Prevalence And Risk Factors Of Work-Related Musculoskeletal Disorders Among Housewives

Swapneela Jacob *, **Choong Bei Ying** **

* Lecturer, Faculty of Medicine and Health Sciences, Department of Physiotherapy, Universiti Tunku Abdul Rahman, Malaysia.
** Year III Bachelor of Physiotherapy (Hons) Student, Faculty of Medicine and Health Sciences, Department of Physiotherapy, Universiti Tunku Abdul Rahman, Malaysia.

Abstract- **Background:** Housewives consist of a large population in Malaysian society. To date, there is no data baseline on the prevalence and risk factors of work-related musculoskeletal disorders among housewife in Malaysia

Aim: To determine the prevalence and risk factors of work-related musculoskeletal disorders among housewives in Selangor, Malaysia.

Methods: A modified questionnaire of study of Golam (2015), Perceived Stress Scale and Nordic Questionnaire was used to determine prevalence, site of work-related musculoskeletal disorders and potential risk factors for work-related musculoskeletal disorders among housewives in the past 12 months. The setting was targeted the housewives in Selangor, Malaysia.

Results: The study shows 75% of prevalence of work-related musculoskeletal disorders among housewives in Selangor, Malaysia. The most common site of work-related musculoskeletal disorder among housewives was lower back, knee and foot/ ankle region. The common site that prevented their normal work was shoulder, knee and neck region. The potential risk factors that was to be found associated with work-related musculoskeletal disorders was age (p=0.015), duration of household activities (p<0.001), exercise (p<0.001) and duration of exercise (p=0.002). Physical factors like repetitive movement, awkward posture, heavy lifting and prolonged activity with insufficient of rest period were found to be related with work-related musculoskeletal disorders among housewives. There was no significant association in work-related musculoskeletal disorders regarding ethnicity, education level obtained, number of children, types of household activities, domestic helps and stress level among housewives.

Conclusion: The prevalence of work related musculoskeletal disorders among housewives is as high compared to other occupations. Awareness and medical attention for housewives regarding work related musculoskeletal disorders must be highly concerned and emphasized. The potential risk factors should be highly avoided to scale down the risk of work-related musculoskeletal disorders.

Index Terms- Prevalence, risk factors, work-related musculoskeletal disorders, housewives

I. INTRODUCTION

1.1 Background of Study

Housewives consist of a large population in Malaysian society and housewifery is known as an occupation in the country. Housewife is a women who manages the household as her main occupation. A housewife is a women that employed her main occupation as taking care and managing her home, educating her children, perform cooking and storing goods, washing and cleaning of the housing area, washing and ironing clothes for the family, buying grocery for the needs of the family (Suvarna & Tulika, 2017).

Full-time housewives tend to involve more in all households compared to part-time housewives (Yuhaniz & Jusan, 2016). Full-time housewives who involved themselves fully in

household activity will be more precise in investigating the prevalence and risk factors of work-related musculoskeletal disorders among housewives. Part-time housewives who having others occupation might alter the result of a study. Those household activities performed by full-time housewives are almost utilized of their hands, arms and legs (Dhone & Khare, 2017). Therefore, there is more incidence of suffering work-related musculoskeletal disorders.

According to the report of Fifth Malaysian Population and Family Survey [MPFS-5] 2014 by the National Population and Family Development Board (LPPKN), among married women aged 15-59 years, there were 46.5 % who were working, 53.5 % who have stopped working and never worked. These figures show that stay-at-home mothers still comprise of a great significant segment of the general public and they required more attention from society. Those full-time stay at home mothers reported to perform the household activities every day and taking care of their family members, especially their children.

A study showed that women perform 54% more household activities compare to men (Horne, Johnson, Galambos, & Krahn, 2018). This is because of the division of household labor literature by disengaging the prescient power of time, resources and gender perspectives on housework at particular life stages. Moreno-Colom (2017) also found that women spend more of their time on housework activities which approximately 3 times the number of hours on routine household activities compared to men. Women who work for high household hours are more likely to report decreased physical health (Thomas et al., 2018).

According to the World Health Organization (WHO), the term work-related musculoskeletal disorders (WMSDs) describes as musculoskeletal disorders which is supposed to be caused by any occupation. The role of housewives for taking care of all family members and household activities is considered as an occupation. The work-related musculoskeletal disorders could affect different parts of the body like neck, shoulder, elbow, wrist, hand, upper back, lower back, thigh, knee and feet. Most of the work-related musculoskeletal disorders develop over time. The duration of work-related musculoskeletal disorders can be categorized into anecdotal and continual. Work-related musculoskeletal disorders can be the consequences of injury sustained in a work-related accident. Work-related musculoskeletal disorders are seldom a life-threatening disorders. However, they can affect the quality of life of a large proportion of working adult population (Health and Safety Executive, 2017).

Housewives having high risk to suffer various problems which related to their occupations that cause injuries to their muscles and skeletal system. Suvarna and Tulika (2017) proven that housewives have more incidence of suffering work-related musculoskeletal disorders. Those work-related musculoskeletal disorders are related with a group of painful disorders of muscles, tendons and nerves. Work-related musculoskeletal disorders are also one of the major factors which related to increased compensation and health costs, reduced productivity of work and lower quality of life (Yan et al., 2017). In addition, work-related musculoskeletal disorders can progress from mild to severe disorders. Thus, early treatment must be taken from mild disorders in order to avoid deterioration of the condition.

Work-related musculoskeletal disorders are associated with work patterns that including constrained body positions, the continual repetition of movements, force concentrated and no sufficient recovery period between activities (Moreno-Colom, 2017). Work-related musculoskeletal disorders can develop in an occupational setting. This is due to the physical tasks which an individual carry out during their normal work activities. Household activities that performed by housewives are included in the associated work pattern of work-related musculoskeletal disorders. Therefore, housewives having higher chances to suffer from work-related musculoskeletal disorders.

The study of Suthar & Kaushik (2011) supported that 76.66% of women reported neck pain and 46.66% of women reported shoulder pain. The reported work-related musculoskeletal disorders was because of performed all the activities in an awkward posture and prolonged duration without sufficient rest period. 76.66% of women also reported back pain and their long term work activities were engaged in standing and bending postures. A total of 46.66% women

reported pain in the upper arm due to the static position of hands and onset of fatigue in upper arm muscles during their work.

Another study done by A.R. Anita et al. (2014) indicated that awkward posture was related to work-related musculoskeletal disorders. Workers that having 87.0% of high and 97.2% of very high Rapid Upper Limb Assessment (RULA) risk level are reported to suffer from musculoskeletal disorders. The awkward posture of housewives during household activities would increase the RULA risk level. Housewives who perform a multitude of tasks from household activities that will cause physical stress as well as exhaustion of muscle groups that result of work-related musculoskeletal disorders (Hossain et al., 2018).

Besides than physical factors, a literature review and epidemiological studies have shown that there are other two sets of risk factors can be considered in the genesis of the work-related musculoskeletal disorder (Nunes & Bush, 2011). Firstly, individual factors including age, ethnicity, household activities, sports activities, domestic activities, recreational activities, alcohols, and tobacco consumption. Those suggested individual factors are related to work-related musculoskeletal disorders (Bruno & Edgar, 2010). Next, psychosocial factors that could cause work-related musculoskeletal disorders are the work pace, stress level, rest cycle, task demands, and social support. Bruno & Edgar (2010) also suggested that the identified psychosocial risk factor of work-related musculoskeletal disorders was a high level of distress. Thus, all kind of factors that caused work-related musculoskeletal disorders among housewives should be investigated to determine the association between them.

In 2016, the Institute for Health Metrics and Evaluation of Malaysia shows that the top causes of years lived with disability are low back and neck pain. It also shows that there is 37.6% increase from the year 2005 to 2016. Work-related musculoskeletal disorder is one of the most common occupational diseases which mainly affects the lower back and neck (Hossain et al., 2018). Many studies have shown that high prevalence (31% to 100%) of work-related musculoskeletal disorder among housewives (Kalra & Bhatnagar, 2017; Sallehuddin et al., 2018).

Regarding the site of work-related musculoskeletal disorders, there were several research studied about the different body parts among housewives. Study of Gupta & Nandini (2015) supported that 83% of 301 non-working rural housewives have low back pain and 51.5% of them had a severe disability. Suthar & Kaushik (2011) also supported that 76.66% of 30 women reported neck pain and 43.33% among them suffer severe pain of neck. Low back pain and neck pain have a high prevalence in housewives compare to other parts of the body.

This study would able to find out the prevalence and risk factors of work-related musculoskeletal disorders among housewives. The most frequent body parts that encounter work-related musculoskeletal disorders will also be investigated. The results from this study would contribute an insight regarding the sustained work-related musculoskeletal disorder. This study will also enable future researchers to evaluate better prevention and treatment in treating work-related musculoskeletal disorders among housewives.

1.2 Research Objectives
The objectives of this study was to:
1. To determine the prevalence of work-related musculoskeletal disorders among housewives.
2. To determine the most common site of work-related musculoskeletal disorders among housewives.
3. To determine the risk factors of work-related musculoskeletal disorders among housewives.

1.3 Research Questions
1. What is the prevalence of work-related musculoskeletal disorder among housewives?
2. Which is the common site of work-related musculoskeletal disorder among housewives?
3. What are the risk factors for work-related musculoskeletal disorder among housewives?

1.4 Operational Definition

Prevalence:

Prevalence is a statistical concept referring to the number of cases of a disease that are present in a particular population at a given time.

$$\text{Prevalence} = \frac{\text{Number of Participants reporting any form of problem}}{\text{Number of questionnaire respondents}}$$

Work-related Musculoskeletal disorder:

Work-related musculoskeletal disorders are musculoskeletal disorders which are caused by occupation. Musculoskeletal disorders are health problem that affect the muscle, skeleton, ligament, tendon and cartilage.

Risk Factor:

Risk factor is any attribute, characteristic or exposure of an individual that increases the likelihood of developing a disease or injury.

Housewives:

Housewife is a women who manages the household as her main occupation and whose spouse usually earns the family income.

1.5 Rationale and Scope of Study

According to Social Security Organisation's (SOCSO) statistics, National Institute of Occupational Safety and Health (NIOSH) in 2013 alone, there were 694 ergonomics related cases out of 2,630 cases of disease in Malaysia. This means that for every four cases reported to SOCSO, there will be one case is related to work-related musculoskeletal disorders (Borneo Post Online, 2017). Work-related musculoskeletal disorders cases are common in Malaysia, however, occupation like housewife is not emphasized.

Many studies concluded that the high prevalence of work-related musculoskeletal disorder is found among housewives (M. M. Habib & Rahman, 2015; Kalra & Bhatnagar, 2017). They are having a high risk of encounter one or more work-related musculoskeletal disorders which can progress to affect their quality of life (Moreno-Colom, 2017). Thus, the prevalence of work-related musculoskeletal disorders among housewives in Selangor, Malaysia should be determined. In addition, work-related musculoskeletal disorders among the population of housewives should be highly concerned to increase awareness and prevention.

Moreover, different studies have shown a different kind of prevalence, site of disorders and risk factor among housewives in a different area. Thus, those studies might not be able to generalize all of the housewife in Selangor, Malaysia. It might due to different culture and environment of different country that generate different result of a study. An independent study in Selangor, Malaysia should be done to clarify the prevalence and risk factors of work-related musculoskeletal disorders among housewives.

To date, there is no data baseline on the prevalence of work-related musculoskeletal disorders among housewife in Malaysia yet. Hence, the purpose of this study is to determine the prevalence of work-related musculoskeletal disorders among housewife. The study will be including the site of disorder and risk identification which including individual, physical and psychosocial risk factor. It is important to understand the potential risk factors of work-related musculoskeletal disorders among housewife. So that, it helps to raise awareness and prevention among the housewives.

This study focuses on the prevalence and risk factor of work-related musculoskeletal disorder among housewives in Selangor. The site of work-related musculoskeletal disorder will also be determined in this study. The questionnaire used is adapted from the questionnaire from the study of Golam (2012), the Nordic Questionnaire and the Perceived Stress Scale.

II.   LITERATURE REVIEW

2.1 Risk Factors of Work-related musculoskeletal disorders

A research was conducted by Macdonald and Oakman (2015) to discuss the exposures of occupational towards workers' risk of developing musculoskeletal disorders (MSDs). Authors indicated that occupational hazards increase the musculoskeletal disorders among the workers. Based on the review of research evidence, National Academy Press (2001) reported the risks of work-related musculoskeletal are external loads, organizational factors and social context. Work-related musculoskeletal disorders risk from various hazards associated with the physical factors. The physical requirements of work performance is often referred to manual handling activities. However, according to European Framework for Psychosocial Risk Management, psychosocial risk factors including the hazards related to job content, workload and work pace, work schedule, organizational culture and function, career development, role in an organization, interpersonal relationships at work, and home-work interface. Lang and colleagues (2012) also confirmed that the relationship between workplace psychosocial risk factors and musculoskeletal disorders.

A journal from Kim (2015) with the title of Ergonomics and Musculoskeletal Disorders supported that work-related musculoskeletal disorders are one of the leading types of occupational injury. Those work-related musculoskeletal disorders provoke the greatest costs to workers' compensation. The consequences of any body parts of work-related musculoskeletal disorders could be long term and can affect every aspect of a worker's life. The source of work-related musculoskeletal disorders development is repetitive, vigorous and awkward movements on body parts of bones, joints, ligaments and other soft tissues. Work-related musculoskeletal disorders always a leading source of disability and affect the productivity of workers in the workplaces.

In 2013, a study was conducted by Bugjska et al. to specifically determine the relationship between psychosocial work conditions and musculoskeletal complaint (MSc). 725 employees with any kind of occupation were targeted in this study. Authors claimed that these issues are rarely precisely discussed in the literature on rheumatology. Employees that performing mental work have increase of musculoskeletal complaints. The reading influenced authors to explore more about the working surroundings for the root of musculoskeletal complaints apart from physical factors. As result, the study has shown that there was an alliance effect of psychosocial and physical factors toward musculoskeletal complaints. In addition, the study concluded that there is adversity to speculate the effect of psychosocial factors on musculoskeletal disorders. This is because there were various ways in identifying the psychosocial attribute of a job and there was different appliance used to measure the psychosocial level.

2.2 Prevalence and Risk Factor of Work-related Musculoskeletal disorders among housewives

In 2018, Sallehuddin et al. (2018) aim to assess the variation in body pain among overweight and obese Malaysian housewives. The musculoskeletal pain (MSP) that determined was according to the site and severity of injured body regions. The study indicated that overweight and obese considered as a high-risk group for getting musculoskeletal pain. Moreover, they suggested that older obese housewife had a higher risk of getting musculoskeletal disorders to compare to a young obese housewife. The number of painful areas and level of pain also increased with obesity level of housewives. The amount of force on a weight bearing joint is found to be increased with excess weight of a person. Among middle age and elderly housewives, finding shows increasing of weight will cause shoulder, heel and hip pain. Another study supported that 31% of 495 housewives who suffered from musculoskeletal pain are having a higher body mass index (Bihari et al., 2013). As weight and age are the risk factors for work-related musculoskeletal disorders, others potential risk factor should be clarified among housewives in Malaysia.

Kalra & Bhatnagar (2017) aims to investigate the prevalence of musculoskeletal disorders (MSDs) of housewives in Delhi and Noida. 100 housewives which aged 25-35 years with no pregnancy were selected to participate in the study. The study indicated that 100 % housewife were affected by musculoskeletal disorders in one or more body region. Housewives suffer pain with lower back (60%), shoulder (42 %), upper back (38%), neck (35%), wrist/ hand (29%), ankle/ feet (26%), knee & thigh/ hips/ buttocks (20%) and elbow (18 %) were prevented from

perform their normal activities. The high prevalence of musculoskeletal disorders among housewives suggests that housework could be an independent risk factor that caused to develop musculoskeletal disorders among housewives. Another reason could be due to some physical stress and features of household activities such as taking care of family members, cooking for meals and cleaning at home. There were several relevant literature review findings found that musculoskeletal disorders likely increased with increasing the duration of performing household activities at home. Besides, low back disorders were found to be corresponded to perform daily household activities, like frequent lifting of objects or children whom heavier than 10 kg. However, the analysis data of risk factor were no stated and discussed in the study. A clear discussion of the risk factor of musculoskeletal disorder should be stated in the study.

There was a study conducted by Dhone and Khare (2017) in Nagpur City, Maharashtra to evaluate musculoskeletal disorders among the housewives. A total number of 100 housewives whom regularly performing household activities such as preparation of food, cooking, cleaning home, dishwashing were targeted. However, the study was only limited to the housewives who aged 40 to 50 years. The working capacity of the housewives is determined by the daily household activities. The musculoskeletal disorder among housewives is determined by the type of household activities which they are performing. 60% of the housewives were having musculoskeletal disorders due to awkward working posture while performing household activities. It also found that about 15% of housewives were suffering from muscles stress due to continuously performing the same household activities without taking proper rest. Lower back and upper extremity were the most common site among housewives because of physical stress factors and individual risk. It was found that wrong working methods will cause housewives to face ergonomic problems which leads to musculoskeletal disorders.

Habib & Rahman (2015) had investigated the prevalence of frequently affected body parts among women who experienced musculoskeletal symptoms (MSS). Throughout the study, musculoskeletal symptoms which disturb the normal daily activities of women were determined. The objective of the study was to find the correlation of musculoskeletal symptoms with physical risk factors among women engaging in regular household activities. The researchers recruited 73 women aged 20 to 45 years who were involved in household activities for at least 5 hours per day for the past year. It was found that in the 12 months prior to the study, the upper back was the most frequently affected body region causing musculoskeletal symptoms followed by lower back, knees, neck, wrists, elbows, shoulders and ankles. Participants with lower back region musculoskeletal symptoms were associated with the awkward posture of the back while regular daily activities of household for prolonged periods of time. The prevalence rate of self-reported musculoskeletal symptoms among the respondents was found to be considerably high (68.49%). The physical risk factors are particularly awkward posture, bending, repetitive movement and lifting during perform household activities. Those physical risk factors were associated for musculoskeletal symptoms in different body parts of women. However, the findings of this study are just a snapshot of the women engaged in regular household activities of one small village in Bangladesh. There is considered a big limitation for generalizability of the findings.

In 2015, Mishra, Srivastava, and Srivastava did a study regarding musculoskeletal pain in rural homemakers of North India. This study purposes to determine the magnitude of musculoskeletal pain among rural homemakers and to identify its modifiable risk factors. 296 homemakers who aged 26 to 65 years have participated in the study. 40.9% of homemakers reported having musculoskeletal pain. The most common site for MSP was found to be ankles/ feet (29.53%) followed by knees (25.59%) and low back (21.26%). This study had identified risk factors of musculoskeletal pain among homemakers. Individual factors which included of age, parity, income, and tobacco chewing were determined. The finding shows that neck and shoulder problems more encountered among women with children compared to women with no children. This might due to the increase of workloads in parental care. Being overweight or obese puts extra weight on muscles and joints, thus caused increases of musculoskeletal pain. However, there is no study about prevalence of musculoskeletal pain among housewives done in Malaysia within years.

In 2014, a cross-sectional study (N=600 housewives, aged 20-65 years old) was done by Fazli et al. in Iran to examine the prevalence of musculoskeletal disorders and its predictors among housewives. The study result showed that 53% of housewives suffering from

musculoskeletal disorders. The greatest prevalence of musculoskeletal disorders was found to be in the back region (51.33%), followed by neck (51%) and shoulder (41.5%) and least at wrist (40.5%). This study suggests that the prevalence of pain and disorders increase with several individual factors. Increasing of age, weight, height, married duration, number of children and with low educational level were related to musculoskeletal disorders. Musculoskeletal pain among housewives could have corresponded with awkward work postures and repetitive hand movements during perform household activities. The finding was supported with some literature discussing the working condition which related to musculoskeletal pain. However, the questions from the questionnaire do not clearly ask for the physical risk factor of the housewives. The types of household activities could be the physical risk factor of getting musculoskeletal disorders which should be clearly stated in the questionnaire.

Golam Kibria (2012) done a study to investigate the common site of musculoskeletal complaints among housewives. A number of 100 samples were selected as convenience sampling from Dhaka district Savar area. A mixed type of questionnaire was used to collect data. There were 84% of housewives suffered from musculoskeletal complaints. The most affected body part of musculoskeletal disorders was lower back (46%). Among the participants, 21% of them have taken physiotherapy treatment for their musculoskeletal disorders. The prognosis of physiotherapy treatment toward musculoskeletal disorders was 100% good reported from housewives. This study supported that work-related musculoskeletal disorders have great impact causing severe chronic pain. The physical disability of musculoskeletal disorders giving a rise to huge costs for compensation. In work place, housewives are susceptible to sustain musculoskeletal disorders during their work routine. Housewives suffer from multiple musculoskeletal problems that significantly blunt their activities of daily living. Further study was required to verify the consistency of findings and also to understand what factors contribute to these musculoskeletal complaints.

2.3 Prevalence of work-related musculoskeletal disorders among housewives in lower back region

In Sri Lanka, Ranasinghe P, Atukorala I and Samaranayake (2016) study the prevalence of household work-related musculoskeletal disorders (HWMSD) in low back region. 1102 housewives among 20 to 50 year old in an urban Sri Lankan participated. Participants were housewives whose perform household activities for a least of 4 hours per day and at least 5 days per week. Housewives whose are menopause, inflammatory arthritis, pregnant and having past disorders or problems that not related to household activities were not included in the study. The prevalence of household work-related musculoskeletal disorders in low back region among housewives was 36%. Most of housewives were performing various types of household activities like cooking, hand washing clothes, ironing, sweeping, cleaning toilets, shopping and carrying children. Household work-related musculoskeletal disorders in low back region were correlated with physical factors. As physical factors are shown related to the household activities, psychosocial factors and individual factors should also to be investigated to determine the correlation between household work-related musculoskeletal disorders. Other parts of body should be included to study the prevalence of household work-related musculoskeletal disorder among housewives.

Gupta & Nandini (2015) study to evaluate the prevalence of low back pain in non-working rural housewives and the impact of social burden on low back pain (LBP). A sample of 301 non-working rural housewives of Kanpur which aged between 30 and 70 years was selected. Analysis of data found that both recent and yearly prevalence of low back pain in rural housewives was 83%. The study also showed more than 50% housewives have a severe disability due to their low back pain. Prolonged duration of working hours without sufficient rest periods, poor posture, improper techniques of lifting and carrying loads also contribute to their back pain as physical factors. Effects of potential risk factors like family structure, socio-economic status and educational level of housewives and social burden should study a give a better understanding of the problem. Furthermore, lower back pain should not be the only musculoskeletal disorder that studies among housewives. Every part of the body that might have the probability in getting musculoskeletal disorder should be studied among housewives.

III.   MATERIAL AND METHOD

3.1 Study Design

A cross-sectional study was used to conduct this research to determine the prevalence, risk factors and the most commonly injured body parts sustained from work-related musculoskeletal disorders among housewives. The duration of study was 4 weeks.

3.2 Ethical Approval

This study was performed after obtaining ethical approval by the Scientific and Ethical Review Committee (SERC) of Universiti Tunku Abdul Rahman (UTAR). Informed consent was obtained from the participants in the form of online or paper copy. In addition, the participants were notified of the confidentiality of the information given by them and the right to withdraw from the study at any given moment.

3.3 Population and Study Sample

In order to participate in this research, participant must be a full-time stay at home housewife who live in Selangor. Participants must be women who were aged between 18 to 50 years old. Last but not least, participants must at least being housewife for 1 year. Pregnant housewife and previous musculoskeletal complaint before being housewife of participants were excluded in the study.

3.4 Sampling method

Convenient sampling method was used.

3.4 Sample Size

The following is the formula to calculate the sample size for cross sectional study suggested by the researchers by Charan and Biswas (2013):

$$Sample\ size = \frac{Z_{1-\alpha/2}^2 p(1-p)}{d^2}$$

$Z_{1-\alpha/2}$ = 1.96 as in most of the studies P values are considered significant (less than 0.05)
p = estimated proportion of characteristics based on previous studies (0.40)
d = tolerated margin of error (5% is chosen)
Hence, the calculated sample size is 368.

3.5 Instrument

The modified questionnaire used was adapted from questionnaire from the study of Golam (2012), the Perceived Stress Scale (PSS) and the Nordic Questionnaire were used. Permission for modification of the questionnaire have been approved by the author of Golam (2012). The modified questionnaire is used to collect data on the prevalence, potential risk factor and site of disorders for work-related musculoskeletal disorders. The potential risk factors were obtained by using question from previous study (Golam, 2012) and Perceived Stress Scale. The site of disorders which work-related musculoskeletal disorders were obtained by using Nordic Questionnaire.

The questions of the modified questionnaire will be including of open-ended question and structured multiple choices options. There were 3 different languages version of modified questionnaire (English version, Chinese version and Malay version) for easy understanding

The paper version of questionnaire consists of five pages. First page consists of information sheet of the study and consent form for the participants. Second page consists of 6 questions of socio-demographics characteristics of subject. The third and fourth page consist of 9 questions about the risk identifications of work-related musculoskeletal disorders and Perceived Stress Scale. The Perceived Stress Scale consists of 10 questions with the scale of 0 to 5. Lastly, the fifth page consists of identification of site of disorders, Nordic Questionnaire. The questions of Nordic Questionnaire consists of body parts like neck, shoulder, elbow, wrist/ hand, upper back, lower back, hip/ thigh, knee and feet/ ankle.

The online version of modified questionnaire was created by Google Forms. The online version of modified questionnaire was uploaded at social media platform, Facebook for study recruitment. Participants who were interested, eligible and agreeable for the study were guided to click the link to complete the online version of modified questionnaire.

Both paper version and online version of modified questionnaire took approximately 3 to 5 minutes to complete.

The questionnaire consisted of 3 sections. Section A of the modified questionnaire was including the socio-demographic information. Section B was including the risk identification questions and Perceived Stress Scale. Section C was Nordic Questionnaire for identify site of disorders.

Section A was relevant to social-demographic and personal data of participant, consisting age, ethnicity, education level that obtained, occupation, duration of occupation and number of children. The questions of occupation and duration of occupation are used to clarify participant whom fits the inclusion criteria for the study.

Section B was pertained to the risk identification. It comprised of duration of working on household activities, types of household activities done, any help from domestic, type of work that domestic work help, types of exercise done, duration of exercise, acknowledgement of physiotherapy treatment and Perceived Stress Scale. The types of household activities consisted of sweeping, mopping, washing, cooking, parental care, grocery shopping and other option that need participant to specify their own. Types of exercise including walking, jogging, swimming, cycling, yoga and other option that need participant to specify their own. The Perceived Stress Scale (PSS) consisted of 10 questions with scale of 0 to 5. The scoring of Perceived Stress Scale is used to determine the stress level of participants.

Section C was the questions of Nordic Questionnaire. The questions including the site of participants that had any trouble in 12 months, during the last 7 days and prevented them from doing their normal work. The site of musculoskeletal symptoms are neck, shoulder, elbow, wrist/ hand, upper back, lower back, hip/thigh, knee and foot/ ankle.

3.6 Procedures

Researcher had distributed the questionnaires to participants in the area of Selangor. The places including recreational park, garden, housing area, wet market and supermarket. Before distributing the questionnaire, the researcher gave a brief explanation regarding the purpose of the study and the information sheet. After agreement of participants to participate in the survey, they were required to sign on the consent form. Participants were prompted to answer the questions accordingly and any inquires with respect to the questionnaire can be asked with author on the spot. After participants completed the questionnaire, they were given a pamphlet regarding some basic stretching technique from neck to calf.

On the other hand, an online survey of the questionnaire was also provided for housewives who were not available to meet up in Selangor. A brief and clear description with poster and a universal resource locator (URL) of the online questionnaires was sent to Facebook group page whom mostly targeting women in Selangor. All the questions from the paper version of questionnaire were converted into google form. The pamphlet regarding basic stretching from neck to calf was given after completed the google form. However, due to slow response rate, the description, poster and URL of the online questionnaire was disseminated by a physiotherapy Facebook page, Movelt Physiotherapy for gaining better responses.

3.7 Data Analysis

Descriptive analysis was performed to summarize the data collected after all modified questionnaire being compiled. Frequency and percentage for nominal data was analysis. Chi-square analysis was used to assess the relationship between the variables to the work-related musculoskeletal disorder. Analysis was performed between age, ethnicity, highest level of education attained, duration of work on household activities, types of household activities done, any help from domestic, types of exercise done, duration of exercise, stress level and site of disorders. Data analysis was performed with IBM SPSS Statistics 23. The alpha level was set to $p < 0.05$ to statistically significant.

IV.   RESULTS

This chapter reports the results and discussion of the findings of this study. It includes the baseline characteristics of the study sample, the normality of data distribution and the hypothesis testing.

4.1 Social-demographic and Personal Data

Table 4.1.1: Number of participants and method of obtained responses.

Variable	n (%)
Participants	309
Housewife	308 (99.7%)
Working woman	1 (0.3%)
Duration of being housewife	
Less than 1 year	0 (0)
More than 1 year	308 (100%)
Response	
Face to face survey administration	229 (74.4%)
Online questionnaire	79 (25.6%)

A total number of 309 participants (housewife = 308 (99.7%), working woman = 1 (0.3%)) completely filled the modified questionnaire. 308 housewives were all being housewife more than 1 year (100%). There were 229 responses (74.4%) obtained from face to face survey administration and 79 responses (25.6%) from online questionnaire. There was 1 respond did not meet the inclusion criteria.

Table 4.1.2: Age range among participants

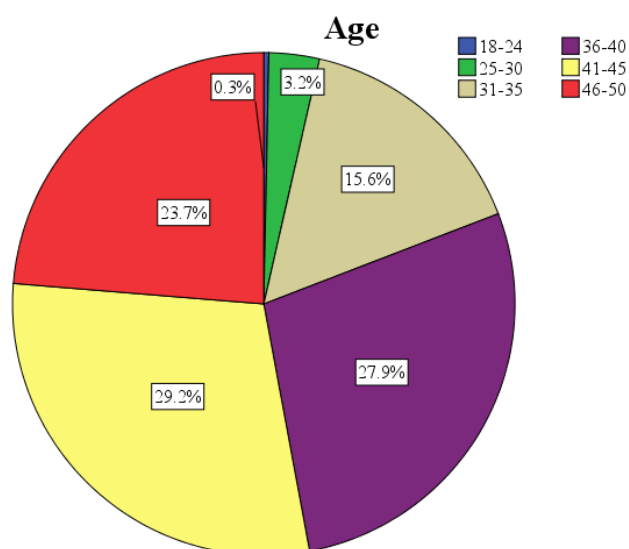| Variable	n (%)
Age	
18-24	1 (0.3)
25-30	10 (3.2)
31-35	48 (15.6)
36-40	86 (27.9)
41-45	90 (29.2)
46-50	73 (23.7)

Figure 4.1.1 Pie chart of age range among participants

Most of the participants were in the age range of 41-45 years (n = 90, 29.2%), followed by 36-40 years (n = 86, 27.9%), 46-50 years (n = 73, 23.7%), 31-35 years (n = 48, 15.6%) and 25-30 years (n = 10, 3.2%). There was only one participant in age range of 18-24 years (0.03%).

Table 4.1.3: Ethnicity of participants

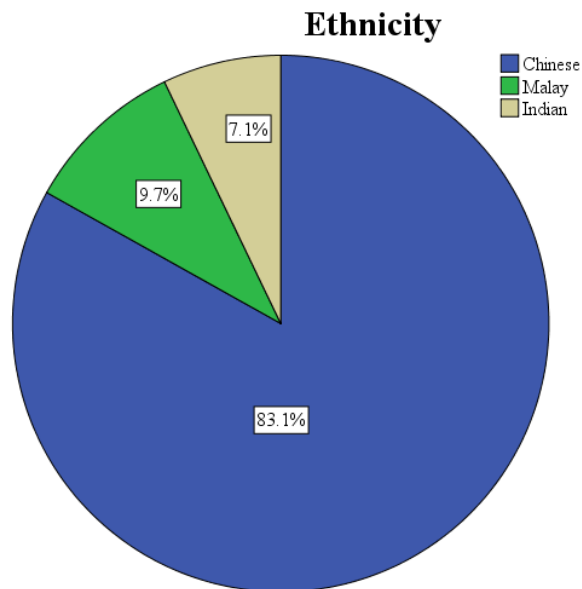| Variable	n (%)
Ethnicity	
Chinese	256 (83.1)
Malay	30 (9.7)
Indian	22 (7.1)

Figure 4.1.2 Pie chart of ethnicity of participants

The majority of participants in this study were Chinese (n = 256, 83.1%). Malay participants consisted of 30 (9.7%) and Indian participants consisted of 22 (7.1%).

Table 4.1.4: Education level that obtained from participants

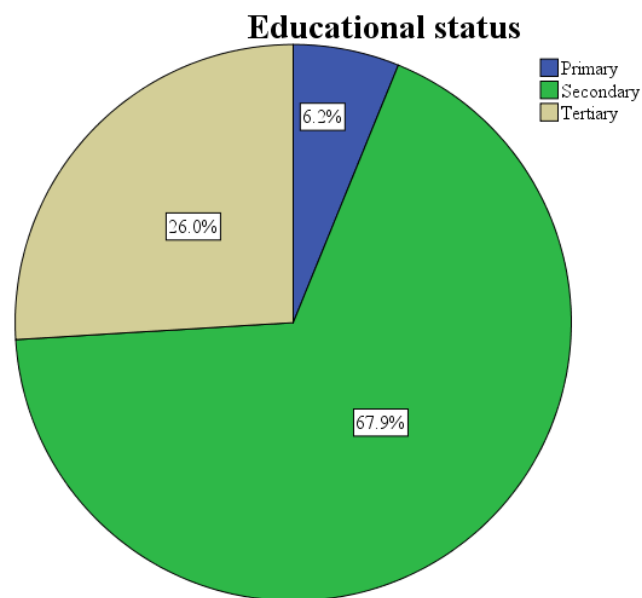| Variable	n (%)
Education level that obtained	
Primary	19 (6.2)
Secondary	209 (67.9)
Tertiary	80 (26.0)

Figure 4.1.3 Pie chart of education level that obtained from participants

The most common education level that obtained by the participants were secondary education (n = 209, 67.9%), followed by tertiary education (n = 80, 26.0%) and primary education (n = 19, 6.2%).

Table 4.1.5: Number of children obtained from participants

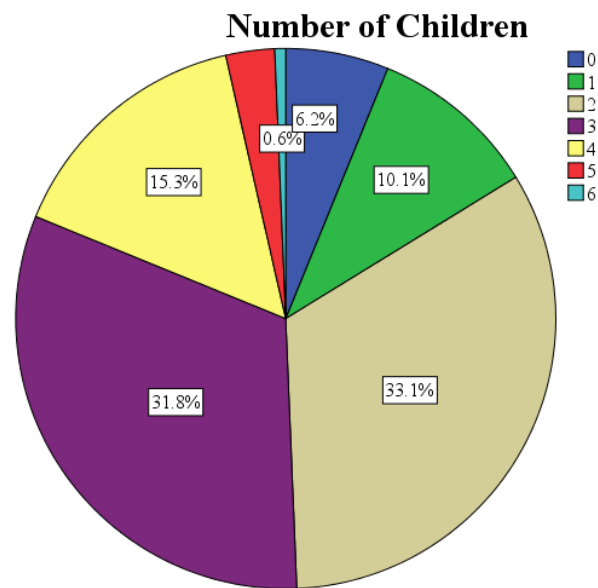| Variable	n (%)
Number of children	
0	19 (6.2)
1	31 (10.1)
2	102 (33.1)
3	98 (31.8)
4	47 (15.3)
5	9 (2.9)
6	2 (0.6)

Figure 4.1.4 Pie chart of number of children obtained by participants

The most common number of children obtained by participants were two children (n = 102, 33.1%), followed by three children (n = 98, 31.8%), four children (n = 47, 15.3%), one child (n = 1, 10.1%), no child (n = 19, 6.2%), five children (n = 9, 2.9%) and six children (n = 2, 0.6%).

4.2 Activity Data

Table 4.2.1 Hours spend on household activities every day.

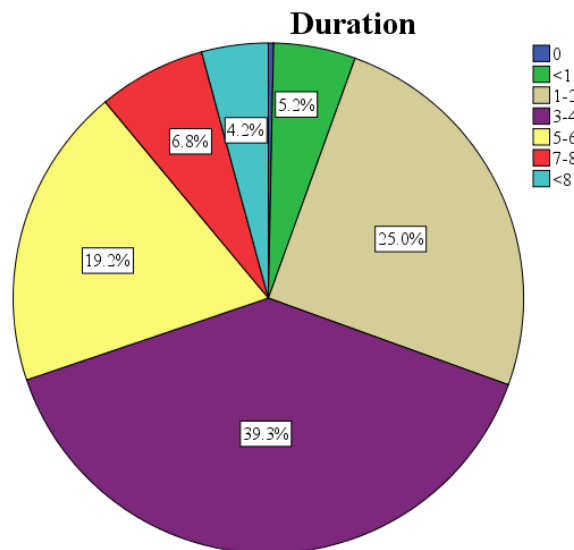| Variables	n (%)
Hours spend on household activities	
Less than 1 hour	16 (5.2)
1-2 hours	77 (25.0)
3-4 hours	121 (39.3)
5-6 hours	59 (19.2)
7-8 hours	21 (6.8)
More than 8 hours	13 (4.2)

Figure 4.1.5 Pie chart of duration of participants spend on household activities

Regarding the duration of participants spend on household activities, 121 participants (39.3%) reported that they spending 3 to 4 hours every day. There were 77 participants (25.0%) spend 1 to 2 hours every day on household activities. There were 59 (19.2%) participants reported spending 5 to 6 hours for household activities, 21 (6.8%) participants spend 7 to 8 hours each day and 13 (4.2%) participants spend less than 1 hour on household activities. The least participants (n = 13, 4.2%) reported spending more than 8 hours on daily household activities.

Table 4.2.2 Types of household activities

Variables	n (%)
Types of household activities	
Sweeping	252 (23.5)
Mopping	251 (23.4)
Washing	111 (10.3)
Cooking	260 (33.6)
Parental care	138 (12.9)
Grocery shopping	61 (5.7)
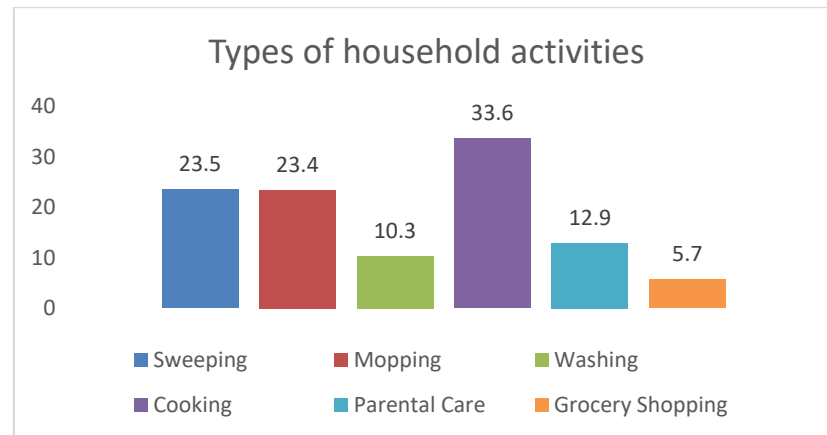
Based on the types of household activities, cooking was the most common activity done by the participants (n = 260, 33.6%). Household activities like sweeping and mopping were having quite similar amount of participants, which were 252 (23.5%) and 251 (23.4%) respectively. There were 138 participants (12.9%) reported perform parental care every day and 111 participants (10.3%) performed washing activities. The least activity performed by participants (n = 61, 5.7%) was grocery shopping.

Table 4.2.3 Assistance from domestic help

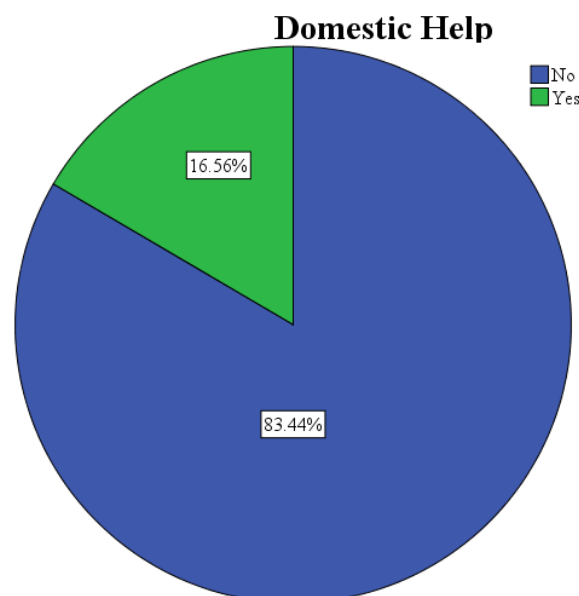| Variables	n (%)
Domestic help	
Yes	51 (16.6)
No	257 (83.4)

Figure 4.1.6 Pie chart of assistance from domestic help

There were 51 participants (16.6%) having domestic help to perform household activities, whereas 257 participants (83.4%) did not having assistance help from domestic help.

Table 4.2.4 Exercise

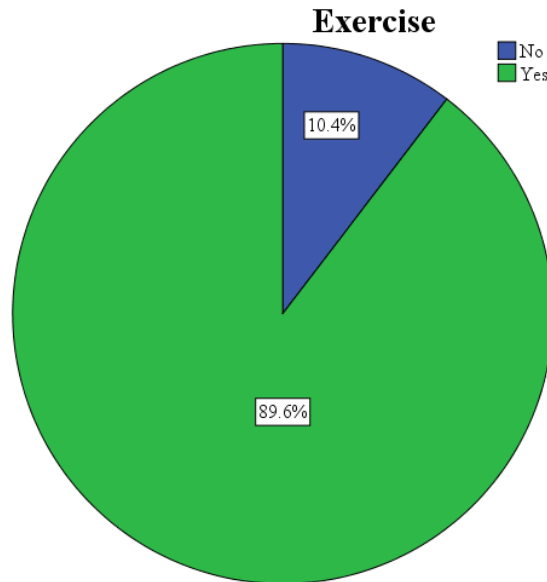| Variables	n (%)
Exercise	
Yes	276 (89.6)
No	32 (10.4)

Figure 4.1.7 Pie chart of exercise performance

Most of the participants (n = 276, 89.6%) were performing exercise activity, whereas 32 participants (10.4%) were not perform any kind of exercise.

Table 4.2.5 Types of exercise

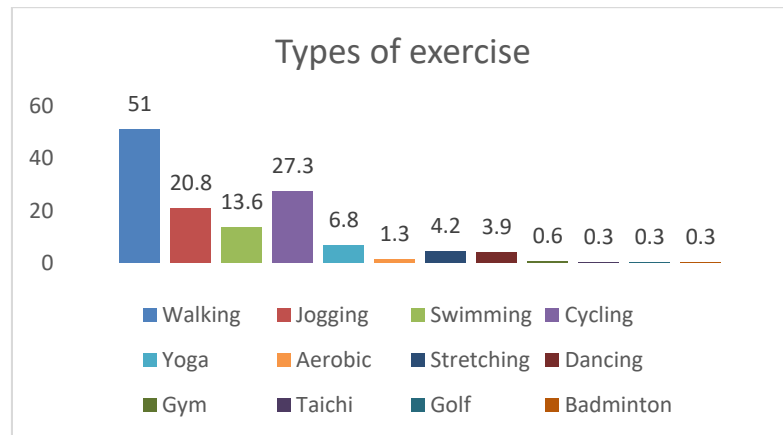| Variables	n (%)
Types of exercise	
Walking	157 (51.0)
Jogging	64 (20.8)
Swimming	42 (13.6)
Cycling	84 (27.3)
Yoga	21 (6.8)
Aerobic	4 (1.3)
Stretching	13 (4.2)
Dancing	12 (3.9)
Gym	2 (0.6)
Taichi	1 (0.3)
Golf	1 (0.3)
Badminton	1 (0.3)

Figure 4.1.8: Bar chart of types of exercise

Approximately half of the participants (n = 157, 51.0%) walked as their exercise activity. The second most frequent exercise among the participants was cycling (n = 84, 27.3%). 64 participants (20.8%) jogged, followed by swimming (n = 42, 13.6%) and yoga (n = 21, 6.8%). There were 13 participants (4.2%) performed stretching as exercise and 12 participants (3.9%) dancing. The not so common exercise among the participants were aerobic (n = 4, 1.3%), gym (n = 2, 0.6%), taichi (n = 1, 0.3%), golf (n = 1, 0.3%) and badminton (n = 1, 0.3%).

Table 4.2.6 Duration of exercise

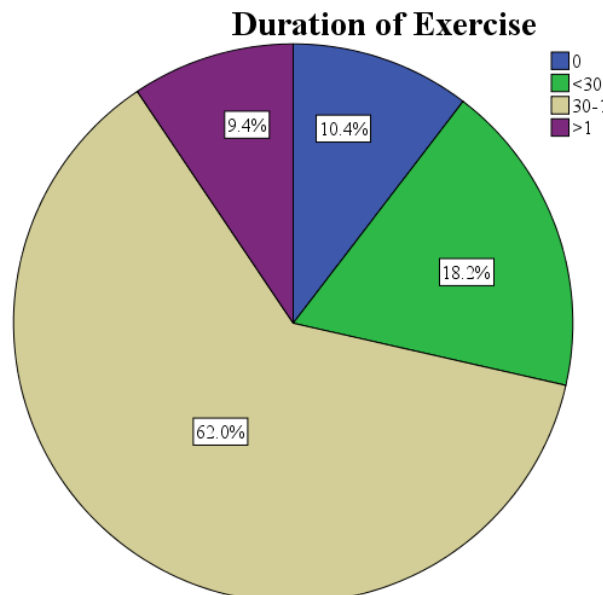| Variables	n (%)
Duration of exercise	
Less than 30 minutes	56 (18.2)
30 minutes to 1 hour	191 (62.0)
More than 1 hour	29 (9.4)

Figure 4.1.9 Pie chart of duration of exercise

Regarding the duration of exercise, most participants (n = 191, 62.0%) reported exercising for 30 minutes to 1 hour. There were 56 participants (18.2%) exercising less than 30 minutes and 29 participants (9.4%) exercising more than 1 hour.

Table 4.2.7 Perceived Stress Scale

Variables	n (%)
Perceived Stress Scale	
Low stress (0-13)	91 (29.5)
Moderate stress (14-26)	217 (70.5)
High perceived stress (27-40)	0 (0)
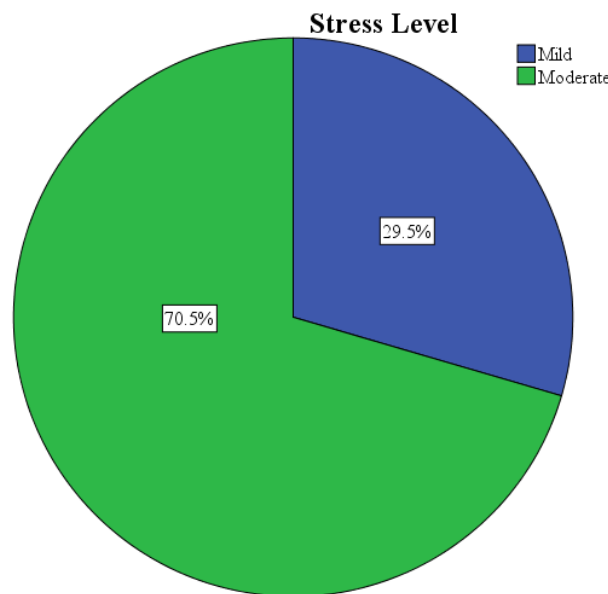
Figure 4.1.10 Pie chart of stress level

Regarding the stress level among participants, there were high percentage 70.5% of participants (n = 217) having moderate stress level. Participants which having low stress level were 91 (29.5%). Fortunately, there was no participant having high perceived stress level.

Table 4.2.8 Physiotherapy treatment for work-related musculoskeletal disorders

Variables	n (%)
Physiotherapy treatment	
Yes	15 (4.9)
No	293 (95.1)

Physiotherapy Treatment

Figure 4.1.11 Pie chart of received physiotherapy treatment

Regarding the acknowledgement of physiotherapy treatment for work-related musculoskeletal disorders among housewives, there were only 4.9% of participants (n = 15) have been received physiotherapy treatment. 293 participants (95.1%) have not received of any physiotherapy treatment before.
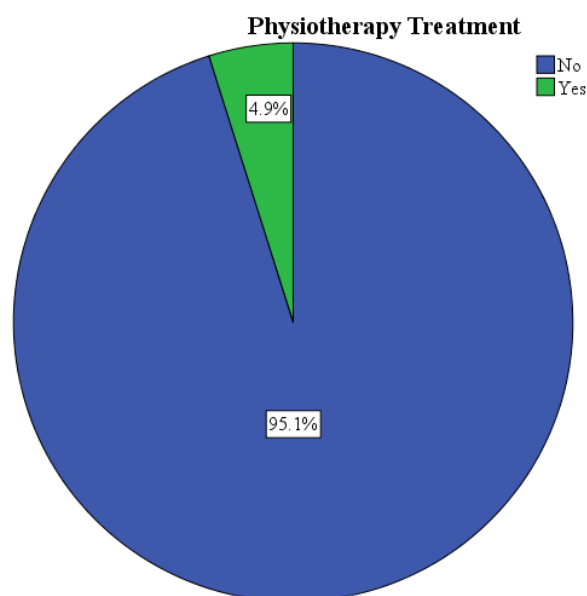
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4.3 Characteristics of Work-related Musculoskeletal Disorders

Table 4.3.1: Present of any work-related musculoskeletal injury in the past 12 months.

Variable	n (%)
Any pain/ discomfort	
Yes	231 (75.0%)
No	77 (25.0%)
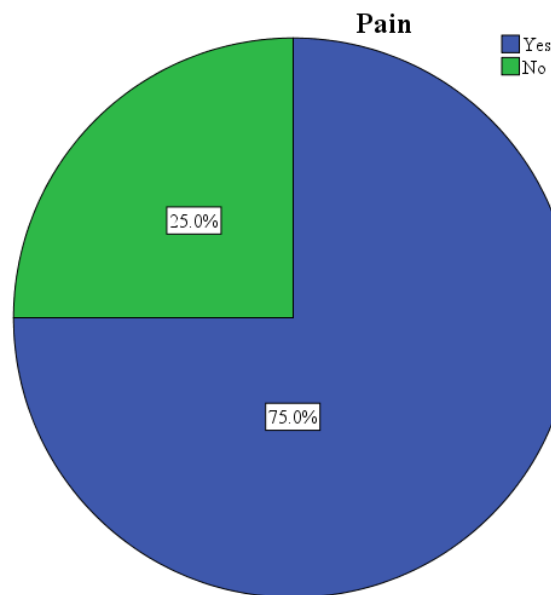
Figure 4.1.12 Pie chart of any work-related musculoskeletal disorders

During the past 12 months, there were 75% of participants (n = 231) reported that they are pain or discomfort on their body parts, whereas 25% of participants (n = 77) did not encounter any pain and discomfort.

Table 4.3.2: Present of any work-related musculoskeletal injury during last 12 months.

Variable	n (%)
Number of injured body parts	
0	77 (25.0)
1	107 (34.7)
2	91 (29.5)
3	19 (6.2)
4	8 (2.6)
5	3 (1.0)
6	3 (1.0)
Part of body	
Neck	47 (10.6)
Shoulder (Left)	11 (2.5)
Shoulder (Right)	31 (7.0)
Shoulder (Both)	26 (5.9)
Elbow (Left)	1 (0.2)
Elbow (Right)	16 (3.6)
Elbow (Both)	2 (0.4)

Wrist/ Hand (Left)	0 (0)
Wrist/ Hand (Right)	38 (8.6)
Wrist/ Hand (Both)	4 (0.9)
Upper Back	21 (4.8)
Lower Back	84 (19.0)
Hip/ Thigh	21 (4.8)
Knee	75 (17.0)
Feet/ Ankle	65 (14.7)

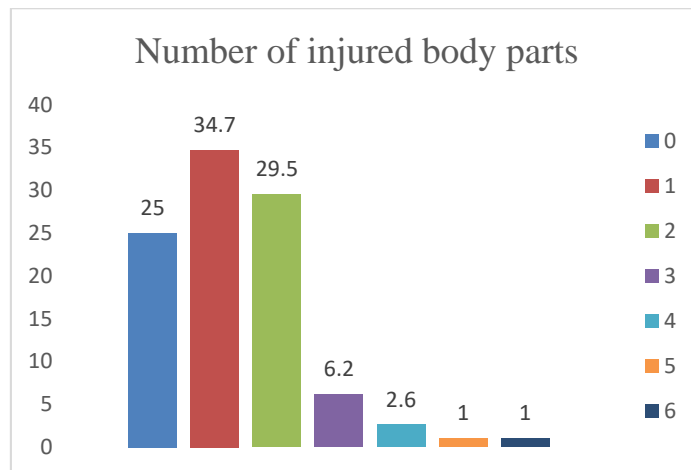**Figure 4.1.13 Bar chart of number of injured body parts in the past 12 months**

Regarding the number of injured body part of participants in 12 months, 107 (34.7%) of 231 participants reported sustained one work-related musculoskeletal injury. 91 participants (29.5%) did reported that they having two injured body parts, 19 participants (6.2%) reported having three injured body parts and 8 participants (2.6%) mentioned of having four injured body parts in the preceding 12 months. Whereas, participants that having five and six injured body part during the last 12 months were respectively 3 (1.0%). Number of participants that not having any injured body part (n = 77, 25%) were same as the number of participants that reported not having any pain and discomfort in Table 4.3.1.
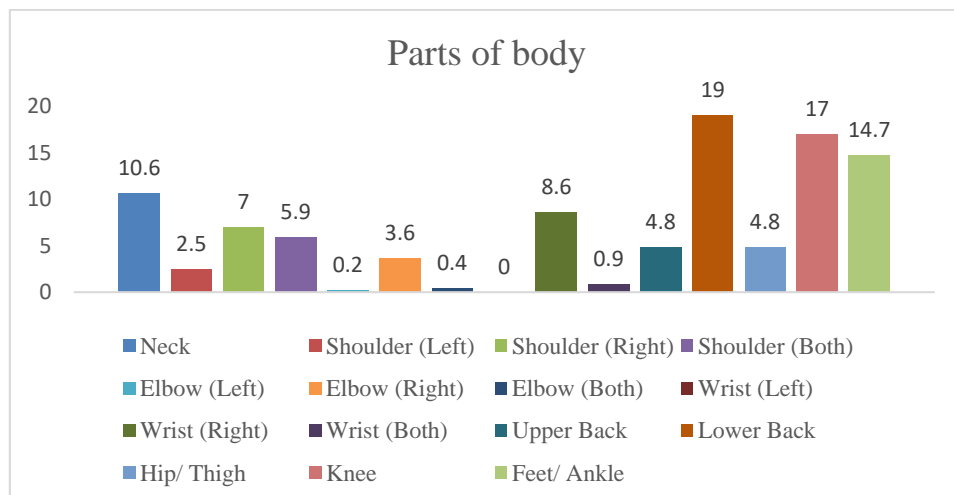
Figure 4.1.14 Bar chart of parts of body encounter work-related musculoskeletal disorders

According to Table 4.3.2, body part of work-related musculoskeletal disorders encounter by participants were reported. A total of 442 injured body parts reported from 231 participants in the previous 12 months. The injured body region consisting of axial region (n = 152, 34.4%), upper extremity (n = 129, 29.2%) and lower extremity (n = 161, 36.4%).

In axial region, the most frequent injured body region was lower back (n = 84, 19.0%). Neck was the second common injured part in axial region. There were 47 participants (10.6%) complaint of foot and ankle pain. The least reported axial region was upper back. Only 21 participants (4.8%) reported of pain at hip and thigh.

For upper extremity, there were 3 parts, shoulder, elbow and wrist. Right shoulder was the most frequent injured shoulder region (n = 31, 7.0%) compare to left shoulder (n = 11, 2.5%). There were 26 participants (5.9%) reported of both shoulder pain. For elbow, right elbow (n = 16, 3.6%) was also injured by more participants compare to left elbow (n = 1, 0.2%). There was two complaints reported of both elbow pain (0.4%). For wrist and hand region, 38 participants (8.6%) reported pain at right wrist and hand and four participants (0.9%) reported pain at both wrist. There was no participants reported of left wrist pain.

For lower extremity, the most frequent injured part was knee. There were 75 participants (17.0%) reported of pain on their knee. Foot and ankle was the second common injured part in lower extremity. There were 65 participants (14.7%) complaint of foot and ankle pain. Only 21 participants (4.8%) reported of pain at hip and thigh.

Table 4.3.3: Site of body region that prevented from normal work because of work-related musculoskeletal disorders during 12 months.

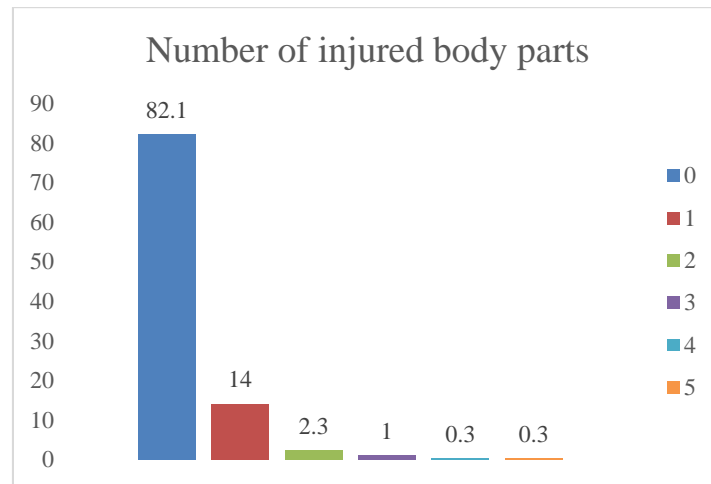| Variable	n (%)
Number of injured body parts	
0	253 (82.1)
1	43 (14.0)
2	7 (2.3)
3	3 (1.0)
4	1 (0.3)
5	1 (0.3)
Part of body	
Neck	12 (15.2)
Shoulder	16 (20.3)
Elbow	2 (2.5)
Wrist/ Hand	10 (12.7)
Upper Back	5 (6.3)
Lower Back	9 (11.4)
Hip/ Thigh	1 (1.3)
Knee	15 (19.0)
Feet/ Ankle	9 (11.4)

Figure 4.1.15 Bar chart of number of injured body parts that prevented participants from normal work.

During the past 12 months, there were 56 participants (17.9%) have been prevent from doing their normal work because of work-related musculoskeletal disorders. Most of the participants reported sustained only one work-related musculoskeletal injury (n = 107, 34.7%). 91 participants (29.5%) did reported that they having two injured body parts, 19 participants (6.2%) reported having three injured body parts and eight participants (2.6%) mentioned of having four injured body parts in the preceding 12 months. Whereas, participants that having five and six injured body part during the last 12 months were respectively 3 (1.0%). Number of participants that not having any injured body part (n = 77, 25%) were same as the number of participants that reported not having any pain and discomfort in Table 4.3.1.
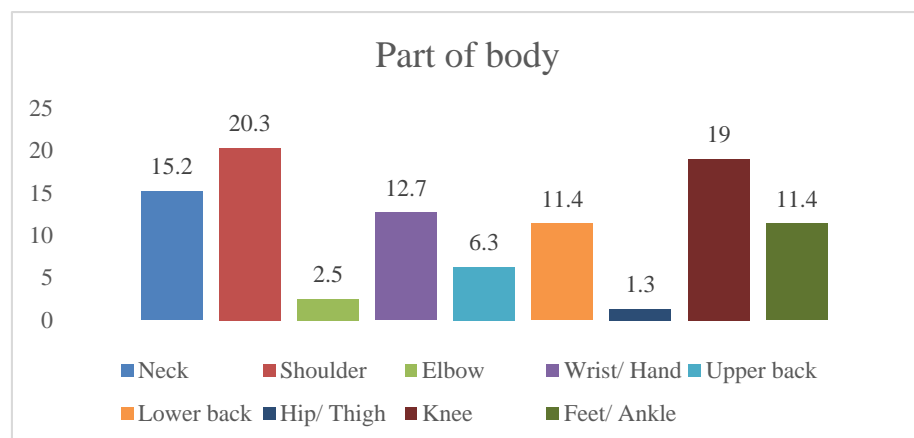
Figure 4.1.16 Bar chart of injured body parts that prevented participants from normal work.

Among those 55 participants, there were 79 body parts were injured and prevented them from normal work as housewife. The injured body region consisting of axial region (n = 26, 32.9%), upper extremity (n = 28, 35.4%) and lower extremity (n = 25, 31.6%).

In axial region, the most frequent injured body region was neck (n = 12, 15.2%). Lower back was the second common injured part in axial region. There were nine participants (11.4%) complaint of foot and ankle pain. The least reported axial region was upper back. Only five participants (6.3%) reported of pain at upper back region.

For upper extremity, there were three parts, shoulder, elbow and wrist. Shoulder was the most frequent injured shoulder region (n = 16, 20.3%).There were two participants (2.5%) reported of elbow pain. For wrist and hand region, ten participants (12.7%) reported pain.

For lower extremity, the most frequent injured part was knee. There were 15 participants (19.0%) reported of pain on their knee. Foot and ankle was the second common injured part in lower extremity. There were nine participants (11.4%) complaint of foot and ankle pain. Only one participants (1.3%) reported of pain at hip and thigh.

Table 4.3.4: Presence of any work-related musculoskeletal injury during last 7 days.

Variable	n (%)
Number of injured body parts	
0	252 (81.8)
1	39 (12.7)
2	10 (3.2)
3	5 (1.6)
4	0 (0)
5	2 (0.6)
Part of body	
Neck	15 (16.3)
Shoulder	15 (16.3)
Elbow	2 (2.2)
Wrist/ Hand	7 (7.6)
Upper Back	7 (7.6)
Lower Back	13 (14.1)
Hip/ Thigh	4 (4.3)
Knee	20 (21.7)
Feet/ Ankle	9 (9.8)
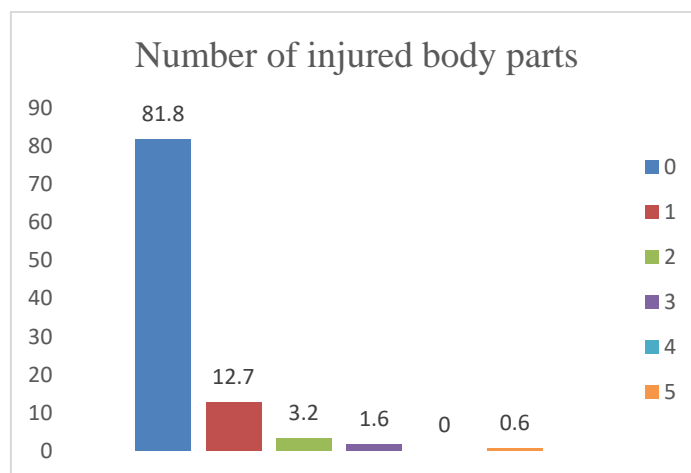
Figure 4.1.17 Bar chart of number of injured body parts in the past 7 days

During the past 7 days, there were 56 participants (18.2%) reported having work-related musculoskeletal pain. 39 participants (12.7%) reported having one injured body part that prevented them for work. Ten participants (3.2%) reported that they were having two injured body part in last 7 days. There five participants (1.6%) having three injured body parts that prevented them from household activities, followed by five injured body parts (n = 2, 0.6%).
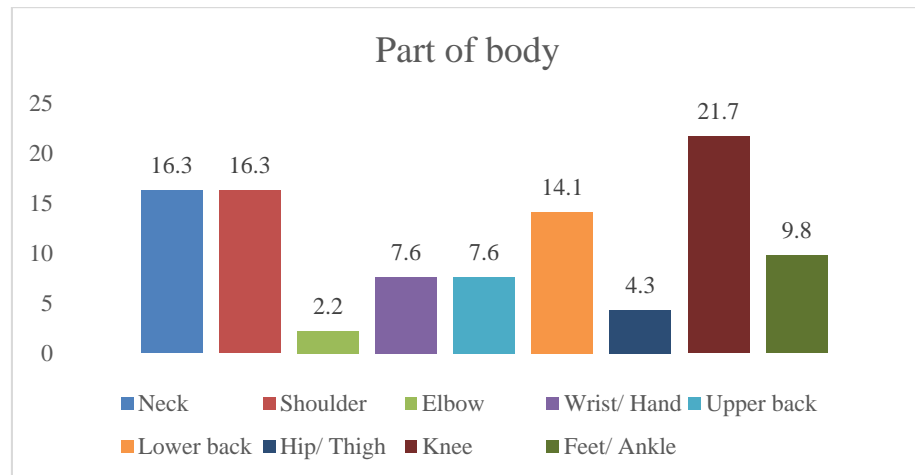
Figure 4.1.18 Bar chart of body parts that prevented participants from normal in the past 7 days.

Among those 56 participants, there were 92 body parts were injured during the past 7 days. The injured body region consisting of axial region (n = 35, 38.0%), upper extremity (n = 24, 26.1%) and lower extremity (n = 33, 35.9%).

In axial region, the most frequent injured body region was neck (n = 15, 16.3%). Lower back was the second common injured part in axial region. There were 13 participants (14.1%) complaint of lower back pain. The least reported axial region was upper back. Only seven participants (7.6%) reported of pain at upper back in past 7 days.

For upper extremity, there were three parts, shoulder, elbow and wrist. Shoulder was the most frequent injured shoulder region (n = 15, 16.3%). There were two participants (2.2%) reported of elbow pain. For wrist and hand region, seven participants (7.6%) reported pain.

For lower extremity, the most frequent injured part was knee. There were 20 participants (21.7%) reported of pain on their knee. Foot and ankle was the second common injured part in lower extremity. There were nine participants (9.8%) complaint of foot and ankle pain. There was only four participants (4.3%) reported of pain at hip and thigh.

4.4 Comparison of Different household activities and different body parts

Table 4.4.1: Types of household activities with body parts that encounter work-related musculoskeletal disorders during the past 12 months.

Activity	Injured body part, n (%)						
	Neck	Shoulder (Left)	Shoulder (Right)	Shoulder (Both)	Elbow (Left)	Elbow (Right)	Elbow(Both)
Sweeping	35	8	22	22	1	13	2
	(9.8)	(2.2)	(6.2)	(6.2)	(0.3)	(3.6)	(0.6)
Mopping	34	9	21	22	1	12	2
	(9.6)	(2.5)	(5.9)	(6.2)	(0.3)	(3.4)	(0.6)
Washing	25	5	6	12	1	4	2
	(13.0)	(2.6)	(3.1)	(6.2)	(0.5)	(2.0)	(1.0)
Cooking	39	10	28	23	1	13	2
	(10.2)	(2.6)	(7.3)	(6.0)	(0.3)	(3.4)	(0.6)
Parental care	18	7	17	13	0	11	2
	(8.9)	(3.5)	(8.4)	(6.4)	(0)	(5.4)	(1.0)
Grocery shopping	15	3	6	9	0	2	1
	(15.6)	(3.1)	(6.3)	(9.4)	(0)	(2.1)	(1.0)

Activity	Wrist/ Hand (Left)	Wrist/ Hand (Right)	Wrist/ Hand (Both)	Upper Back	Lower Back	Hip/ Thigh	Knee	Feet/ Ankle
Sweeping	0	32	4	17	64	16	61	60
	(0)	(9.0)	(1.1)	(4.8)	(17.9)	(4.5)	(17.1)	(16.8)
Mopping	0	31	4	17	63	15	61	61
	(0)	(8.8)	(1.1)	(4.8)	(17.8)	(4.2)	(17.3)	(17.3)
Washing	0	13	4	13	29	9	30	31
	(0)	(6.7)	(2.0)	(6.7)	(15.0)	(4.7)	(15.5)	(16.1)
Cooking	0	34	4	19	74	14	65	55
	(0)	(8.9)	(1.2)	(5.0)	(19.4)	(3.7)	(17.1)	(14.4)
Parental care	0	17	1	8	46	9	24	29
	(0)	(8.4)	(0.5)	(4.0)	(22.8)	(4.5)	(11.9)	(14.4)
Grocery shopping	0	5	2	7	12	5	15	14
	(0)	(5.2)	(2.1)	(7.3)	(12.5)	(5.2)	(15.6)	(14.6)

Table 4.4.1 shows according the different types of household activities which cause injured body parts that encounter work-related musculoskeletal disorders. Participants reported that most injured body was lower back region. Most of the reported work-related musculoskeletal disorders among housewives was related to cooking.

Injured body part	Household activities, n (%)					
	Sweep- ing	Mop- ping	Wash- ing	Cook- ing	Parental Care	Grocery Shopping
Neck	35	34	25	39	18	15
	(21.1)	(20.5)	(15.1)	(23.5)	(10.8)	(9.0)

Regarding sweeping and mopping, there were similar frequency of injured body part. For participants that always perform sweeping (17.9%) and mopping (17.8%), the most frequent injured body part was lower back region, followed by knee, feet/ ankle, neck, right wrist/ hand, both of shoulder, right shoulder, upper back, hip/ thigh, right elbow, left shoulder, both of wrist/ hand, both of elbow and left elbow. Left wrist/ hand was not encounter by any participants whom perform sweeping.

Participants who perform washing sustained most injury of feet/ ankle (16.1%). The frequency of having knee (15.5%) and lower back (15.0%) disorder were quite similar with feet/ ankle. The following injured body parts were neck, right wrist/ hand, upper back, both of shoulder, hip/ thigh, right shoulder, left shoulder, right elbow, both of wrist/ hand both elbow and left elbow. There was no participant encounter pain on left wrist/ hand.

There were 19.4% of participants had lower back disorders after performing cooking at home. The sequent was followed by knee, feet/ ankle, neck, right wrist/ hand, right shoulder, both of shoulder, upper back, hip/ thigh, right elbow, left shoulder, both of wrist/ hand, both of elbow, left elbow and left wrist/ hand (0%).

For parental care, lower back disorders (22.8%) still the most frequent encounter work-related musculoskeletal disorders among housewives. Feet/ ankle was the next and following with knee, neck, right wrist/ hand, right shoulder, both shoulder, right elbow, hip/ thigh, upper back, left shoulder, both of elbow and both of wrist/ hand. Left elbow and left wrist/ hand were not reported by the participants.

Lastly, regarding grocery shopping, there were two body parts that encounter most work-related musculoskeletal disorders among housewives. There were neck and knee region, which were 15.6% respectively. The other body region that have quite similar amount of participants encounter was feet/ ankle. Next followed by lower back, both of shoulder, upper back, right shoulder, right wrist/ hand, hip/ thigh, left shoulder, right elbow, both of wrist/ hand and both of elbow. There were two body parts that not encounter among housewives, which were left elbow and left wrist/ hand.

Injured body part	Household activities, n (%)					
	Sweep- ing	Mop- ping	Wash- ing	Cook- ing	Parental Care	Grocery Shopping
Shoulder (Left)	8	9	5	10	7	3
	(19.0)	(21.4)	(11.9)	(23.8)	(16.7)	(7.1)

Table 4.4.2: Types of household activities with neck work-related musculoskeletal disorders during the past 12 months.

Reported from participants that encounter neck region of work-related musculoskeletal disorders, there were several household activities did they performed. The most frequent household activity performed was cooking (23.5%), followed by sweeping, mopping, washing, parental care and grocery shopping.

Table 4.4.3: Types of household activities with left shoulder work-related musculoskeletal disorders during the past 12 months.

For injured left shoulder, the reported most perform household activity was cooking (23.8%). The following household activities that might cause left shoulder injury were mopping, sweeping, parental care, washing and grocery shopping.

Table 4.4.4: Types of household activities with right shoulder work-related musculoskeletal disorders during the past 12 months.

28 out of 100 amount of household activities were from cooking. Cooking (28%) was the highest frequency of household activity which caused right shoulder work-related musculoskeletal disorders. The rest household activities that cause right shoulder work-related musculoskeletal disorders were according sweeping, mopping, parental care, washing and grocery shopping respectively.

| Injured body part | Household activities, n (%) | | | | | |
	Sweep- ing	Mop- ping	Wash- ing	Cook- ing	Parental Care	Grocery Shopping
Shoulder (Right)	22 (22.0)	21 (21.0)	6 (6.0)	28 (28.0)	17 (17.0)	6 (6.0)

Table 4.4.5: Types of household activities with both shoulder work-related musculoskeletal disorders during the past 12 months.

| Injured body part | Household activities, n (%) | | | | | |
	Sweep- ing	Mop- ping	Wash- ing	Cook- ing	Parental Care	Grocery Shopping
Elbow (Left)	1 (25.0)	1 (25.0)	1 (25.0)	1 (25.0)	0 (0.0)	0 (0.0)

Cooking (22.8%) still the most frequent household activity that performed among both shoulder work-related musculoskeletal disorders participants. However, the frequency of both sweeping (21.8%) and mopping (21.8%) were similar to cooking. The following sequence will be parental care, washing and grocery shopping.

Table 4.4.6: Types of household activities with left elbow work-related musculoskeletal disorders during the past 12 months.

| Injured body part | Household activities, n (%) | | | | | |
	Sweep- ing	Mop- ping	Wash- ing	Cook- ing	Parental Care	Grocery Shopping
Elbow (Right)	13 (23.6)	12 (21.8)	4 (7.3)	13 (23.6)	11 (20.0)	2 (3.6)

Regarding left elbow work-related musculoskeletal disorders, there were equal frequency of household activities which are sweeping, mopping, washing and cooking. The frequency was 25% respectively.

Table 4.4.7: Types of household activities with right elbow work-related musculoskeletal disorders during the past 12 months.

| Injured body part | Household activities, n (%) | | | | | |
	Sweep- ing	Mop- ping	Wash- ing	Cook- ing	Parental Care	Grocery Shopping
Shoulder (Both)	22 (21.8)	22 (21.8)	12 (11.9)	23 (22.8)	13 (12.9)	9 (8.9)

The frequency of sweeping, mopping, cooking and parental care was about the same, it was 23.6%, 21.8%, 23.6% and 20.0% respectively. These four types of household activities were the most performed among housewives whom encounter right elbow musculoskeletal disorders. Whereas, washing and grocery shopping were the least performed household activities.

Table 4.4.8: Types of household activities with both elbow work-related musculoskeletal disorders during the past 12 months.

For the both elbow work-related musculoskeletal disorders, all of the household activities, sweeping, mopping, washing, cooking and parental care had the same frequency which was 18.2% except for grocery shopping (9%).

Table 4.4.9: Types of household activities with right wrist/ hand work-related musculoskeletal disorders during the past 12 months.

Injured body part	Household activities, n (%)					
	Sweep- ing	Mop- ping	Wash- ing	Cook- ing	Parental Care	Grocery Shopping
Elbow (Both)	2 (18.2)	2 (18.2)	2 (18.2)	2 (18.2)	2 (18.2)	1 (9.0)

Cooking, sweeping and mopping consisted of equally same frequency of household activities, which were 25.8%, 24.2% and 23.5% respectively. This means that they having same probability cause right wrist/ hand work-related musculoskeletal disorders. The rest household activities were followed by parental care, washing and grocery shopping.

Injured body part	Household activities, n (%)					
	Sweep- ing	Mop- ping	Wash- ing	Cook- ing	Parental Care	Grocery Shopping
Wrist/ Hand (Right)	32 (24.2)	31 (23.5)	13 (9.8)	34 (25.8)	17 (12.9)	5 (3.8)

Table 4.4.10: Types of household activities with both wrist/ hand work-related musculoskeletal disorders during the past 12 months.

For both of wrist/ hand musculoskeletal disorders, there were 4 types of household activities having same frequency (21.1%), which are sweeping, mopping, washing and cooking. Parental care and grocery shopping were least frequency compare to them, which also mean that they were comparative less chance to cause both of wrist/ hand injury.

Injured body part	Household activities, n (%)					
	Sweep- ing	Mop- ping	Wash- ing	Cook- ing	Parental Care	Grocery Shopping
Wrist/ Hand (Both)	4 (21.1)	4 (21.1)	4 (21.1)	4 (21.1)	1 (5.3)	2 (10.5)

Table 4.4.11: Types of household activities with upper back work-related musculoskeletal disorders during the past 12 months.

For upper back work-related musculoskeletal disorders, the reported most perform household activity was cooking (23.5%). The second frequent household activities were sweeping and mopping. The following household activities that might cause upper back injury were washing, parental care and grocery shopping.

Injured body part	Household activities, n (%)					
	Sweep- ing	Mop- ping	Wash- ing	Cook- ing	Parental Care	Grocery Shopping
Lower back	64 (22.2)	63 (21.9)	29 (10.1)	74 (25.7)	46 (16.0)	12 (4.2)

Table 4.4.12: Types of household activities with lower back work-related musculoskeletal disorders during the past 12 months.

Lower back was the most affected part of work-related musculoskeletal disorders among housewives. The most performed household activity by housewives whom encounter lower back injury was cooking (25.7%). The rest household activities that cause lower back work-related musculoskeletal disorders were according sweeping, mopping, parental care, washing and grocery shopping.

Table 4.4.13: Types of household activities with hip/ thigh work-related musculoskeletal disorders during the past 12 months.

Regarding hip/ thigh work-related musculoskeletal disorders, the highest frequency of household activity involved was sweeping (23.5%). The frequency of mopping and cooking were also just few amount least than sweeping. Washing, parental care and grocery shopping were listed accordingly.

Injured body part	Household activities, n (%)					
	Sweep- ing	Mop- ping	Wash- ing	Cook- ing	Parental Care	Grocery Shopping
Upper back	17 (21.0)	17 (21.0)	13 (16.0)	19 (23.5)	8 (9.9)	7 (8.6)

Injured body part	Household activities, n (%)					
	Sweep- ing	Mop- ping	Wash- ing	Cook- ing	Parental Care	Grocery Shopping
Hip/ Thigh	16 (23.5)	15 (22.1)	9 (13.2)	14 (20.6)	9 (13.2)	5 (7.4)

Table 4.4.14: Types of household activities with knee work-related musculoskeletal disorders during the past 12 months.

65 out of 256 amount of household activities were from cooking. Cooking (25.4%) was the highest frequency of household activity which caused knee work-related musculoskeletal disorders. The rest household activities that cause knee work-related musculoskeletal disorders were according sweeping, mopping, parental care, washing and grocery shopping respectively.

Injured body part	Household activities, n (%)					
	Sweep- ing	Mop- ping	Wash- ing	Cook- ing	Parental Care	Grocery Shopping
Knee	61	61	30	65	24	15
	(23.8)	(23.8)	(11.7)	(25.4)	(9.4)	(5.9)

Table 4.4.15: Types of household activities with feet/ ankle work-related musculoskeletal disorders during the past 12 months.

The most performed household activity by housewives whom encounter feet/ ankle injury was mopping (24.2%). Sweeping (24.0%) was having similar frequency of household activity as mopping. The rest household activities that cause feet/ ankle work-related musculoskeletal disorders were according cooking, washing, parental care and grocery shopping.

Injured body part	Household activities, n (%)					
	Sweep- ing	Mop- ping	Wash- ing	Cook- ing	Parental Care	Grocery Shopping
Feet/ Ankle	60	61	31	55	29	14
	(24.0)	(24.2)	(12.4)	(22.0)	(11.6)	(5.6)

Table 4.4.16 Types of exercise with work-related musculoskeletal disorders.

According to table 4.4.16, there show the most frequent performed exercise is walking. For walking, there show only 18.5% of them

Exercise	Work-related musculoskeletal disorders, n (%)	
	Yes	No
Walking	128	29
	(81.5)	(18.5)
Jogging	47	17
	(73.4)	(26.6)
Swimming	33	9
	(78.6)	(21.4)
Cycling	66	18
	(78.6)	(21.4)
Yoga	16	5
	(76.2)	(23.8)
Aerobic	2	2
	(50.0)	(50.0)
Stretching	8	5
	(61.5)	(38.5)
Dancing	10	2
	(83.3)	(16.7)
Gym	1	1
	(50.0)	(50.0)
Taichi	1	0
	(100.0)	(0.0)
Golf	0	1
	(0.0)	(100.0)
Badminton	1	0
	(100.0)	(0.0)

did not encounter work-related musculoskeletal disorders. It is same as dancing that show 16.7% of them did not have work-related musculoskeletal disorders. Whereas the other types of exercise show lower rate of participants encounter work-related musculoskeletal disorders. Golf exercise shows lowest rate of getting work-related musculoskeletal disorders. Taichi and badminton show the highest rate of getting work-related musculoskeletal disorders among housewives.

4.5 Association of Different Variables and Work-related Musculoskeletal Disorders.

Table 4.5.1: Association between age and work-related musculoskeletal disorders in the past 12 months.

Age	Work-related musculoskeletal disorders		χ^2	df	p-value
	Yes n (%)	No n (%)			
18-24	1 (100.0)	0 (0)	14.036*	5	0.015
25-30	7 (70.0)	3 (30.0)			
31-35	40 (83.3)	8 (16.7)			
36-40	64 (74.4)	22 (25.6)			
41-45	75 (83.3)	15 (16.7)			
46-50	44 (53.0)	29 (47.0)			

*Chi-square test was performed, df=degree of freedom, Level of significant at $p<0.05$,

The association between age and work-related musculoskeletal disorders in the past 12 months was determined by using Chi-square test. The number of participants who were had work-related musculoskeletal disorders in the age range of 18 to 24 was one (100%), followed by 25 to 30 years (n = 7. 70.0%). The number of participants whom had work-related musculoskeletal disorders increase to 40 (83.3%) at the age of 31 to 35, followed by the age of 36 to 40 (n = 64, 74.4%). The age range which have the highest number of participants (75, 83.3%) of getting work-related musculoskeletal disorders was 41 to 45 years. At the age of 46 to 50, there were 44 participants (53.0%) had work-related musculoskeletal disorders. The difference in the work-related musculoskeletal disorders between age range among housewives was statistically significant as p = 0.015, which stated that there was correspond between age and work-related musculoskeletal disorders.

Table 4.5.2: Association between ethnicity and work-related musculoskeletal disorders in the past 12 months.

Ethnicity	Work-related musculoskeletal disorders		χ^2	df	p-value
	Yes n (%)	No n (%)			
Chinese	186 (72.7)	70 (27.3)	4.831*	0	0.089
Malay	25 (83.3)	5 (16.7)			
Indian	20 (90.9)	2 (9.9)			

*Chi-square test was performed, df=degree of freedom, Level of significant at $p<0.05$,

Chi-square test was used to investigate the association of ethnicity and work-related musculoskeletal disorders in the past 12 months. The number of participants who had work-related musculoskeletal disorders among ethnicity was Chinese (n = 186, 60.4%), Malay (n = 25, 8.1%) and Indian (n = 4, 25.0%). The difference in the work-related musculoskeletal disorders and ethnicity was not statistically significant as p = 0.089. It shows that ethnicity was not associated with work-related musculoskeletal disorders among housewives.

Table 4.5.3: Association among the education level that obtained and work-related musculoskeletal disorders in the past 12 months.

Education level that obtained	Work-related musculoskeletal disorders		χ^2	df	p-value
	Yes n (%)	No n (%)			
Primary	13 (68.4)	6 (31.6)	0.720*	2	0.698
Secondary	156 (73.6)	56 (26.4)			
Tertiary	62 (77.5)	18 (22.5)			

*Chi-square test was performed, df=degree of freedom, Level of significant at $p<0.05$,

Association between the education level that obtained by participants and work-related musculoskeletal disorders in the past 12 months was tested by chi-square. The number of respondents of primary education who sustained injury was 13 (68.4%), secondary

education (n = 156, 73.6%), and tertiary (n = 62, 77.5%). The difference in the work-related musculoskeletal disorders in the past 12 months between the education level that obtained was not statistically significant as p = 0.698. There shows no correspond relationship between the education level that obtained among housewives and work-related musculoskeletal disorders.

Table 4.5.4: Association between number of children and work-related musculoskeletal disorders in the past 12 months.

| Number of children | Work-related musculoskeletal disorders | | χ^2 | df | p-value |
	Yes n (%)	No n (%)			
0	14 (73.7)	5 (26.3)	6.842*	6	0.336
1	28 (90.0)	3 (10.0)			
2	71 (69.6)	31 (30.4)			
3	74 (75.5)	24 (24.5)			
4	37 (78.7)	10 (21.3)			
5	6 (66.7)	3 (33.3)			
6	1 (50.0)	1 (50.0)			

*Chi-square test was performed, df=degree of freedom, Level of significant at p<0.05,

Chi-square was used to test was the number of children and its association with work-related musculoskeletal disorders in the past 12 months. There were 14 participants (73.7%) had work-related musculoskeletal disorders but did not have any child. The number of participants who were having one child and had work-related musculoskeletal disorders was 28 (90.0%). The number of participants whom having two children and had work-related musculoskeletal disorders increase to 71 (69.6%), followed by having three children (n = 74, 75.5%). 37 participants (78.7%) having four children and had work-related musculoskeletal disorders in past 12 months. The number of participants of having five children decrease to 6 (66.7%), followed by having six children (n = 1, 50.0%). The difference between the work-related musculoskeletal disorders and number of children was not statistically significant as p = 0.336. The number of children obtained by participants was no associated with work-related musculoskeletal disorders among housewives.

Table 4.5.5: Association between duration of household activities and work-related musculoskeletal disorders in the past 12 months.

| Duration of household activities | Work-related musculoskeletal disorders | | χ^2 | df | p-value |
	Yes n (%)	No n (%)			
Less than 1 hour	8 (73.7)	5 (26.3)	33.795*	5	<0.001
1 – 2 hours	28 (90.0)	3 (10.0)			
3 – 4 hours	71 (69.6)	31 (30.4)			
5 – 6 hours	74 (75.5)	24 (24.5)			
7 – 8 hours	37 (78.7)	10 (21.3)			
More than 8 hours	1 (50.0)	1 (50.0)			

*Chi-square test was performed, df=degree of freedom, Level of significant at p<0.05,

The association between duration of household activities and work-related musculoskeletal disorders in the past 12 months was determined by perform Chi-square test. The number of injured participants who perform household activities less than 1 hour was 8 (73.7%), followed by 1 to 2 hours (n = 28, 90.0%). The number of participants that perform household activities for 3 to 4 hours were 71 (69.6%). Highest number of participants (n =74, 75.5%) perform 5 to 6 hours of household activities. There were 37 participants (78.7%) had work-related musculoskeletal disorders and perform 7 to 8 hours household activities. There was only one participant perform household activities more than 8 hours. The difference between duration of household activities and work-related musculoskeletal disorders among housewives was statistically significant as p < 0.001. The duration of household activities was associated with work-related musculoskeletal disorders.

Table 4.5.6: Association between sweeping and work-related musculoskeletal disorders in the past 12 months.

| Sweeping | Work-related musculoskeletal disorders | | χ^2 | df | p-value |
	Yes n (%)	No n (%)			
Yes	189 (75.0)	63 (25.0)	>0.001*	1	1.000
No	42 (75.0)	14 (25.0)			

*Chi-square test was performed, df=degree of freedom, Level of significant at p<0.05,

Association between sweeping and work-related musculoskeletal disorders in the past 12 months was investigate by using Chi-square test. Injured participants who performed sweeping were 189 (75.0%) whereas injured participants who did not perform sweeping were 42 (75.0%). The difference in the work-related musculoskeletal disorders between performing sweeping was not statistically significant as p = 1.000. Household activities like sweeping shown no correspond with work-related musculoskeletal disorders among housewives.

Table 4.5.7: Association between mopping and work-related musculoskeletal disorders in the past 12 months.

| Mopping | Work-related musculoskeletal disorders | | χ^2 | df | p-value |
	Yes n (%)	No n (%)			
Yes	190 (75.7)	61 (24.3)	0.352*	1	0.553
No	41 (71.9)	16 (28.1)			

*Chi-square test was performed, df=degree of freedom, Level of significant at p<0.05,

Association between household activity like mopping was investigated with work-related musculoskeletal disorders in the past 12 months by using Chi-square test. Injured participants who performed mopping were 190 (75.7%) whereas injured participants who did not perform mopping were 41 (71.9%). The difference in the work-related musculoskeletal disorders between performing mopping was not statistically significant as p = 0.553 Household activities like mopping shown no correspond with work-related musculoskeletal disorders among housewives.

Table 4.5.8: Association between washing and work-related musculoskeletal disorders in the past 12 months.

| Washing | Work-related musculoskeletal disorders | | χ^2 | df | p-value |
	Yes n (%)	No n (%)			
Yes	86 (77.5)	25 (22.5)	0.568*	1	0.451
No	145 (73.6)	52 (26.4)			

*Chi-square test was performed, df=degree of freedom, Level of significant at p<0.05,

Household activity, washing was tested with work-related musculoskeletal disorders in the past 12 months for its association by performing Chi-square test. Injured participants who performed washing were 86 (77.5%) whereas injured participants who did not perform washing were 145 (73.6%). The difference in the work-related musculoskeletal disorders between performing washing was not statistically significant as p = 0.451. There was no association between performing washing and work-related musculoskeletal disorders among housewives.

Table 4.5.9 Association between cooking and work-related musculoskeletal disorders in the past 12 months.

| Cooking | Work-related musculoskeletal disorders | | χ^2 | df | p-value |
	Yes n (%)	No n (%)			
Yes	199 (76.5)	61 (23.5)	2.106*	1	0.147
No	32 (66.7)	16 (33.3)			

*Chi-square test was performed, df=degree of freedom, Level of significant at p<0.05,

Chi-square test was performed to determine the association between cooking and work-related musculoskeletal disorders in the past 12 months. Injured participants who performed cooking were 199 (76.5%) and participants whom encounter work-related musculoskeletal disorder that not performed cooking were 32 (66.7%). The difference in the work-related musculoskeletal disorders between performing cooking was not statistically significant as p = 0.147. Household activities like cooking shown no correspond with work-related musculoskeletal disorders.

Table 4.5.10: Association between parental care and work-related musculoskeletal disorders in the past 12 months.

| Parental care | Work-related musculoskeletal disorders | | χ^2 | df | p-value |
	Yes n (%)	No n (%)			
Yes	108 (78.3)	30 (21.7)	1.418*	1	0.234
No	123 (72.4)	47 (27.6)			

*Chi-square test was performed, df=degree of freedom, Level of significant at p<0.05,

The correspond relationship between parental care and work-related musculoskeletal disorders in the past 12 months was determined by performing Chi-square test. Injured participants who performed parental care were 108 (78.3%) whereas injured participants who did not perform washing were 123 (72.4%). The difference in the work-related musculoskeletal disorders between performing parental care was not statistically significant as p = 0.234. Household activities like parental shown no correspond with work-related musculoskeletal disorders.

Table 4.5.11: Association between grocery shopping and work-related musculoskeletal disorders in the past 12 months.

| Grocery shopping | Work-related musculoskeletal disorders | | χ^2 | df | p-value |
	Yes n (%)	No n (%)			
Yes	44 (72.1)	17 (27.9)	0.334*	1	0.563
No	187 (75.7)	60 (24.3)			

*Chi-square test was performed, df=degree of freedom, Level of significant at p<0.05,

To determine the association between grocery shopping and work-related musculoskeletal disorders in the past 12 months, Chi-square test is used. Injured participants who performed grocery shopping were 44 (72.1%) whereas injured participants who did not perform grocery shopping were 187 (75.7%). The difference in the work-related musculoskeletal disorders between performing washing was not statistically significant as p = 0.451. Household activities like grocery shopping shown no correspond with work-related musculoskeletal disorders among housewives.

Table 4.5.12: Association between domestic help and work-related musculoskeletal disorders in the past 12 months.

| Domestic help | Work-related musculoskeletal disorders | | χ^2 | df | p-value |
	Yes n (%)	No n (%)			
Yes	41 (80.4)	10 (19.6)	0.948*	1	0.330
No	190 (73.9)	67(26.1)			

*Chi-square test was performed, df=degree of freedom, Level of significant at p<0.05,

The correspond relationship between domestic help and work-related musculoskeletal disorders in the past 12 months was determined by using Chi-square test. Injured participants who having domestic help were 41 (80.4%) whereas injured participants who did not have any domestic help were 190 (73.9%). There was significant difference in the work-related musculoskeletal disorders with domestic help (p = 0.330). The finding shows that domestic help did not corresponded with work-related musculoskeletal disorders among housewives.

Table 4.5.13: Association between exercise and work-related musculoskeletal disorders in the past 12 months.

| Exercise | Work-related musculoskeletal disorders | | χ^2 | df | p-value |
	Yes n (%)	No n (%)			
Yes	216 (78.3)	60 (21.7)	15.065*	1	<0.001
No	15 (46.9)	17 (53.1)			

*Chi-square test was performed, df=degree of freedom, Level of significant at p<0.05,

    To investigate the relationship between exercise and work-related musculoskeletal disorders in the past 12 months, Chi-square test was performed. Injured participants who did perform exercise were 216 (78.3%) whereas injured participants who did not perform any exercise were 15 (46.9%). The difference in the work-related musculoskeletal disorders between exercise was statistically significant as p <0.001. It shows that performing exercise was corresponded with work-related musculoskeletal disorders among housewives.

Table 4.5.14: Association between duration exercise and work-related musculoskeletal disorders in the past 12 months.

| Duration of exercise | Work-related disorders | musculoskeletal | χ^2 | df | p-value |
	Yes n (%)	No n (%)			
Less than 30 minutes	45 (80.4)	11 (19.6)	16.833*	3	0.002
30 minutes to 1 hour	151 (79.5)	40 (20.5)			
More than 1 hour	20 (69.0)	9 (31.0)			

*Chi-square test was performed, df=degree of freedom, Level of significant at p<0.05,

    The relationship between duration of exercise and work-related musculoskeletal disorders in the past 12 months was determined by using Chi-square test. Injured participants who did perform exercise less than 30 minutes were 75 (80.4%). There were 151 participants (79.5%) perform exercise for 30 minutes to 1 hour had work-related musculoskeletal disorders. Whereas injured participants who perform any exercise more than 1 hour were 20 (69.0%). There was an association between duration exercise and work-related musculoskeletal disorders among housewives. As there was significant difference in the work-related musculoskeletal disorders between exercise (p = 0.002).

Table 4.5.15: Association between stress level and work-related musculoskeletal disorders in the past 12 months.

| Stress level | Work-related disorders | musculoskeletal | χ^2 | df | p-value |
	Yes n (%)	No n (%)			
Low stress	62 (68.1)	29 (31.9)	3.249*	1	0.071
Moderate stress	169 (77.9)	48 (22.1)			

*Chi-square test was performed, df=degree of freedom, Level of significant at p<0.05,

    The relationship between stress level and work-related musculoskeletal disorders in the past 12 months was determined by Chi-square test. Most of the participants having moderate stress were 169 (77.9%) whereas injured participants whom having low stress were 62 (68.1%). There was no statistically difference between work-related musculoskeletal disorders and exercise (p = 0.071). Thus, it shows no correspond between stress level and work-related musculoskeletal disorders.

V.   DISCUSSION

5.1 Prevalence and characteristic of work-related musculoskeletal disorders

This is the first study of prevalence and risk factors of work-related musculoskeletal disorders among housewives in Selangor, Malaysia. The results of the study show that the prevalence of work-related musculoskeletal disorders among housewives was 75.0%. The prevalence of work-related musculoskeletal disorders in Malaysia is comparatively higher than the work-related musculoskeletal disorders rate was 40.9% in North India (Mishra et al., 2017). In contrary, Kalra & Bhatnagar (2017) indicated a higher prevalence which was 100% of housewife were affected by musculoskeletal disorders in Delhi and Noida of India. The contradictory of the result of studies might due to different environment, lifestyle, cultural and types of household activities which alter the present result.

In Malaysia, comparison of work-related musculoskeletal disorders between occupations can be done. A study of work-related musculoskeletal disorders among female non-healthcare working population in Selangor shown quite a similar rate (77.3%) compare to housewives in Selangor (Balakrishnan et al., 2016). Another study in 2004 showing higher prevalence rate (83.4%) of musculoskeletal problems among women assembly workers in the semiconductor industry (Chee & Rampal, 2004). This suggested that housewives having a similar probability of getting work-related musculoskeletal disorders as other occupations. Thus, awareness and treatment of work-related musculoskeletal disorders among housewives in Malaysia should be highly emphasized.

In the past 12 months, the main reported region of work-related musculoskeletal disorders was lower extremity, followed by axial region and upper extremity. The lower extremities including hip/ thigh, knee and feet/ ankle. The axial region including neck, upper back and lower back. The upper extremities including shoulder (left, right and both), elbow (left, right and both) and wrist/ hand (left, right and both). Overall, the most frequently injured body region of work-related musculoskeletal disorders among housewives in the past 12 months was lower back, followed by knee, feet/ ankle, neck, right of wrist/ hand, right shoulder, both of shoulder, upper back, hip/ thigh, right elbow, left shoulder, both of wrist/ hand, both of elbow and left elbow.

Since previous studies from other country were targeting among housewives, it is comparable to the past studies by Kalra & Bhatnagar (2017), Mishra, Srivastava and Srivastava (2015), Habib & Rahman (2015) and Fazli et al. (2014) and Golam Kibria (2012). Kalra & Bhatnagar (2017) found that the most frequently injured body region was lower back as similar as this study found. From the study by Mishra et al. (2015), the most common site for musculoskeletal disorders was found to be feet/ ankle among housewives. However, study from Habib & Rahman (2015) indicated that feet/ ankle was the least body region that encounters work-related musculoskeletal disorders. Habib and Rahman suggested that upper back was the most frequently affected body region causing work-related musculoskeletal disorders. In 2014, Fazli et al. (2014) conducted a study to determine the prevalence of musculoskeletal disorders among housewives. The result of the study indicated that back region was to be found as the highest prevalence of work-related musculoskeletal disorders among housewives. Golam Kibria (2012) also identified that 46% of respondents reported experiencing lower back pain.

As this study suggested that lower back was the most frequent region that caused work-related musculoskeletal disorders among housewives. There were previous studies specifically focus on investigating the prevalence of work-related musculoskeletal disorders among housewives in lower back region. Study of Gupta & Nandini (2015) suggested that there were 83% of respondents reported have low back pain. The study also show that more than 50% of housewives have severe disability due to low back pain. However, another study by Ranasinghe et al. (2016) indicated that the prevalence of household work-related musculoskeletal disorders in low back region among housewives was 36%. This antithetical result may be because of the different body parts of work-related musculoskeletal disorders caused by different types of household activities done.

From the result of this study, all of the participants that have work-related musculoskeletal disorders in the past 12 months were full-time housewife. The duration of participants being of housewife was more than 1 year. In the study of Habib & Rahman (2015), the population studied were women who engaging in regular household activities at a rural village of Bangladesh. Authors did not specify women who are full-time housewife or part-time housewife. This might alter the result of study due to external factor of being a part-time housewife. For example, a part-time housewife might be having other works that cause work-related musculoskeletal disorders. Specific inclusion criteria must be stated to ensure population were full-time housewife. So that, the data and information analyzed will be significant as housewife related musculoskeletal disorders.

Most of the participants who encounter work-related musculoskeletal disorders sought of medical treatment to solve their problems. However, there was only 4.9% of participants seek for physiotherapy treatment to reduce their musculoskeletal problems. The result was comparative low compared to the study of Golam Kibria (2012). In the study of Golam Kibria (2012), among the participants 21% of them have taken physiotherapy treatment for their work-related musculoskeletal disorders. Moreover, the prognosis of physiotherapy treatment was 100% good for them. The acknowledgement of physiotherapy treatment to housewives in Malaysia should be increased. As proven in study of Golam Kibria (2012), physiotherapy treatment had provided a good prognosis to work-related musculoskeletal disorders among housewives.

In the current study, authors found 75% of prevalence of work-related musculoskeletal disorders among housewives in Selangor, Malaysia. The most common site of work-related musculoskeletal disorder among housewives in the past 12 months was lower back, knee and foot/ ankle region. The common site that prevented their normal work during the past 12 months was shoulder, knee and neck region.

5.2 Risk Factors of Work-related Musculoskeletal Disorders

There were numerous potential risk factors that caused work-related musculoskeletal disorders among housewives. Those risk factors were the tasks that might increases the likelihood of developing work-related musculoskeletal disorders among housewives. The main risk factors can be categorized into individual factors, psychosocial factors and physical factors.

Regarding the individual factors study in this study, there were age, ethnicity, highest level of education attained and the number of children. Height and weight of participants did not study in this study due to those factors are proven by the study of Sallehuddin et al. (2018). This study was conducted among housewives in Malaysia. The authors had suggested that overweight and obese housewives considered as a high-risk group for getting musculoskeletal pain. Another study by Mishra et al. (2015) also indicated that overweight or obese puts extra weight on muscles which caused musculoskeletal disorders. Thus, overweight and obese housewives which perform household activities might raise the chance of getting work-related musculoskeletal disorders.

For age factor, there was a significant association between age and work-related musculoskeletal disorders among housewives in Selangor, Malaysia. The age range which has the highest number of participants of getting work-related musculoskeletal disorders was 41 to 45 years. For my point of view, there are reduce of muscle mass and bone density by aging and with multiple household activities will increase the fatigue rate of muscle which leads to work-related musculoskeletal disorders. This was supported by Sallehuddin et al. (2018) that older obese housewife had higher risk of getting musculoskeletal disorders compared to a young obese housewife. The finding of Mishra et al. (2015) also supported that age was the risk factor of musculoskeletal pain. The authors targeted homemakers who aged between 26 to 65 years. Another study by Fazli et al. (2014) also targeted housewives who aged between 20 to 65 years and suggested that the prevalence of pain and disorders increase with the increasing of age. However, in the current study, the targeted population of housewives in Selangor, Malaysia was between 18 to 50 years only. This is because to prevent any others data collection of work-related musculoskeletal disorders that caused by menopause. As hormonal change during menopause will increase the causes of musculoskeletal disorders. There was study suggested that women who experienced postmenopausal are having a higher prevalence of getting musculoskeletal symptoms compared to premenopausal women (Gao et al., 2013). Thus, the age limit of this study was 50 years due to the average age of menopause in Malaysia was 50.7 years (Abdullah et al., 2017).

In the current study, the difference in the work-related musculoskeletal disorders between ethnicity was not statistically significant. This is due to more Chinese participants were taking part in current study. Thus, the finding result might be altered. There was few study determine the association between ethnicity and work-related musculoskeletal disorders. In 2012, Dham et al. conducted a study to describe the relationship between work-related musculoskeletal disorders and ethnicity in different parts of the world. The authors suggested that the burden of work-related musculoskeletal disorders is likely to vary in different parts of the world. They also indicated that disease health process in cultural and is influenced by socioeconomic factors. Thus, there is no specific relationship between ethnicity and work-related musculoskeletal disorders among housewives. However, more studies are needed to evaluate the risk of work-related musculoskeletal disorders among different ethnicities in the nation.

Notably, there was no association between the education level that obtained and work-related musculoskeletal disorders. This might due to high technology nowadays, a person with high or low education level is able to browse internet and search information for their particular work-related musculoskeletal disorders. This result differed from the study by Fazli et al. (2014) that low education level increases the prevalence of work-related musculoskeletal disorders. In contradictory, the author suggested that subjects who have a high educational degree have got more information about ergonomic issues and keeping body in proper posture from different sources compare to subjects who have low educational level. Regarding this factor, further research should be carried out so that the result would be valuable in assessing the relationship between education level that obtained and work-related musculoskeletal disorders.

The difference between the work-related musculoskeletal disorders in the past 12 months and number of children was not statistically significant. Current study showed no association between number of children and work-related musculoskeletal disorders among housewives. There are several factors that alter the result like the age range of participants in current study and the age of their children. As in the majority of age range within 41 to 45 years, their number of children probably will not show much effect on their work-related musculoskeletal disorders. Whereas, the age of their children will more effect to their work-related musculoskeletal disorders as younger children needs more care like carrying children around. However, several studies had revealed otherwise. A study that conducted among 296 housewives found that women with children have higher chances to develop work-related musculoskeletal disorders around neck and shoulder region compare to single women with no children. This is also supported by Fazli et al. (2014) that work-related musculoskeletal disorders is associated with the number of children among housewives. Further studies should be done to investigate the association between the number of children and specific age group of housewives.

Regarding the duration in performing household activities, there shown an association with work-related musculoskeletal disorders. The percentage of getting work-related musculoskeletal disorders increased with the increasing of duration of household activities. As prolonged period of repetitive movement of household activities will increase the muscle fatigue and also increase the physical stress to body parts. The highest frequency of getting work-related musculoskeletal disorders was 3 to 4 hours of household activities each day. Based on this duration, there was a study specifically conducted among women that involved in household activities for at least 5 hours a day. Habib & Rahman (2015) found that among them, the prevalence rate of musculoskeletal pain was considerably high (68.49%). Ranasinghe et al. (2016) indicated that 36% of housewives had household related musculoskeletal disorders in low back region were participated themselves for at least of 4 hours of household activities for 5 days in a week. From reviewing the literature of study of Kalra & Bhatnagar (2017), increased hours of household activities at home was the finding of risk factor caused work-related musculoskeletal disorders. Prolonged duration of household activities with an insufficient resting period was the risk factor of work-related musculoskeletal disorders.

For the types of household activities that performed among housewives, there shown no direct association with work-related musculoskeletal disorders. This might due to the single factors of types of household activities does not directly cause work-related musculoskeletal disorders. Whereas, with the combination of individual factors, duration of work and physical stress obtained by household activities will cause work-related musculoskeletal disorders. Previous studies from Kalra & Bhatnagar (2017) and Dhone & Khare (2017) supported that reason of getting work-related musculoskeletal disorders could be biomechanical features of household like cleaning at home and cooking. In relation to washing, Dhone and Khare (2017) proposed that ergonomic and work-related musculoskeletal disorder among housewives was greatly determined by the type of activities which housewives performed. In order to focus on work-related musculoskeletal disorders in low back region, Ranasinghe et al. (2016) advocated that majority housewives that had work-related musculoskeletal disorders were performing multiple of household activities which conceptualized with physical exposures which related to. Even it has shown no direct relationship of types of household activities and work-related musculoskeletal disorders in this study, there were alternative studies shown contradictory among them. Thus, further study should proceed to justify the relationship between types of household activities and work-related musculoskeletal disorders.

The difference in the work-related musculoskeletal disorders between exercise was statistically significant. There was a negative correlation shown between both variables. This means that the increasing of performing exercise will reduce the work-related musculoskeletal disorders. 78% of participants that are did not encounter work-related musculoskeletal disorders claimed that they did perform exercise. However, 93.5% of them have work-related musculoskeletal disorders also claimed that they did perform exercise. Half of the participants did walked as their exercise activity. Yet, walking shows highest percentage of participants encounter work-related musculoskeletal disorders. The intensity of walking is not clearly stated by the participants, thus the intensity of exercise is the factors that affect the effectiveness of work-related musculoskeletal disorders. This might explain the contradictory of participants that performed exercise still getting work-related musculoskeletal disorders. A literature reviewed from Gasibat et al. (2017) suggested that there was no complete interpretation shows work-related musculoskeletal disorders can be prevented from performing stretching during work. Nonetheless, Freitas-Swerts & Robazzi (2014) that there was a statistically significant of in reducing pain of body parts with exercise program. There were some studies indicated that discomfort and pain of musculoskeletal disorders can be reduced by performing stretching exercises during working time. Further studies might needed to clearly clarify the importance of exercises to work-related musculoskeletal disorders.

In current study, the duration of exercise is associated with work-related musculoskeletal disorders. It showed a negative correlation which means that the increased of duration of exercise will dwindle the work-related musculoskeletal disorders. This is due to increasing duration of exercise did increase the flexibility, strength and mass of muscle. Muscle and bones which are strong enough will reduce the risk of work-related musculoskeletal disorders. The finding of Rodrigues et al. (2014) supported that exercised with high intensity, three times a week for 20 minutes could reduce work-related musculoskeletal pain in workers. However, previous studies were not emphasized about the relationship between exercise and its duration to work-related musculoskeletal disorders among housewives.

On regard to psychosocial factor, it was shown no association between stress level and work-related musculoskeletal disorders. The result might due to less psychosocial effect toward work-related musculoskeletal disorders among housewives. The stress caused by psychological workloads is not severe enough to cause tension of muscle that leads to work-related musculoskeletal disorders. Furthermore, housewives who having low or moderate stress have their own method to release their stress that will not further leads to work-related musculoskeletal disorders. A study of psychosocial factors on work-related musculoskeletal disorders among Southeastern Asian female workers in Korea was also unsuccessful to confirm the relationship between psychosocial factors and workloads (Lee et al., 2011). In contrast, a cross-sectional study among nurses provided an indication of the relationship between work environment stress levels and musculoskeletal disorders (Dehdashti et al., 2017). The result was in agreement of previous literature suggesting that role related stress are highly frequent in a variety of occupations. Oluedele (2015) also shows among office worker, stress level having a great potential in causing pain in different parts of the body. In fact, high stress level of workers have corresponded with pain in different parts of body of participants and musculoskeletal disorders. A more precise method should be carry out in further study to investigate the relationship between stress level and work-related musculoskeletal disorders.

In current study, the association between types of household activities and different parts of body that encounter work-related musculoskeletal disorders was determined. There was no previous research study about the association between them. However, a study of Bihari et al. (2013) had determined the routine activities of housewives and the possible physical stress. With the same method, the possible physical stress of household activities among housewives had determined. Sweeping included the involvement of hands and bending of trunk together with whole body muscular movement while standing. Mopping involved more force of hands and bending of trunk together with whole body muscular movement while standing. Washing involved of hands, arms and back muscles for washing clothes. Cooking required the involvement of bending and stretching of arm for cooking and leg muscles for prolonged standing. Whereas, grocery shopping required the involvement of upper limbs which requires more force and increase load of trunk. Parental care which included the involvement of shoulder and trunk which requires a lot of muscular movement. With the possible physical stress, it is able to explain the relationship of the different types of household activities and body parts that encounter work-related musculoskeletal disorders.

For neck region of work-related musculoskeletal disorders, the most household activities done was cooking. Sweeping and mopping were also frequently done by housewives which had neck work-related musculoskeletal disorders. Cooking, sweeping and mopping that required awkward position of neck to bend for a period will caused neck pain. Besides these three types of household activities that might cause neck work-related musculoskeletal disorders, washing was also suggested by Habib & Rahman (2015). The authors reported necks remained bent more than 45 degrees and those movements were repetitive while performing sweeping, cooking

and washing clothes. Mishra et al. (2015) indicated that women with children tend to develop neck problem due to a long period of parental care. Household activities like sweeping, mopping, washing, cooking and parental care were involved in the neck work-related musculoskeletal disorders.

The most frequent household activity performed by housewives which involved in right, left and both shoulder work-related musculoskeletal disorders was cooking. Since cooking involved repetitive movement of bending and stretching of arm for a prolonged period. This supported by a study of Dhone and Khare (2017) that pulling and pushing while cooking will be caused shoulder pain. For pulling and pushing of arm during household activity, sweeping and mopping fulfil the criteria. Current study also showed that sweeping and mopping were the more frequently performed household activities after cooking. Fong & Law (2008) also suggested that grocery shopping will cause shoulder pain due to heavy lifting of loads. For shoulder work-related musculoskeletal disorders, the involvement of household activities was sweeping, mopping, cooking and grocery shopping.

Regarding the part of elbow work-related musculoskeletal disorders, the overall most frequent household activity did by housewives were sweeping and cooking. This is due to repetitive movement of bending and stretching of elbow while they performing those household activities. Habib & Rahman (2015) investigated that household activities like cooking, washing and sweeping consisted of repetitive elbow movement. Coffin (2013) supported that repetitive movement of work will cause work-related musculoskeletal disorders. Sweeping, cooking and washing that regularly performed by housewives were highly caused of elbow work-related musculoskeletal disorders.

For wrist/ hand work-related musculoskeletal disorders, cooking was the most frequently performed household activity among housewives. Habib & Rahman (2015) also suggested that cooking for more than 6 hours per day was associated with work-related musculoskeletal disorders in wrist region. However, sweeping was also found in current study and study of Habib & Rahman. As wrist/ hand region is mostly used for any activities of daily living among anyone, housewives who perform household activities daily will reduce the resting period of their wrist/ hand. Based on a journal from European Agency for Safety and Health at work, household activities with insufficient rest period is a kind of risk factor that can cause leading of getting work-related musculoskeletal disorders. Cooking and sweeping can considerable as the household activities that boosting up the hazard of wrist/ hand work-related musculoskeletal disorders.

There was only few studies determine the relationship between household activities and upper back work-related musculoskeletal disorders. In 2008, Fong & Law suggested that there was an association between upper back pain and shopping. Authors claimed that repetitive carrying of heavy loads will affect both upper back and shoulder. However, in current study cooking was the most frequently done household activity among upper back pain housewives. This might due to awkward posture of bending their trunk when they performed cooking. Further study can be done to clarify the effect of household activities on upper back work-related musculoskeletal disorders.

Regarding the most frequently injured body part, lower back work-related musculoskeletal disorders, there were several studies could be compared to current study. In the current study, the most frequent household activity done was cooking. While performing cooking, they always in awkward posture of bending their trunk. Habib & Rahman (2015) also supported that cooking which involved awkward posture of back bent forward more than 45 degrees will cause lower back pain. The authors further suggested that washing and sweeping will place housewives in an awkward posture. Working in awkward postures is one of the physical factors that associated with work-related musculoskeletal pain (Habib et al., 2015). Another study by Kalra & Bhatnagar (2017) indicated that parental care like heavy lifting of children whom over 10kg correlated with low back disorders. Thus, the combination of suggestion in current and previous study shows that sweeping, washing and cooking having a higher chance to cause upper back work-related musculoskeletal disorders.

For hip/ thigh work-related musculoskeletal disorders, current study shows that sweeping was the most frequent household activity performed among hip/ thigh injury housewives. This might due to prolonged awkward posture of bending while sweeping. Another reason will be caused by radiating from the lower back pain. There were only study of Fong & Law (2008) investigated that self-perceived hip/ thigh pain was more likely occur when performing washing. Authors also show there was an association between hip/ thigh work-related musculoskeletal disorders and washing utensils. Since there was contradictory of findings, further study on types of household activities and hip/ thigh work-related musculoskeletal disorders should be carried out.

Regarding knee work-related musculoskeletal disorders, current study shows cooking was the most frequent performed household activity. However, study of Habib & Rahman (2015) suggested that household activity which required squatting position like cooking on ground level burner will cause knee WMSDs increase the risk of knee injury. Awkward posture like squatting for prolonged period is known to be risk factor for knee disorders suggested by Ditchen et al. (2014). However, ergonomics design for stove level nowadays is rarely at ground level. Thus, knee work-related musculoskeletal disorders in current study might due to other factors like aging. Any types of household activities which required squatting should be precisely further investigate to determine the association of knee work-related musculoskeletal disorders.

According to the feet/ ankle work-related musculoskeletal disorders, mopping and sweeping were found that more performed among housewives compare to other types of household activities. Mopping and sweeping required prolonged period of standing which might cause feet/ ankle work-related musculoskeletal disorders. Study of Adbus et al. (2016) supported that prolonged standing can cause sore feet and swelling of the legs. However, further study should be done to more investigate the effect of household activities towards feet/ ankle musculoskeletal disorders.

In the current study, there was some potential risk factor like individual and physical factor corresponded with work-related musculoskeletal disorders among housewives. Individual factor like age, duration of household activities, exercise and duration of

exercise were related to work-related musculoskeletal disorders among housewives. Physical factors like repetitive movement, awkward posture, heavy lifting and prolonged activity with insufficient of rest period were related to work-related musculoskeletal disorders among housewives. However, psychosocial factor like stress level among housewives was failed to confirm its relationship with work-related musculoskeletal disorders. Furthermore, there shown that there was no significant association in work-related musculoskeletal disorders regarding ethnicity, education level obtained, number of children, types of household activities and domestic help.

5.3 Limitations

There were several limitations in this study. In methodology, author used convenience sampling method. While recruiting the participants, the sampling method used might consisting of sample bias. Thus, the biased results might not be truly represented the whole population. In additional, the author did not reached the sample size of 368 participants in this study.

The study was limited to the area of Selangor only. As the findings of study may not generalized to all the housewives in Malaysia.

There was duration limitation on this study. Author had time limitation on recruiting 368 participants to take part in this study. There was only 4 weeks to recruit the total number of participants.

5.4 Recommendations

In future studies, a larger sample size is recommended in order to achieve more accurate and precise result of the prevalence and risk factors of work-related musculoskeletal disorders among housewives. The generalizability of the study can be increased by using random sampling method among those targeted population.

Future studies can also investigate more detailed information toward household activities. For example, the duration of each kind of household activities that performed, duration of perform household activities in a week and duration of getting rest from household activities.

Those potential risk factors that are not proven their association with work-related musculoskeletal disorder in current study can be further determined in further study. A better method should be used to investigate those risk factors with work-related musculoskeletal disorders.

A more precise method can used to determine the stress level among housewives. As perceived stress scale obtained only ten questions to investigate the stress level of housewives. A more detailed questionnaire should be used to determine stress level and associated with work-related musculoskeletal disorders.

The setting of study should equally include all the state of Malaysia, so that the result can be generalised to the whole population of housewives in Malaysia.

To resolve the problem of time limitation on this study, the duration of data collection should be slightly increase to a long period. This is in order to have enough time to recruit the total number of sample size for the study.

VI.   CONCLUSIONS

The prevalence of work-related musculoskeletal disorders among housewives is as high compared to other occupations. Therefore, awareness and medical attention for housewives regarding work-related musculoskeletal disorders must be highly concerned and emphasized. The potential risk factor associated with work-related musculoskeletal disorders were age, height, weight, duration spending on household activities, exercise and duration of performing exercise. While these potential risk factors are found to be associated, further investigation into finding the causal relationships is required. The potential risk factors should be highly avoided to scale down the risk of work-related musculoskeletal disorders. Housewives that performed several household activities is necessary to be disseminate the awareness to perform with sufficient rest period and avoid those possible risk factors which might impact any injury of body parts. By reducing the work-related musculoskeletal disorders, housewives can enjoy their healthy life without any discomfort with their family.

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AUTHORS

First Author – Swapneela Jacob, Lecturer, Faculty of Medicine and Health Sciences, Department of Physiotherapy, Universiti Tunku Abdul Rahman, Malaysia.

Second Author – Choong Bei Ying, Year III Bachelor of Physiotherapy (Hons) Student, Faculty of Medicine and Health Sciences, Department of Physiotherapy, Universiti Tunku Abdul Rahman, Malaysia.

APPENDIX D

Questionnaire

(English Version)

Prevalence and Risk Factor of Work-related Musculoskeletal Disorders among Housewives
Questionnaire

Please put tick (√) in the given boxes.

Part- A: Socio-demographic information.

Name: _____

1. Age:
   ☐ 18-24 years
   ☐ 25-30 years
   ☐ 31-35 years
   ☐ 36-40 years
   ☐ 41-45 years
   ☐ 46-50 years

2. Ethnicity:
   ☐ Malay
   ☐ Chinese
   ☐ Indian
   ☐ Others: _____

3. Educational status:
   ☐ Primary education
   ☐ Secondary education
   ☐ Tertiary education
   ☐ Others:_____

4. Please tick the suitable option:
- ☐ Housewife   → Proceed to Question 5
- ☐ Working woman   → End of question

5. Duration of being housewife:
- ☐ Less than 1 year
- ☐ More than 1 year

6. Number of children: _____

Part-B: Risk identification.

1. On an average, how many hours you work on household activities every day?
- ☐ Less than 1 hour
- ☐ 1-2 hours
- ☐ 3-4 hours
- ☐ 5-6 hours
- ☐ 7-8 hours
- ☐ More than 7 hours

2. What types of work you are doing during household activities?
(You can select more than one option.)
- ☐ Sweeping
- ☐ Mopping
- ☐ Washing
- ☐ Cooking
- ☐ Parental care
- ☐ Grocery shopping
- ☐ Other: (please specify)_____

3. Do you have any domestic help?
- ☐ Yes
- ☐ No (Skip question 6)

4. What type work that domestic work helps you?
(You can select more than one option.)
- ☐ Sweeping
- ☐ Mopping
- ☐ Washing

☐ Cooking

☐ Parental care

☐ Grocery shopping

☐ Other: (please specify)_____

5. Do you exercise?

☐ Yes

☐ No (Skip question 8 & 9)

6. What kind of exercise do you do?
(You can select more than one option.)

☐ Walking

☐ Jogging

☐ Swimming

☐ Cycling

☐ Yoga

☐ Other: (please specify) _____

7. How long do you perform the exercise?

☐ Less than 30 minutes

☐ 30 minutes to 1 hour

☐ More than 1 hour

8. Have you taken any medical treatment for household related
musculoskeletal problems?

☐ Yes

☐ No

9. Have you taken any physiotherapy treatment for household related
musculoskeletal problems?

☐ Yes

☐ No

Perceived Stress Scale

The questions in this scale ask you about your feelings and thoughts during the last month. In each case, you will be asked to indicate by circling how often you felt or thought a certain way.

	Never	Almost Never	Sometimes	Fairly Often	Very Often
1. In the last month, how often have you been upset because of something that happened unexpectedly?	0	1	2	3	4
2. In the last month, how often have you felt that you were unable to control the important things in your life?	0	1	2	3	4
3. In the last month, how often have you felt nervous and "stressed"?	0	1	2	3	4
4. In the last month, how often have you felt confident about your ability to handle your personal problems?	0	1	2	3	4
5. In the last month, how often have you felt that things were going your way?	0	1	2	3	4
6. In the last month, how often have you found that you could not cope with all the things that you had to do?	0	1	2	3	4
7. In the last month, how often have you been able to control irritations in your life?	0	1	2	3	4
8. In the last month, how often have you felt that you were on top of things?	0	1	2	3	4
9. In the last month, how often have you been angered because of things that were outside of your control?	0	1	2	3	4
10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?	0	1	2	3	4

Part-C: Site of disorder.

1. Do you have any pain or discomfort?

   ☐ Yes

   ☐ No (Skip question 2)

2. The table below relates to musculoskeletal symptoms questions.   Nordic Questionnaire
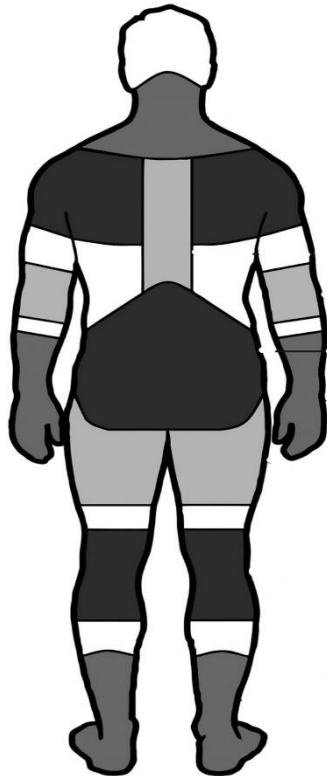
Site	Have you at any time during the last 12 months had trouble (ache, pain, discomfort, numbness) in :	Have you had any time during the last 12 months been prevented from doing your normal work (at home or away from home) because of the trouble?	Have you had trouble at any time during the last 7 days?
Neck	☐ No ☐Yes	☐ No ☐Yes	☐ No ☐Yes
Shoulder	☐ No ☐ Yes, side: (left/ right/ both)	☐ No ☐Yes	☐ No ☐Yes
Elbow	☐ No ☐ Yes, side: (left/ right/ both)	☐ No ☐Yes	☐ No ☐Yes
Wrist/Hand	☐ No ☐ Yes, side: (left/ right/ both)	☐ No ☐Yes	☐ No ☐Yes
Upper back	☐ No ☐Yes	☐ No ☐Yes	☐ No ☐Yes
Lower back	☐ No ☐Yes	☐ No ☐Yes	☐ No ☐Yes
Hip/Thigh	☐ No ☐Yes	☐ No ☐Yes	☐ No ☐Yes
Knee	☐ No ☐Yes	☐ No ☐Yes	☐ No ☐Yes
Foot/Ankle	☐ No ☐Yes	☐ No ☐Yes	☐ No ☐Yes

APPENDIX F

Online Questionnaire

12/9/2015   Prevalence and Risk Factors of Work Related Musculoskeletal Disorders among Housewives

Prevalence and Risk Factors of Work Related Musculoskeletal Disorders among Housewives
* Required

1. You are invited to participate in a research titled "Prevalence and risk factors of work-related musculoskeletal disorders among housewife". This study is being conducted by Choong Bei Ying, a student from Department of Physiotherapy, Faculty of Medicine and Health Sciences from Universiti Tunku Abdul Rahman. The purpose of this study is to investigate the prevalence and risk factor of work-related musculoskeletal disorders among housewives. The information gathered during this study will remain confidential in secure premises during this project. There are no risks or discomfort that are anticipated from your participation in the study. Participation in this study is voluntary. You have the right not to participate at all or to leave the study at any time. This questionnaire takes approximately 5 minutes to complete. If you have any question regarding this study, please don't feel hesitate to contact me. Choong Bei Ying (019-4723195 / bei_1128@hotmail.com). If you have understood and agree with the statement above and wish to participate in this survey, please select Agree. Your participation is appreciated. *
Mark only one oval.

⬭ Agree

⬭ Not Agree

2. Name *

_____

3. Date

_____
Example: December 15, 2012

Socio-demographic information

4. 1. Age
Mark only one oval.

⬭ 18-24 years

⬭ 25-30 years

⬭ 31-35 years

⬭ 36-40 years

⬭ 41-45 years

⬭ 46-50 years

5. 2. Ethnicity
Mark only one oval.

⬭ Malay

⬭ Chinese

⬭ Indian

⬭ Other: _____

https://docs.google.com/forms/d/1RwszR4zLREJXkl0kl-WOlkk8ZbzR3nE4SRtAg0NK7WDledit

6. 3. Educational status
Mark only one oval.

◯ Primary education

◯ Secondary education

◯ Tertiary education

◯ Other: _____

7. 4. Please choose the suitable option:
Mark only one oval.

◯ Housewife

◯ Working women (Skip question 5)

8. 5. Duration of being housewife:
Mark only one oval.

◯ Less than 1 year

◯ More than 1 year

9. 6. Number of children

_____

Risk identification.

10. 1. On an average, how many hours you work on household activities every day?
Mark only one oval.

◯ Less than 1 hour

◯ 1-2 hours

◯ 3-4 hours

◯ 5-6 hours

◯ 7-8 hours

◯ More than 8 hours

11. 2. What types of work you are doing during household activities? (You can select more than one option.)
Check all that apply.

☐ Sweeping

☐ Mopping

☐ Washing

☐ Cooking

☐ Parental care

☐ Grocery shopping

☐ Other: _____

12. 3. Do you have any domestic help?
Mark only one oval.

◯ Yes

◯ No

13. 4. What type work that domestic work helps you? (You can select more than one option.)
Check all that apply.

☐ Sweeping

☐ Mopping

☐ Washing

☐ Cooking

☐ Parental care

☐ Grocery shopping

☐ Other: _____

14. 5. Do you exercise regularly?
Mark only one oval.

◯ Yes

◯ No

15. 6. What kind of exercise? (You can select more than one option.)
Check all that apply.

☐ Walking

☐ Jogging

☐ Swimming

☐ Cycling

☐ Yoga

☐ Other: _____

16. 7. How long do you perform the exercise?
Mark only one oval.

◯ Less than 30 minutes

◯ 30 minutes to 1 hour

◯ More than 1 hour

17. 8. Have you taken any medical treatment for household related musculoskeletal problems?
Mark only one oval.

◯ Yes

◯ No

18. 9. Have you taken any physiotherapy treatment for household related musculoskeletal problems?

Mark only one oval.

◯ Yes

◯ No

Perceived Stress Scale

The questions in this scale ask you about your feelings and thoughts during the last month. In each case, you will be asked to indicate by circling how often you felt or thought a certain way.

19. 1. In the last month, how often have you been upset because of something that happened unexpectedly?

Mark only one oval.

	0	1	2	3	4	
Never	◯	◯	◯	◯	◯	Very Often

20. 2. In the last month, how often have you felt that you were unable to control the important things in your life?

Mark only one oval.

	0	1	2	3	4	
Never	◯	◯	◯	◯	◯	Very Often

21. 3. In the last month, how often have you felt nervous and "stressed"?

Mark only one oval.

	0	1	2	3	4	
Never	◯	◯	◯	◯	◯	Very Often

22. 4. In the last month, how often have you felt confident about your ability to handle your personal problems?

Mark only one oval.

	0	1	2	3	4	
Never	◯	◯	◯	◯	◯	Very Often

23. 5. In the last month, how often have you felt that things were going your way?

Mark only one oval.

	0	1	2	3	4	
Never	◯	◯	◯	◯	◯	Very Often

24. 6. In the last month, how often have you found that you could not cope with all the things that you had to do?

Mark only one oval.

	0	1	2	3	4	
Never	◯	◯	◯	◯	◯	Very Often

25. 7. In the last month, how often have you been able to control irritations in your life?

Mark only one oval.

	0	1	2	3	4	
Never	◯	◯	◯	◯	◯	Very Often

26. 8. In the last month, how often have you felt that you were on top of things?

Mark only one oval.

	0	1	2	3	4	
Never	◯	◯	◯	◯	◯	Very Often

27. 9. In the last month, how often have you been angered because of things that were outside of your control?

Mark only one oval.

	0	1	2	3	4	
Never	◯	◯	◯	◯	◯	Very Often

28. 10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?

Mark only one oval.

	0	1	2	3	4	
Never	◯	◯	◯	◯	◯	Very Often

Site of disorder

29. 1. Do you have any pain or discomfort?

Mark only one oval.

◯ Yes
◯ No

30. 2. Have you at any time during the last 12 months had trouble (ache, pain, discomfort, numbness) *

Mark only one oval.

◯ Yes
◯ No

31. 3. Which area of body? (You can select more than one option.)

Check all that apply.

- [ ] Neck
- [ ] Shoulder (Left)
- [ ] Shoulder (Right)
- [ ] Shoulder (Both)
- [ ] Elbow (Left)
- [ ] Elbow (Right)
- [ ] Elbow (Both)
- [ ] Wrist/Hand (Left)
- [ ] Wrist/Hand (Right)
- [ ] Wrist/Hand (Both)
- [ ] Upper back
- [ ] Lower back
- [ ] Hip/Thigh
- [ ] Knee
- [ ] Foot/Ankle

32. 4. Have you had any time during the last 12 months been prevented from doing your normal work (at home or away from home) because of the trouble?

Mark only one oval.

- ( ) Yes
- ( ) No

33. 5. Which area of body? (You can select more than one option.)

Check all that apply.

- [ ] Neck
- [ ] Shoulder
- [ ] Elbow
- [ ] Wrist/Hand
- [ ] Upper back
- [ ] Lower back
- [ ] Hip/Thigh
- [ ] Knee
- [ ] Foot/Ankle

34. 6. Have you had trouble at any time during the last 7 days?

Mark only one oval.

- ( ) Yes
- ( ) No

35. 7. Which area of body? (You can select more than one option.)

Check all that apply.

- [ ] Neck
- [ ] Shoulder
- [ ] Elbow
- [ ] Wrist/Hand
- [ ] Upper back
- [ ] Lower back
- [ ] Hip/Thigh
- [ ] Knee
- [ ] Foot/Ankle

APPENDIX G

Pamphlet

Basic Stretching from Head to Toes

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