%). These similarities showed that these three areas are common sites of musculoskeletal pain among medical.

5.2 Anthropometric Characteristics

5.2.1 Nutritional Status

In this study, the respondent's with obesity having the highest percentage with musculoskeletal pain (58.8%) which is 10 out of 17 obese respondents. Based on the study done by Peltonen *et al* (2003) on "Musculoskeletal pain in the obese" showed a higher number of obese respondents presented with work-restricting pain compared to general population. There is an association between obesity and musculoskeletal pain in that study ($p=0.001$). There are underweight, normal weight and overweight (non-obese) respondents with musculoskeletal pain are 49.1%, 51.5% and 51.51% respectively in our study. There is only slight difference between each class of nutritional status. Most of the respondents with musculoskeletal pain presented with neck pain (80.3%). 35.9% of obese respondents having pain at the neck area compared to 69.4% of non-obese respondents. Based on the same study done by Peltonen *et al* (2003), obese subjects have work-restricting pain at the neck area more common in general populations.

However, in our study there is no association between anthropometric characteristics and musculoskeletal pain (p=0.920). This is because most of the medical students having sedentary lifestyles regardless of different classes of nutritional status making them having less musculoskeletal pain compared to other courses (Smith *et al*.,2007). Moreover, most of medical students learned about pain management during class so they seek medication before having musculoskeletal pain. (Paananen *et al*., 2011)

5.3 Demographic Factors

5.3.1 Age

This study was done among all medical students from first year of study to fifth year of study in Faculty of Medicine and Health Sciences, UPM. The age range of our respondents is from 19-23 years old. Most of our respondents are 20 years old which is 115 respondents. 63.6% of 19 years old respondents (first year of study) had musculoskeletal pain followed by 21 years old respondents (62.5%) which are in their third year of study. A study done by Smith *et al* (2007) on "Prevalence and distribution of musculoskeletal pain among Australian medical students" reported that the prevalence of musculoskeletal pain is higher among second year (75.8%) and third year of study (89.3%) among medical students.

In our study, there is no association between age and musculoskeletal pain (p=0.108) because all of the medical students are in the same age group which is young adults and they are exposed to the same exposure leading to musculoskeletal pain. (Saad A. Khan *et al*., 2013)

5.3.2 Gender

In this study, the percentage of female respondents who had musculoskeletal pain (62.6%) is higher than male respondents (47.1%). In the study done among Australian medical students by Smith *et al* (2004) reported that the prevalence of musculoskeletal pain is also higher among female respondents compared to male respondents.

Gender played a role in musculoskeletal pain as there is a significant association between gender and musculoskeletal pain (p=0.002). This is due to female medical students are likely to be affected by hormone factors such as pre-menstrual syndromes and inactive lifestyles among medical students. (Rugulies, 2004)

5.3.3 Ethnicity

From our study, respondents from other races (77.8%) have the highest percentage of musculoskeletal pain, followed by Indians (75.0%), Chinese (55.7%) and lastly Malays (54.9%). Ethnicity is not clearly shown of its association with musculoskeletal pain(p=0.240) but in a study done on "Musculoskeletal pain in Malaysia: a COPCORD survey" by Veerapen *et al* (2007) showed that Chinese has lower musculoskeletal pain prevalence compared to Indians. There is no association between ethnicity and musculoskeletal pain in our study because all of the students are living in the same residential college regardless of their ethnicity. So, they are exposed the same risk factors of musculoskeletal pain even though they are different races.

5.4 Ergonomic Factors

5.4.1 Computer Usage

Most of the respondents reported of having musculoskeletal pain are from those who use computer for 3-6 hours per day (60. %) and the least are from those who use computer less than 1 hour per day. In the study done by Blatter *et al.* (2002) on "Duration of computer use and mouse use in relation to musculoskeletal disorders of neck or upper limb" showed that the usage of computer more than 6 hours per day associated with pain in all body regions.

In our study, there is an association between computer usage and musculoskeletal pain (p=0.005). This is because of the prolonged sitting and body posture of the respondents while using the computer and worsened by the long duration of usage per day. (Lorusso *et al.*, 2009)

CHAPTER 6

CONCLUSION, LIMITATIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH

6.1 CONCLUSION

218 out of 424 respondents (51.4%) who participated in this study had musculoskeletal pain for the past 12 months. Chi-square test showed that there is a significant association between gender and hours of computer usage per day. However there is no association between nutritional status, age, and ethnicity.

6.2 LIMITATIONS

Even though this research was carefully and mindfully prepared, we are still aware of its limitations. Our study was conducted in only one faculty of UPM which is Faculty of Medicine and Health Sciences (FHMS) and hence this may not easily generalized to the real prevalence of musculoskeletal pain among students in UPM. Besides, the date for data collection was from 14th July to 31st July 2013, about 3 weeks in total. The amount of samples was limited due to the short data collection period. Secondly, all of data obtained will be only based on questionnaire, so the validity of the answer given is entrust upon the respondents since we are not able to access their medical reports. Plus, the questionnaire might also contain a few words or terms that cannot be understood by the participants. Lastly, some of the respondents were unavailable during the period of data collection. Moreover, some of the respondents are avoiding us during data collection period which lead to non-response bias.

6.2.1 Bias and confounding

Information bias may arise from questionnaires that do not measure what they are supposed to measure. In term of information bias, there are recall bias and misclassification. Recall bias might also occur as the respondents could not recall the pain sensation and location. Our study might also be affected by non-response bias due to the refusal of the selected students to take part in the study and unavailability of the respondents. Since only certain factors are being studied, confounders that involved in other factors such as previous history or unreported of motor vehicle accident (MVA), and previous disease in any respondents may lead to confounding. This directly alters the exact association the risk factors and the prevalence of musculoskeletal pain

6.3 RECOMMENDATIONS

A longer period of time for data collection for this research project is highly recommended. Because this is a cross-sectional study, we cannot get temporal sequence from our study. To obtain the causal relationship, a prospective cohort study should be conducted for a longer duration in a larger population. This prospective cohort study can also serve to evaluate the effectiveness of the intervention programs, such as pain management and healthcare seeking by the medical students to relief musculoskeletal pain. The information obtained from this study will act as a guide to Universiti Putra Malaysia especially Faculty of Medicine and Health Sciences and residential colleges to provide a better facilities to improve the ergonomic factors and organising various events to increase awareness and reduce the prevalence of musculoskeletal pain among the students. We would recommend a community based primary approach on prevention of musculoskeletal pain to improve the quality of life. Besides that, every medical students in FMHS should be aware of the long term effects of musculoskeletal pain on their body and daily routine.

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APPENDIX 1

GANTT CHART

<u>Gantt Chart of Research Studies</u>

Title: Evaluation of Risk Factors Contributed to Musculoskeletal Pain among Medical Students in Faculty of Medicine and Health Sciences, Universiti Putra Malaysia (UPM)

Commencement date: Phase 1: 25th of March 2013 – 5th April 2013

Phase 2:14th July to 6th September 2013

No	Activities	March 2013	April 2013	May 2013	June 2013	July 2013	August 2013	Srptember 2013	October 2013
	Preparation of draft proposal								
	Submission of draft proposal								
1	Preparation of proposal and ethical approval/letters								
2	Data collection and management								
3	Data analysis 1)Submission 2)Presentation 3)Correction								
4	Progress report								

5	Report 1)Writing 2)Submission 3)Correction 4)Final Report (hard cover)
6	Scientific article 1)Writing 2)Submission 3)Correction
6	Presentation 1)Meeting 2)Preparation 3)Rehearsal 4)Final presentation
7)	Submission of log book
8)	Result

APPENDIX 2

RESEARCH TEAM:

Supervisor :Dr Nizar Bin AbdManan

ChalidaBunthan a/p E Tooi 160589

APPENDIX 3

BUDGET PLANNING

No	Item	Estimated amount (RM)
1.	Transportation	100
2.	Photocopy Questionnaires (RM 0.05) Consent Forms (RM 0.05) Information Sheets (RM 0.05)	150
3.	Printing Questionnaires, proposal, forms, consent form Binding + Hard Cover Binding	120 250
4.	Miscellaneous Phone Charge Refreshment	120 110
	Total	900

APPENDIX 4

Questionnaire

A. Anthropometric factors

1) Weight: _______kg
2) Height: _______cm

B) Socio-demographic factors

3) Age: _______ years old

4) Gender
- ☐ Male
- ☐ Female

5) Ethnicity origin (or Race)
- ☐ Malay
- ☐ Chinese
- ☐ Indian
- ☐ Others (please specify) : ___________

6) Highest level of education
- ☐ STPM/ Diploma
- ☐ Foundation/Matriculations
- ☐ Bachelor Degree
- ☐ Master/PhD

7) Marital Status
- ☐ Single
- ☐ Married
- ☐ Widowed
- ☐ Divorced
- ☐ Separated

C. Ergonomic Factors

32) Do you ever have any musculoskeletal pain?
- ☐ Yes
- ☐ No --- go to question no. 36

33) Are your musculoskeletal pain conditions concerned with your study environment?
- ☐ Yes
- ☐ No

34) Are your study environment problems concerned with...
- ☐ Study area layout?
- ☐ Space?
- ☐ Other?

35) Are your musculoskeletal pain conditions caused by

- ☐ Study posture?
- ☐ Repetitive tasks?
- ☐ Other?

9) Hours of computer usage per day (average over the last 12 months)

- ☐ None
- ☐ < 1 hour
- ☐ 1-3 hours
- ☐ 3-6 hours
- ☐ > 6 hours

37) Do you have any current health concerns that you believe to be related to the computer usage / study place?

- ☐ Yes ‰
- ☐ No

38) If yes, check the area(s) of discomfort and circle the number which best describes the level

(1= slight discomfort, 3=moderate, 5=significant pain)

Check all that apply	Area of Body	Right	Left
☐	Fingers, Thumbs	1 2 3 4 5	1 2 3 4 5
☐	Hand, Wrist	1 2 3 4 5	1 2 3 4 5
☐	Forearm, Elbow	1 2 3 4 5	1 2 3 4 5
☐	Upper arm, Shoulder	1 2 3 4 5	1 2 3 4 5
☐	Thigh, Knee	1 2 3 4 5	1 2 3 4 5
☐	Lower leg	1 2 3 4 5	1 2 3 4 5
☐	Foot, ankle	1 2 3 4 5	1 2 3 4 5
☐	Neck	1 2 3 4 5	
☐	Upper middle back	1 2 3 4 5	
☐	Lower back	1 2 3 4 5	
☐	Other: ____________	1 2 3 4 5	

APPENDIX 6

JAWATANKUASA ETIKA UNIVERSITI UNTUK PENYELIDIKAN MELIBATKAN MANUSIA (JKEUPM)
UNIVERSITI PUTRA MALAYSIA, 43400 UPM SERDANG, SELANGOR, MALAYSIA

BORANG PERSETUJUAN PENYERTAAN (IBUBAPA/ PENJAGA)

TAJUK PENYELIDIKAN :

Evaluation Risk Factors Contribute To Musculoskeletal Pain Among Undergraduate Students In Faculty Of Medicine And Health Sciences, Universiti Putra Malaysia

PENYELIDIK :

1. MUHAMMAD IZZAT BIN AHMAD SABRI 156898
2. CHALIDA BUNTHAN A/P E TOOI 160589

Saya... No Kad Pengenalan. .... beralamat.. ....dengan ini secara sukarela bersetuju membenarkan *anak / jagaan saya .... menyertai penyelidikan klinikal *(pengajian klinikal/ pengajian soal selidik/ percubaan ubat-ubatan) seperti yang disebut di atas.

Saya telah diberi penjelasan secara menyeluruh mengenai dasar penyelidikan klinikal dari segi metodologi, risiko dan komplikasi (seperti tertulis pada Helaian Penerangan Responden). Saya memahami bahawa *anak / jagaan saya berhak menarik diri dari penyelidikan ini pada bila-bila masa tanpa memberi sebarang alasan.Saya juga memahami bahawa sebarang maklumat yang berkaitan identity *anak / jagaan saya akan dirahsiakan.

Saya* berminat / tidak berminat untuk mengetahui keputusan kajian yang dijalankan ke atas sampel yang diambil *anak / jagaan saya.

*potong yang tidak berkenaan

Tandatangan ....
(*Ibubapa/ Penjaga*)

Tarikh :..

Tandatangan ....
(*Saksi*)

Nama :..

No. K/P: ....

Saya mengesahkan bahawa saya telah menerangkan kepada ibubapa/penjaga responden mengenai sifat dan tujuan penyelidikan klinikal tersebut di atas.

Tarikh ....

Tandatangan ....
(*Penyelidik*)

JAWATANKUASA ETIKA UNIVERSITI UNTUK PENYELIDIKAN MELIBATKAN MANUSIA (JKEUPM)
UNIVERSITI PUTRA MALAYSIA, 43400 UPM SERDANG, SELANGOR, MALAYSIA

CONSENT FORM (PARENTS/GUARDIAN)

STUDY TITLE :

Evaluation Risk Factors Contribute To Musculoskeletal Pain Among Undergraduate Students In Faculty Of Medicine And Health Sciences, Universiti Putra Malaysia

RESEARCHER :

3. MUHAMMAD IZZAT BIN AHMAD SABRI 156898
4. CHALIDA BUNTHAN A/P E TOOI 160589

I .... Identity Card No. ....
address..
....hereby voluntarily agree to allow my *son / daughter / ward.. to take part in the clinical research *(clinical study, questionnaire study/ drug trial) specified above.

I have been informed about the nature of the clinical research in terms of methodology, possible adverse effects and complications (as written in the Respondent Information Sheet). I understand that my *son / daughter / ward has the right to withdraw from this clinical research at any time without assigning any reason whatsoever. I also understand that this study is confidential and all information provided with regards to the identity of my* son / daughter / ward will remain private and confidential.

I* wish / do not wish to know the result of the tests performed on any samples taken from my *son / daughter / ward.

* delete where necessary

Signature ....
(*Parent/Guardian*)

Date :...

Signature ....
(*Witness*)

Name :..

I/C No.
:...

I confirm that I have explained to the respondent's parent/guardian the nature and purpose of the above –mentioned clinical research.

Date ....

Signature ....
(*Researcher*)

Attachment 1

JAWATANKUASA ETIKA UNIVERSITI UNTUK PENYELIDIKAN YANG MELIBATKAN MANUSIA (JKEUPM) UNIVERSITI PUTRA MALAYSIA

Research title	:	**Evaluation Risk Factors Contribute To Musculoskeletal Pain Among Undergraduate Students In Faculty Of Medicine And Health Science, University Putra Malaysia**
Study Site	:	**Faculty Of Medicine And Health Science, University Putra Malaysia**
JKEUPM Ref No.	:	**FPSK_Jun(13)04**
Principal Investigator	:	**Chalida Bunthan a/p Tooi**
Supervisor	:	**Dr. Nizar Abd Manan**

Documents received and reviewed with reference to the above study:

1. Ethics Application Form, received on 19/6/2013.
2. Respondent Information Sheet, Malay and English Version.
3. Consent Form, Malay and English Version.
4. Proposal, English Version.
5. Questionnaire, Malay and English Version.

The University Research Ethics Committee, Universiti Putra Malaysia (JKEUPM) operates in accordance to the ICH-GCP Guidelines.

Decision by JKEUPM:

[X] Approved

[ ] Conditionally Approved

[ ] Disapproved

Please be informed that you are required to submit annual reports, completion reports and "all adverse events, both serious and unexpected" to the committee.

PROF DR ZAMBERI SEKAWI

Date of Decision:6/9/2013

b/p **PROFESSOR DR. NORLIJAH OTHMAN**
Chairman
University Research Ethics Committee
(JKEUPM)
Universiti Putra Malaysia

Attachment 2

JKEUPM Ref No. : FPSK_Jun(13)04

Members of the JKEUPM who reviewed the documents:

Prof. Dr. Elizabeth George

Date of approval: 6/9/2013

Endorsed at JKEUPM Meeting on **6/9/2013**, attended by:

NAME	DESIGNATION	GENDER	TICK IF PRESENT
Prof. Dr. Norlijah Othman	Paediatrics& Dean, Faculty of Medicine and Health Sciences	Female	√
Prof. Dr Zamberi Sekawi	Medical Microbiologist & Deputy Dean of Research and Internationalization, Faculty of Medicine and Health Sciences	Male	√
Prof. Dato' Dr. Lye Munn Sann	Medical Statistician, Dept of Community Health, Faculty of Medicine and Health Sciences	Male	
Prof. Dr. Tengku AizanAbd Hamid	Gerontologist & Director, Institute of Gerontology	Female	√
Prof. Dr. Lekhraj Rampal	Medical Statistician, Dept of Community Health, Faculty of Medicine and Health Sciences	Male	√
Prof. Dr. Elizabeth George	Pathologist, Dept of Pathology, Faculty of Medicine and Health Sciences	Female	√
Prof. Dr. Lim ThiamAun	Anesthesiologist, Dept of Surgery, Faculty of Medicine and Health Sciences	Male	√
Prof. Dr. Wan Omar Abdullah	Medical Parasitologist, Dept of Medical Microbiology and Parasitology, Faculty of Medicine and Health Sciences	Male	
Prof. Dr. Patimah Ismail	Professor of Biomedicine, Dept of Biomedical Sciences, Faculty of Medicine and Health Sciences	Female	√
Assoc. Prof. Dr. Johnson Stanslas	Pharmacologist, Dept of Medicine, Faculty of Medicine and Health Sciences	Male	√
Assoc. Prof Dr. Mansor Abu Talib	Assoc. Professor of Guidance and Counselling, Dept of Human Development and Family Studies, Faculty of Human Ecology	Male	
Assoc. Prof. Dr. Noritah Omar (Lay Person)	Assoc. Professor of English Language, Dept of English Language, Faculty of Communication and Modern Languages	Female	
Dr. RojanahKahar (Lay Person)	Lecturer of Dept of Human Development and Family Studies, Faculty of Human Ecology	Female	√
Tan Sri Dato' Napsiah Omar (Lay Person)	Chairman, National Population and Family Development Board	Female	