UNIVERSITI PUTRA MALAYSIA

THE PREVALENCE OF MUSCULOSKELETAL SYMPTOMS (MSS) ASSOCIATED WITH PSYCHOSOCIAL AND ERGONOMIC RISK FACTORS AMONG FEMALE TAILORS IN TEMERLOH, PAHANG

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BY

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ABSTRACT

THE PREVALENCE OF MUSCULOSKELETAL SYMPTOMS (MSS) ASSOCIATED WITH PSYCHOSOCIAL AND ERGONOMIC RISK FACTORS AMONG FEMALE TAILORS IN TEMERLOH, PAHANG

NURHASNIDA MOHD PIAH

Introduction: Musculoskeletal symptoms (MSS) arise among sewing machine operators (SMOs) in textile or garment industries increased especially in developing countries. This condition has been attributed to poor working posture and repetitive task. Other risk factor which contributed to musculoskeletal problems is psychosocial risk factors, but a few literature reviews shows the association between psychosocial risk factors with musculoskeletal symptoms among SMOs. **Objectives:** To determine the prevalence of MSS associated with psychosocial and ergonomic risk factors among female tailors in Temerloh, Pahang. **Methods:** Snowball sampling method was adopted in this study with a total of 25 female tailors in Temerloh participated. Data was collected through face-to-face interview using modified Standardized Nordiq Questionnaire (SNQ), Job Content Questionnaire (JCQ) and Rapid Upper Limb Assessment (RULA) to determine the relationship between MSS with psychosocial and ergonomic risk factors respectively. **Results:** The highest prevalence rates of MSS among female tailors were in the upper back (52%), lower back pain (44%) and shoulder pain (40%) in the last 12 months. The analytical statistics shows there was no any link between socio-demographic background (age, body mass index and physical activity), ergonomic (awkward posture) and psychosocial risk factors (job decision latitude, job demand and social support). **Conclusion:** This study shows no significant association between MSS with psychosocial and ergonomic risk factors among female tailors in Temerloh, Pahang.

Keywords: Musculoskeletal symptoms, psychosocial risk factors, ergonomic risk factors, female tailors

ABSTRAK

PREVALENS SIMPTOM MUSKULOSKELETAL BERKAITAN DENGAN FAKTOR-FAKTOR RISIKO PSIKOSOSIAL DAN ERGONOMIK KALANGAN TUKANG JAHIT WANITA DI TEMERLOH, PAHANG.

NURHASNIDA MOHD PIAH

Pengenalan: Simptom Muskuloskeletal (MSS) kian meningkat kalangan pengendali mesin jahit (SMOs) dalam industri tekstil atau pakaian terutama kalangan negara-negara membangun. Keadaan ini dikaitkan dengan postur bekerja yang lemah dan tugas yang berulang-ulang. Faktor risiko lain yang menyumbang kepada permasalahan musculoskeletal adalah faktor risiko psikososial, tetapi beberapa risalah kajian semula menunjukkan hubungan antara faktor risiko psikososial dengan simptom musculoskeletal di kalangan SMOs. **Objektif:** Untuk menentukan prevalens MSS yang berkaitan dengan faktor-faktor risiko psikososial dan ergonomik kalangan tukang jahit wanita di Temerloh, Pahang. **Kaedah:** Kaedah persampelan 'Snowball' telah diterima pakai dalam kajian ini dengan sejumlah 25 tukang jahit wanita di Temerloh mengambil bahagian. Data dikumpul melalui wawancara bersua muka menggunakan Piawai Borang Soal Selidik Nordiq (SNQ) Soal Selidik Kandungan Kerja (JCQ) dan Penilaian Rapid Upper Limb (RULA) untuk menentukan hubungan antara MSS dengan faktor risiko psikososial dan ergonomik. **Hasil:** Kadar prevalens MSS tertinggi antara tukang jahit wanita adalah di belakang atas (52%), sakit belakang bawah (44%) dan bahagian bahu (40%) dalam tempoh 12 bulan lepas. Analisis statistik menunjukkan bahawa hanya penggunaan tangan yang dominan dalam aspek ergonomik mempunyai hubungan yang signifikan dengan MSS. Faktor ergonomik lain (postur janggal, pengalaman bekerja dan tempoh bekerja) dan faktor-faktor risiko psikososial (latitud keputusan pekerjaan, permintaan pekerjaan dan sokongan sosial) tidak menunjukkan hubungan signifikan dengan MSS. **Kesimpulan:** Kajian ini menunjukkan tiada perhubungan yang signifikan antara MSS dengan faktor-faktor risiko psikososial dan ergonomik kalangan tukang jahit wanita di Temerloh, Pahang.

Kata kunci: Simptom muskuloskeletal, faktor risiko psikososial, faktor risiko ergonomic, tukang jahit wanita

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LIST OF ABBREVIATIONS

BMI	Body mass index
CDC	Center for Disease Control and Prevention
EHS	Environmental Health and Safety
FELDA	Federal Land Development Authority
IOSH	Institution of Occupational Safety and Health
JCQ	Job Content Questionnaire
LBP	Low back pain
MSD	Musculoskeletal disorder
MSS	Musculoskeletal symptom
MSP	Musculoskeletal pain
OD	Occupational disease
OSH	Occupational Safety and Health
RULA	Rapid Upper Limb Assessment

SD	Standard deviation
SMO	Sewing machine operator
SNQ	Standardize Nordiq Questionnaire
SOCCSO	Malaysian Social Security Organization
SPSS	Statistical Package for Social Science
UPM	Univeristi Putra Malaysia
VDU	Visual display unit
WRMD	Work-related musculoskeletal disorder

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

Musculoskeletal disorders (MSDs) are conditions that affect the nerves, tendons, muscles and supporting structures, such as the discs in your back which may result from one or more of these tissues having to work harder than they are designed to (Institution of Occupational Safety and Health, 2013). At the same time, MSDs can cause pain and

discomfort which will affect the health and give impact to the quality of life as well as performance and productivity in work (NIOSH, 1997; Straaton *et al.*, 1998; National Research Council, 2001; Huang and Feuerstein, 2004). Several findings showed that the main complaints of musculoskeletal symptoms (MSS) were the left shoulder, neck, back and lower extremities due to sitting work posture (Vihma *et al.*, 1982; Wick and Drury, 1986; Blader *et al.*, 1991).

The prevalence of MSS arising was due to the two different categories of risk factors including occupational and non-occupational risk factors. Occupational risk factors that contribute to MSS were ergonomic, psychosocial and organizational factors meanwhile non-occupational risk factors were physical condition, health problems, pregnancy, hobbies and house chores (Canadian Centre for Occupational Health and Safety, 2014; European Agency for Safety and Health at Work, 2007). Ergonomic risk factors such as poor work posture and repetitive work were the common risk factors contribute to MSS in the textile and garment manufacturing industries (Blader *et al.*, 1991; Halpern and Dawson, 1997; Kaergaard and Andersen, 2000; Delleman and Dul, 2002).

Social and psychological work environment are the aspects in psychosocial risk factor that can play a role in MSD development and exacerbation. However, it become confusing because the definition of psychosocial used in common were different in

external and internal aspects. The external aspects can cause stress to the worker which linked to a wide variety of negative health outcomes including MSD. Meanwhile, the internal aspects of workers psychological can affect how the individuals experiences pain, discomfort and other symptoms as well as affecting the worker's reporting of disease, experience of disability and return to work (Warren, 2001). According to Hoogendoorn *et al.* (2000), the ability of an individual to cope with the pain was due to the presence of psychosocial factors. Moreover, these factors might impact biomechanical load due to changes in posture, movement and force exerted.

1.2 PROBLEM STATEMENT

As a new developing industrial nation, Malaysia had faced the major problem of Occupational Disease (OD) which proved to increase rapidly. In 2001, OD was reported with 204 cases (0.09 cases in every 10,000 workers). However, in 2010 there was an increased in the number of cases reported with 1221 cases of OD (2.26 cases in every 10,000 workers). Malaysian Social Security Organization (SOCSO) had published specific records on Work-related Musculoskeletal Disorders (WRMDs) that show an increase in these disorders. The trend was increase from 26 cases of MSDs in 2007 to 239 cases in 2010. Furthermore, there was more than 25 Prolapsed Intervertebral Disc

were reported at workplace (SOCSO, 2011). About 1.2 million compensation cost of one death spent by SOCSO and in 2009, a huge loss to the nation with 1.4 billion due to 1231 occupational deaths. Approximately one third of workers' compensation costs in Malaysian private industry representing the WRMDs (Mohamed Azman, 2010).

There were many risk factors associated to MSS among individuals who were working in garment industry. The most common risk factors which were associated with MSS were psychosocial and ergonomic risk factors (Schibye *et al.,* 1995; Devereux *et al*., 2004; Sarder *et al.,* 2006). A study by Dahlberg *et al*., (2004) showed that there was a high prevalence of MSDs among female rather than male that exposed with monotonous repetitive and heavy work task such as sewing machine operators (SMOs), cleaner, cashiers, and health care personnel (Brisson *et al*., 1989; Dahlberg *et al*., 2004). Tailor was an occupational that has the same exposure to MSS as reported by SMOs due to repetitive movement, static posture, and awkward posture (Vihma *et al*., 1982; Punnett *et al*., 1985; Lee *et al*., 1986; Schuldt *et al*., 1986). However, there were limited numbers of studies conducted to determine the prevalence of MSS related to psychosocial risk factors either among SMOs or tailor in Malaysia.

A previous study conducted by Zakerian and Subramaniam (2009) among computer users in Malaysia, the result shows that there were two elements of psychosocial factors (job demand and negative social interaction) have a direct effect on

musculoskeletal discomfort and musculoskeletal through work stress, whereas job control and social support only shows a direct effect on musculoskeletal discomfort through work stress. Meanwhile, there was no direct effect on musculoskeletal discomfort and musculoskeletal through work stress with job content. This finding indicates that the mediator between psychosocial factors and musculoskeletal discomforts was work stress and it is consistent with other studies (Lim and Carayon, 1993; Bongers *et al.*1993).

In a recent study conducted among nurses show findings of significant association between psychosocial variables with MSS in central regions such as shoulders, thoracic spine and lumbar column rather than in peripheral regions which include upper and lower limbs (Magnago *et al.,* 2010). This finding was also supported with other literature studies (Skov *et al.,* 1996; Josephson *et al.,* 1997; Toomingas *et al.,* 1997). However, low back discomfort shows a significant increase in psychosocial factors which include work demand, job content, social support and job control among emergency unit nurses (Habibi *et al.,* 2012).

Therefore, this study was conducted to know whether the female tailors who were exposed with the similar hazards and work tasks with SMOs showed high prevalence of MSS in relation to psychosocial and ergonomic risk factors.

1.3 STUDY JUSTIFICATION

According to the previous studies, there were high prevalence of MSS with its associated risk factors among SMOs such as socio-demographic, ergonomic and psychosocial risk factors (Hsu and Wang, 2003; Devereux *et al.,* 2004; Cail and Aptel, 2005; Sarder *et al.*, 2006; Sealetsa and Thatcher, 2011; Esin and Öztürk, 2011). However, there were no study conducted to determine the prevalence of MSS and its associated factors among female tailors or any similar study among SMOs in Malaysia, in which they were exposed with the same hazards and mostly done the similar work task such as clothes designing, sewing and cutting task, and clothes wholesaling (Chan *et al.,* 2002). There were also limits in number of studies conducted to determine the relationship between psychosocial risk factors with MSS among SMOs rather than other occupational field such as healthcare staff (Habibi *et al.,* 2012), plantation workers (Asyraf *et al.,* 2007) and office workers (Zakerian and Subramaniam, 2009).

Thus, this study will help to identify the prevalence of MSS associated with the risk factors of ergonomic and psychosocial among female tailors as well as to determine whether the prevalence of MSS in this study is significantly associated with ergonomic and psychosocial risk factors with the previous studies conducted in other countries. Furthermore, less study conducted in Malaysia among female tailors will help to provide

baseline information to researcher and government in ergonomic and psychosocial aspect. Prevention programmes can be well introduced and properly planned to the female tailors because mostly the tailors were self-employed and lack of knowledge regarding risk factors of MSS.

According to Ghaffari *et al.* (2006), data concerning on back pain related to developing and low-income countries was lacking compared with developed countries. Malaysia is categorized as developing countries with lack of awareness on back pain because back pain considered new issues in Malaysia and in progress to be promoted by professionals especially the Occupational Safety and Health (OSH) practitioners to increase the awareness level to all Malaysians (Baba *et al.,* 2010).

1.4 CONCEPTUAL FRAMEWORK

Figure 1.4 shows the conceptual framework of this study. There are two main factors which contribute to development of MSS such as ergonomic (awkward posture, working experience, working duration, dominant hand-used) and psychosocial risk factors (job decision latitude, job demand and social support). These two factors are

associated with MSS such as pain, ache or discomfort at neck, shoulder, elbow, wrist or hand, upper and lower back according to previous study with wide range of occupation worldwide (Bongers *et al.*1993; Carayon P., 1995; Esin and Öztürk, 2011; Nurul and Devinthiran, 2012; Habibi *et al.,* 2012) by using Standardized Nordic Questionnaire (Kourinka *et al.,* 1987).

Poor ergonomic features are highly associated with MSDs including static posture, awkward posture and repetitive movement. However, this study focused more on tailor's postures which was awkward posture. Rapid Upper Limb Assessment (RULA) tool were used to assess biomechanical and postural loading on the work-related upper limb disorders (McAtamney and Corlett, 1993). This method was based on RULA checklist and observations were recorded as numerical scores. The specific RULA matrix of scoring was used to translate the score to get a grand score which reflects the musculoskeletal loading associated with the tailor's posture. Table 1 shows the requirements for action into which the grand scores were divided and summarized into Action levels.

Table 1.1: *Action level of RULA and its description*

Action level	Grand score	Description
1	1 – 2	The posture is acceptable if it is not maintained or repeated for long periods.
2	3 – 4	Further investigation is needed and changes may be required.
3	5 – 6	Investigation and changes are required soon.
4	7	Investigation and changes are required immediately.

The second main factors which contribute to MSS among tailors was psychosocial risk factors including psychosocial work demand, job decision latitude and workplace social support. This risk factor was determined by using Malay version of Karasek's Job Control Questionnaire (JCQ) which consists of three dimensions including psychosocial work demands (five items), job control (nine items) and workplace social support (eight items) (Karasek *et al.,* 1998).

Socio-demographic factors were one of the main risk factors of MSS such as age, body mass index (BMI), education level, health status and marital status will be asked in the self-administered questionnaire. In many literatures study revealed socio-

demographic factors such as physical activity, BMI, working experience, and education level were increased with the increase prevalence of MSDs (Andersen and Gaardboe, 1993; Ming and Zaproudiana, 2003; Waersted and Westgaard, 1991).

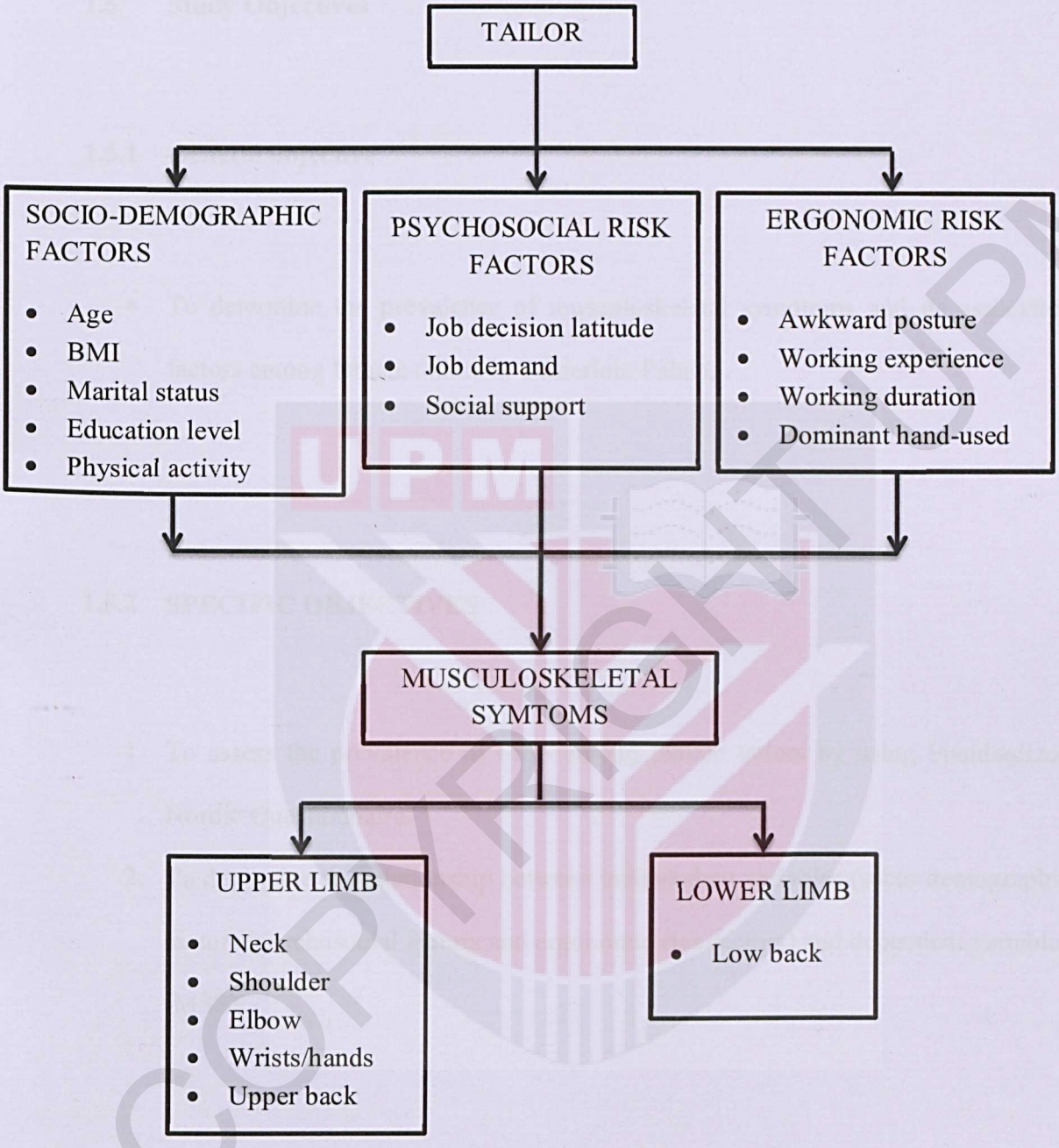

Figure 1.1 *Conceptual framework of MSS associated with psychosocial and ergonomic risk factors*

1.5 Study Objectives

1.5.1 General objective

- To determine the prevalence of musculoskeletal symptoms and its associated factors among female tailors in Temerloh, Pahang.

1.5.2 SPECIFIC OBJECTIVES

1. To assess the prevalence of MSS among female tailors by using Standardized Nordic Questionnaire.
2. To determine the relationship between independent variables (socio-demographic factors, psychosocial factors and ergonomic risk factors) and dependent variables (MSS).

1.6 STUDY HYOTHESIS

1. There is a significant association between the psychosocial risk factors with MSS.
2. There is a significant association between the ergonomic risk factors with MSS.

1.7 DEFINITION OF TERMS

1.7.1 Conceptual definition

- **Musculoskeletal symptoms**

  Symptom was defined as a change in our body that is a sign of illness. (New Oxford English-English-Malay Dictionary, 2000). Musculoskeletal symptoms were the condition such as pain, stiffness and swelling that affect one or more joints.

- **Ergonomic risk factors**

Ergonomic risk factors were aspects of a job or task that imposes a biomechanical stress on the worker and it is the synergistic elements of MSD hazards. Those risk factors include awkward postures, cold temperature, contact stress, force, repetition, static postures and vibration (EHS, IOWA State University, 2013).

- **Psychosocial risk factors**

Psychosocial risk factors refer to individual subjective perceptions by worker regarding aspects of the organization of work and carry emotional values (Devereux *et al.,* 2004).

1.7.2 Operational definition

- **Musculoskeletal symptoms**

Musculoskeletal symptoms will be evaluated by using Standardized Nordic Questionnaire which was comprised of two types of questionnaires: (i) general questionnaire and (ii) locomotive organ trouble which the human body was divided into six anatomical regions (neck, shoulders, elbows, wrists/hands and upper and lower back) (Kuorinka *et al.,* 1987).

- **Ergonomic risk factors**

Ergonomic risk factors will be measured by using Rapid Upper Limb Assessment (RULA) method. The full description about RULA method is provided in Chapter 3, Research Methodology, Section 3.4.1.

- **Psychosocial risk factors**

Psychosocial risk factors will be measured by using Malay version of JCQ which consists of three dimensions including psychosocial work demands (five

items), job control (nine items) and workplace social support (eight items) (Karasek *et al.,* 1998). The full description about this questionnaire is provided in Chapter 3, Research Methodology, Section 3.4.1.

CHAPTER 2

LITERATURE REVIEW

2.1 MUSCULOSKELETAL SYMPTOMS

One of major causes of work-related disabilities and injuries in most of the developed and industrial developing countries is musculoskeletal disorder (MSD) (Anderson and Gaardboe, 1993; Kaergaard and Andersen, 2000; Choobineh *et al.*, 2004). MSD are injuries or disorders of the muscles, nerves, tendons, joints, cartilage, and supporting structure of the upper and lower limbs, neck, and lower back that caused,

precipitated or exacerbated by sudden exertion or prolonged exposure to physical factors such as repetition, force, vibration, or awkward posture (CDC, 2012). According to Andersson *et al.* (1993), the highest prevalence of MSD were neck, upper and lower back pain amongst all body regions. This was because these regions were more mobile within lumbar and cervical curves and easily affected (Norkin and Levangie, 1992)

Risk factors of MSD were multiple that include personal or individual (Ekman *et al.,* 2000; Spyropoulos *et al.,* 2007; Johnston *et al.,* 2008), physical or ergonomic (Palmer *et al.,* 2001; Delleman and Dul, 2002; Mohd *et al.,* 2009; Syazwan *et al.,* 2010) and psychosocial factors (Carayon *et al.,* 1998; Cail and Aptel, 2005; Hsu and Wang, 2003; Mosrafa *et al.,* 2008; Habibi *et al.,* 2012).

Personal or individual factors such as age, gender, BMI, physical activity, medical and family history, alcohol consumption and smoking were found in a recent study to significantly influence low back pain (LBP) severity general workers who were involving manual labor, prolonged sitting or standing, and suffering from low back pain (Nirathi and Babski-Reeves, 2014). According to the findings from Grotle *et al.* (2004), the intervertebral discs undergo degenerative changes due to aging factor that lead to increased LBP severity. This finding was consistent with result of a previous study by Paajanen *et al.,* (1997). However, the finding from the study of Nirathi and Babski-

Reeves (2014), gender shows no differences in descriptive statistics. In fact, it cannot stand by its own to influence the severity of LBP without the presence of other factors.

Physical activity such as regular exercise shows a higher incidence of LBP and disc herniation (Frymoyer *et al.,* 1983; Van der Linden and Fahrer, 1988), and physical activity may influence LBP severity in personal model even though it did not show any trend in the descriptive statistics (Nirathi and Babski-Reeves, 2014).

Evidence that smokers were more likely to develop severe LBP compared to non-smokers (Frymoyer *et al.,* 1983). Breathing ability differences can contribute to LBP while handling loads because the muscle used for breathing were also used to maintain spine. As a result, lung elasticity was weakened among smokers and they tend to be at risk of LBP (McGill *et al.,* 1995).

2.2 ERGONOMIC RISK FACTORS

Ergonomic risk factor was one of the major risk factors associated with MSS. Ergonomic is concerned on the capabilities of humans to fit with the equipment

(machine) and work environment (workstation condition). It focused on analysis and reduction of MSD risk factors at the job level such as tool and workstation characteristics, attributes of the work piece, work flow, and the fit of these aspects of work to individual worker characteristics (Warren, 2001).

There were varieties of ergonomic risk factors such as workstation design, repetitive movements, awkward postures, static postures, manual and lifting handling, etc. (Vihma *et al.,* 1982; Schuldt *et al.,* 1986; Baba *et al.,* 2010). There were many kinds of job in which the workers were exposed to ergonomic risk factors and contributed to musculoskeletal problems such as healthcare staff, construction workers, workers in automotive industries, cashiers and others. The most common jobs related to MSDs and ergonomic which had been studied in Malaysia were healthcare staff (Nurul *et al.,* 2012), office workers (Norashikin *et al.,* 2010), plantation workers (Asyraf *et al.,* 2007; Ismail , 2007; Rosnah *et al.,* 2007; Chow *et al.,* 2012), manufacturing company (Baba *et al.,* 2010) and construction workers (Mohd *et al.,* 2012). However, there was lack of studies conducted on MSD associated with ergonomic risk factors in garment industries compared to other developing countries either between workers in garment manufacturing or self-employed tailors.

In Malaysia, a study conducted by Nurul and Devinthiran (2012) shows the finding of high prevalence of lower back (88.2%) and neck (76.5%) due to prolonged

seated position among healthcare professional such as radiographers, patient assistants and nurses. These findings were consistent with those found in previous studies among dental students from five dental schools in Malaysia (Khan and Yee Chew, 2013).

According to a study by Khan and Yee Chew (2013), sitting position was identified as one of the major working factors that can contribute to MSD. In this study, 568 dental students recruited were provided with confortable work stool, back support while sitting and adjustable the stool-height and back position which representing the sitting position. The prevalence of lower back discomfort decreases with the used of comfortable dental chair with a back support, meanwhile the result also found that there was no effect on the prevalence of lower back discomfort with adjusting the chair height.

Findings of a study by Esin and Öztürk, (2011) among SMOs in Turkey shows that the prevalence rates were higher among women's musculoskeletal symptoms in the trunk (62.5%), neck (50.5%), and shoulder (50.2%). One of the purposes of this study was to examine the level of ergonomic workplace risk factors by using RULA. The RULA's score was high with the mean of 6.9 which indicate that the employee's posture in this study needs to be investigated immediately. However, there were no employees participate in this study received RULA scores of 1 – 2 which indicates an acceptable work posture.

Work sitting posture was the major factor which contributes to the development of MSD reported in textile industry (Yu *et al*, 1988). It was not due to the highly repetitive arm motions (Li *et al.,* 1995). Poor sitting posture give rise to musculoskeletal symptoms at the back, neck, and upper limbs among SMOs (Keyserling *et al.,* 1982; Vihma *et al.,* 1982; Punnet *et al.,* 1985; Kumar, 1989; Blader *et al.,* 1991; Vezina *et al.,* 1992; Westgaard and Jansen, 1992). Besides, musculoskeletal problems will arise due to static posture maintained for a long working period (Vihma *et al.,* 1982; Punnett *et al.,* 1985; Blader *et al.,* 1991). This posture involve the flexion of head and trunk for simultaneously but different in motions of two hands (left hand for pushing the material forward and right hand for manipulating and holding the materials while sewing) which cause an awkward and extreme joint posture, as well as foot pedals which operated continuously (Li *et al.,* 1995).

However, in a study by Sealetsa and Thatcher (2011) in Botswana found that the primary contributors towards the high incidence of MSDs were highly repetitive nature of the work which was against the finding by Li *et al.* (1995). This was because the operators need to flex and extend the arm repeatedly, and flex the wrist with the shoulder bearing greater than the load due to the table height. This findings were supported by the findings of Vihma *et al.,* (1982) and Punnett *et al.,* (1985) which conclude that SMOs experience musculoskeletal problems due to highly repetitive manual tasks performed, as well as maintaining static posture during their whole

working period. In this study, result shows that 32.5% of participants expressed extreme pain at the upper back which the most frequent complaints, followed by mid-back region (26.4%) and lower back (26.2%) (Sealetsa and Thatcher, 2011).

2.3 PSYCHOSOCIAL RISK FACTORS

Psychosocial risk factors were related to interaction between individuals with the demands of their job, work environment and the social contacts within their job. These factors are important because they can become the sources of stress once it present in the work environment (Rick *et al.,* 2001) in which it will influence on the development and persistence of MSDs (Devereux *et al.,* 2004). As a result, individuals will experience problems with absenteeism, productivity and impact on injury related costs.

There was a study found that psychosocial risk factors affect self-reported productivity due to working overtime and high work demands that cause neck and back symptoms. Another finding shows that the productivity decreased due to problems of forearm or hands associated with the combination of high work demands and low job control (van den Heuvel *et al.,* 2007). Moreover, psychosocial factors such as lack of

control, poor skill use, and low job variety were found to be significantly associated with an increased risk of MSDs and sickness absence (Acheson, 1998).

There are seven factors classified as risks under psychosocial aspect such as work demand and mental load, job control, co-worker social support, sense of community, management feedback, quality of leadership, and work stress (Wellnomics, 2008). However, most of the studies conducted found that the factors such as mental load and work demands, job control, social support and work stress were the most reported as psychosocial risk factors (Hales *et al.,* 1994; Karlqvist *et al.,* 2002; Bergqvist *et al.,* 1995; Polanyi *et al.,* 1997; Bongers *et al.,* 2002).

A study conducted by Habibi *et al.,* (2012) among emergency unit nurses found that there was a significant relationship between psychosocial risk factors such as work demand, job content and social support with the intensity of low back discomfort, meanwhile job control had no significant relation with low back discomfort through Spearmen test. These findings considered strong relationship with the evidence of poor job content and low social support associated with back pain (Bongers *et al.,* 1993; Henry, 2004; Cameron *et al.,* 2008).

Psychosocial risk factors were also common among visual display unit (VDU) users especially for those who were involved with computer work and it show a link with MSDs. A study was conducted by Hsu and Wang (2003) among 119 of video display terminal (VDT) users in a semiconductor manufacturing company in Taiwan. The findings showed that the prevalence rate of upper extremity discomfort was 42%, and rates of physical discomfort shows a significantly higher among full-time VDT users (66%) than part time VDT users (41%).

There were two different of independent variables focused in this study that were physical/ergonomics variables and psychosocial variables in relation to physical discomfort including upper extremities (neck, shoulder, upper arm, forearm/elbow, wrist and finger), back and lower extremities (buttock, thigh and lower leg). Both variables show different relation towards physical discomfort in their findings. Physical/ergonomic variables were more dominant visual and upper extremity discomforts; meanwhile psychosocial variables were more dominant for back and lower extremity discomforts. Meanwhile, job satisfaction, intensified work load, monotonous work, low job control and low social support were the major contributors of psychosocial factors in this study.

In Malaysia, agriculture was one of the contributors to the nation's economy and being promoted as the third engine of growth and modernization for poverty reduction (Ninth Malaysia Plan, 2006). Workers in agriculture sectors such as rubber tappers, palm oil workers, farmers and others were no exception from reporting of MSDs. However, a finding from recent study among male rubber workers in (FELDA) (Chow *et al.,* 2012) shows that there was no significant association between psychosocial factors (decision latitudes, psychological demands and social support) with neck pain except for job insecurity that shows a weak and positive correlation with neck pain (p value < 0.05). A number of reviews have concluded that evidence exists for the relationship between psychosocial risk factors (work demand, job content, and social support) and low back discomfort (Hsu and Wang, 2003; Habibi *et al.,* 2012; Nurul and Devinthiran, 2012).

CHAPTER 3

METHODOLOGY

3.1. STUDY DESIGN

Study design is a specific plan or protocol for conducting the study, which allows the investigator to translate the conceptual hypothesis into an operational one. A cross-sectional study design was used in this research. It was a descriptive study in which disease and exposure status was measured simultaneously in a given population. This study was proposed to assess the prevalence of acute or chronic conditions in a

population in which it focused on MSS associated with psychosocial and ergonomic risk factors and it was chosen as study design due to limited period of time for data collection.

3.2. STUDY LOCATION

The study was conducted in Temerloh, Pahang. There were 18 sewing shops were chosen based on the number of female tailors selected and agreed to participate in this study. Temerloh was chosen because during a survey conducted, most of the female tailors complaining on having pain and discomfort on musculoskeletal.

3.3. STUDY SAMPLING

3.3.1. Study population

There was no available data on total population of female tailors in Temerloh.

3.3.2. Sample

The participants were all female tailors who were working at sewing shops in which female tailors were the inclusion criterion and sampling unit in this study. Only female tailors were selected because the prevalence of MSS was higher among female than male according to a previous study (Dahlberg *et al.,* 2004).

3.3.3. Sampling method

Sampling method is the scientific procedures of selecting those sampling units which would provide the required estimates with associated margins of uncertainty, arising from examining only a part and not the whole. The sampling method of this research was Snowball sampling by starting with a few female tailors and asked them to identify other female tailors in Temerloh District. This process was repeated until the required number of participants was reached. This method was chosen because there was no available data on total population of female tailors in Temerloh in order to get the exact number of sample size.

3.3.4. Sample size

Sample size is the act of choosing the number of observations or replicates to include in a statistical sample. It is important to uncover a significant difference when it actually exists. Sample size was calculated using Kirkwood (1988) formula as follow:

$$n = \frac{p(1-p)}{e^2}$$

$$n = \frac{0.599(1-0.599)}{0.05^2}$$

$$n = 97.44 \text{ @ } 97 \text{ respondents}$$

Where,

P = the prevalence of MSP which was 42%, taken from research titled "Physical discomfort among visual display terminal users in a semiconductor manufacturing company: A study of prevalence and relation to psychosocial and physical/ergonomic factors" (Hsu and Wang, 2003).

e^2 = standard error (0.05^2)

n = sample size

An additional 10% of minimum size is included to sum up 107 respondents in order to cater for any defaulter. However, only 25 respondents were selected in this study due to limited numbers of target population of female tailors working at sewing

shops. Moreover, no prevalence on physical discomfort among self-employed tailors was found in previous studies. Therefore, an accurate sample size for this study could not be calculated.

3.4. STUDY INSTRUMENTATION

3.4.1. Questionnaires

Questionnaire is a list of a research or survey questions asked to respondents and designed to extract specific information. The questionnaire used for the study consists of three sections (i) Standardized Nordiq Questionnaire (Kuorinka *et al.,* 1987) to determine the prevalence of MSSs, (ii) Job Content Queationnaire (JCQ) (Karasek *et al.,* 1998) and (iii) Rapid Upper Limb Assessment (RULA) (McAtamney et al, 1993) with all of the questionnaire translated into Malay version (Appendix 4 and 5). RULA was chosen in this study because the previous study conducted also used the same instrument to assess biomechanical and postural among SMOs (Esin and Öztürk, 2011) and the complaint received during the survey among female tailors in Temerloh mostly having pain and discomfort on upper limb.

The first section was a modified SNQ which consists of three parts (i) socio-demographic characteristics, (ii) general questionnaire and (iii) localized body symptoms survey. Socio-demographic focused on age, race, education level, marital status, pregnancy, physical activity and part-time job. General questionnaire focused on working hours, working experience, height and weight measurements, and dominant hand used. In localized body symptoms survey part, the respondents were asked question on MSSs such as ache, pain, and discomfort during the last 12 months and last 7 days discomfort with the answers of yes and no responses.

The second section was JCQ developed by Karasek *et al.* (1998) which contains three main psychosocial risk factors (job decision latitude, job demand and social support) with a total of 22 items and the provided answers were all in a Likert-scale of 1 to 4 (1 = strongly disagree, 2 = disagree, 3 = agree, and 4 = strongly agree). Job decision latitude referred as an operationalization of control concept with the combination of job decision-making authority and the opportunity to use and develop skills on the job. Job demand described as mental and physical requirement of the job (working very fast, working intensely, high work load, high information processing demands, constant time pressures and pressure to work overtime). Social support was defined as the support that workers perceive they receive from co-workers or supervisor at workplace. Reliability and validity was tested before the questionnaires distribute to the real study sample among female tailors in Mentakab, Pahang using Cronbach's Alpha. The Cronbach's Alpha was 0.918 which indicates a high level of internal consistency.

The third section was RULA method assessed through direct observation of female tailor's posture at their workstations while performing their task with the aid of photo taken. RULA is a tool which requires no special equipment in providing a quick assessment of the posture of the neck, trunk and upper limbs along with muscle function and the external loads experienced by the body. As a result, score were calculated for the posture of each body part. The scores were given based on the range from 1 to 4 in which score 1 indicates the best posture, whereas score 4 indicates the worst posture into two different main scores which were score A (arm and wrist analysis) and B (neck, trunk and legs analysis). In each scores was added with muscle use and force exerted with a score of 1 and 0 respectively for a static posture without loading to obtain scores C and D. The final score which also known as "grand score" was the combination of score C and D indicates the musculoskeletal loading associated with the worker's posture. The grand score was categorized into "action level" from 1 to 4.

The grand scores of 1 to 2 indicate that the work posture is acceptable. The grand scores 3 to 4 indicates a further investigation and changes may be recommended; 5 to 6 recommended a prompt investigation and changes; and 7 need immediate investigations and changes.

3.5. VARIABLES

3.5.1. Independent variables

Independent variable is a factor which is measured, manipulated, or selected by the experimenter to determine its relationship to an observed phenomenon. The main independent variables were the potential risk factors which were categorized into two (2) which were psychosocial and ergonomic risk factors. Socio-demographic factors were categorized as confounding factors.

3.5.2. Dependent variable

Dependent variable is defined as a principal focus of research interest or the outcome of the study. The dependent variable was musculoskeletal symptoms such as pain, ache or discomfort at neck, shoulders, wrists or hands, upper back and low back.

3.6. DATA COLLECTION PROCEDURE

The participants were selected by using Snowball sampling technique. The participants who were selected and agreed to participate were interviewed and advised that their individual responses would remain anonymous, protected by the study investigators and a short briefing on the purpose of this study was conducted. There was no personal detail such as full name, phone number and address were recorded in the questionnaire because this study was not a cohort study which needed to follow up with participants. A consent letter and a self-administered questionnaire were distributed to every selected female tailor to be answered and those questionnaires were collected by investigator at the end of the survey. The questionnaires were used to collect all the information needed in this study according to the parameters that need to be measured.

An observation on performing task was conducted and permission to take photos and videos were required from the respondent for assessing RULA tool. The photos were taken only used for reviewing purposes to assess and measure the degree of every posture with RULA tool. The face of the respondent was unexposed to ensure the confidentiality of the video as mention in the Respondent's Information Sheet.

3.7. DATA ANALYSIS

Data analysis was done using "Statistical Package for Social Sciences (SPSS) Version 21.0. Descriptive analysis was performed to analyse the overall of socio-demographic factors presented as numbers, percentages median, mean and standard deviation. For univariate analysis, distribution and frequency of socio-demographic factors in this study was determined.

The analytical statistic carried out in this study was using Chi-square test to determine both of the study hypotheses of i) a significant association between the factors of psychosocial factors with MSDs, and ii) a significant association between ergonomic risk factors with MSS.

3.8. QUALITY CONTROL

Pre-test questionnaire was conducted by distribute the study questionnaire to 10% of sample size before the start of the study among tailors working at homes who have similar characteristics with sample subjects of the study and they were excluded in

the real study. The purpose of the pre-test was to ensure the understanding of the questions (face validity) and to find out any improper part or difficulty of questions asked. When difficulty existed in the questions, a correction was done to ensure respondents could understand and answered it easily.

Photos were taken to analyse the sitting posture of tailors and calculate the RULA score used as postural analysis. The sitting posture that had the highest RULA score was chosen to be the awkward sitting posture for each study participant.

3.9. STUDY LIMITATION

The study limitation was information bias can occur due to perception and honesty of the participants which will influence the result. Recall bias also existed because the information related to musculoskeletal symptoms was obtained through questionnaire. A small size of 25 respondents was insufficient to show the significant association between independent and dependent variables due to limited period of time. This study was not representing the whole population of female tailors in Malaysia.

3.10. ETHICAL CONSIDERATION

Research ethics are a set of principles about how researchers and research organizations should conduct themselves when dealing with research participants, other researchers and colleagues, the users of their research and society in general. The importance of ethic consideration is to respect and cause no harm to the participants and also to respect for other researchers and those who will used the research in future. Approval from Faculty of Medical Researcher Ethics Committee, Universiti Putra Malaysia (UPM) was obtained before conducting this study (Appendix 1). A written consent was obtained after getting the permission from the respondents selected before conducting this study (Appendix 3). The privacy of information and confidentiality was protected and upheld at all times.

CHAPTER 4

RESULT

4.1. Socio-demographic background

Table 4.1 shows that out of 25 female tailors, 64% of the respondents aged from 20 to 44 years old, while only 36% of the respondents aged from 45 to 69 years old. Majority of the respondents were Malay (96%) and the rest were non-Malay (4%) whom was a Sikh. In terms of education level, the respondents were mostly finished to primary or secondary school (84%) rather than graduation from university or college (16%). In

this study, 16 out of 25 respondents were married and none of the respondents were pregnant during carried out this study.

Table 4.1: Socio-demographic of respondent (n = 25)

	n	%	Median	Mean ± SD
Age			1.00	
20 – 44	16	64.0		
45 - 69	9	36.0		
Race			1.00	
Malay	24	96.0		
Non-Malay	1	4.0		
Education level			1.00	
Primary/Secondary school	21	84.0		
University/College	4	16.0		
Marital status			2.00	
Single	9	36.0		
Married	16	64.0		
Pregnancy			2.00	
Yes	-	-		
No	25	100		
Physical activity			2.00	
Yes	8	32.0		
No	17	68.0		
Part-time job			2.00	
Yes	3	12.0		
No	22	88.0		
BMI			1.00	
Normal	16	64.0		
Abnomal	9	36.0		

SD = Standard deviation

Minority of the respondents (32%) had their time to exercise at least once a week rather than those who did not exercise. The overall mean of working experience was 13.49 (SD: 15.13) which shows that most of the respondents were still young and new in this occupation. About 80% of the respondents were working for 5 to 7 hours per day with the overall mean of 13.49 (SD: 15.13) with only 12% of the respondents had part-time job. Mostly, the respondents had normal BMI (64%) with below than 24.9 rather than abnormal BMI (36%) which include overweight and obesity.

Table 4.2 shows the result from descriptive analysis for ergonomic (working experience, working duration, dominant hand-used and RULA grand score) and psychosocial risk factors (job decision latitude, job demand and social support) with MSS. The overall mean of working experience was 13.49 (SD: 15.13) with majority of the respondents were young and new in this occupation. Most of the respondents worked for more than 41 hours per week (80%) with the range of 5 to 7 hours per day. The respondents were more likely to used right-hand (92%) when performing their task. The result from RULA grand score shows that 92% of the respondents achieved score below than 4 which indicates a further investigation and changes may be recommended, meanwhile the respondents who achieve a score more than 5 may prompt investigation and changes soon.

Table 4.2: Descriptive statistic for ergonomic and psychosocial risk factors

	n	%	Median	Mean ± SD
Working experience (years)				13.49 ± 15.13
≤ 25	19	76.0		
> 26	6	24.0		
Working hours/week				46.28 ± 11.02
24 – 40	5	20.0		
≥ 41	20	80.0		
Hand used				
Right-handed	23	92.0		
Left-handed	2	8.0		
RULA grand score			2.00	
≤ 4	23	92.0		
≥ 5	2	8.0		
Job decision latitude	25	100.0		74.96 ± 10.134
Job demand	24	96.0		12.47 ± 2.010
Social support				
Supervisor support	19	76.0		13.68 ± 3.092
Co-worker support	19	76.0		31.00 ± 5.283

The overall mean of job decision latitude was 74.96 (SD: 10.134) with possible range score of 24 to 96, meanwhile job demand show the mean of 12.47 (SD: 2.010) with possible range of 12 to 48. However, there was a missing data in the elements of job demand because a few respondents did not answer the questions given. Social

support was divided into two sub-elements which were supervisor and co-worker support with the mean of 13.68 (SD: 3.092) and 31.00 (SD: 5.283), respectively.

4.2. Prevalence of MSS

The prevalence of MSS as shown in Table 4.3 was according to different body part during last 12 months and 7 days. The most common affected body region during last 12 months found that 52% having upper back pain, followed by lower back pain, shoulder pain, neck pain, wrist/hand pain and elbow with 44%, 40%, 36%, 24% and 1% respectively. During the last 7 days indicates an acute pain experienced by the respondents and most of respondent having neck pain, shoulder pain, upper and lower back pain.

Table 4.3: Prevalence of MSS during last 12 months and 7 days

Musculoskeletal symptoms	Last 12 months		Last 7 days	
	Yes	No	Yes	No
	n (%)	n (%)	n (%)	n (%)
Neck pain	9 (36.0)	16 (64.0)	3 (12.0)	5 (20.0)
Shoulder pain	10 (40.0)	15 (60.0)	3 (12.0)	8 (32.0)
Elbow pain	1 (4.0)	24 (96.0)	-	3 (12.0)
Wrist/hand pain	6 (24.0)	19 (76.0)	1 (4.0)	4 (16.0)
Upper back pain	13 (52.0)	12 (48.0)	3 (12.0)	8 (32.0)
Lower back pain	11 (44.0)	14 (56.0)	3 (12.0)	8 (32.0)

4.3. Relationship between MSS and ergonomic risk factors

The analytical statistics were carried out by using Chi-square test to determine the association between ergonomic risk factors with MSS (in Table 4.4). The result shows that there only dominant hand used had a significant association between MSS (p-value = 0.049, $p < 0.05$). Other ergonomic factors such as RULA working experience, working duration and grand score shows no significant association with MSS.

Table 4.4: Relationship between ergonomic risk factors with MSS (n = 25)

Variables (n)	Musculoskeletal symptoms		Statistics (x^2)	Significant (p-value)
	Yes (n=16) %	No (n=9) %		
Working experience (yrs)			16.319	0.835
≤ 25 (20)	52.0	24.0		
> 26 (5)	12.0	12.0		
Working hours/week (hrs)			5.262	0.405
24 – 40 (5)	16.0	4.0		
≥ 41 (20)	48.0	32.0		
Dominant hand used			3.865	**0.049**[a]
Right-handed (23)	64.0	28.0		
Left-handed (2)	0.0	8.0		
RULA/Grand score			1.223	0.269
≤ 4 (23)	56.0	36.0		
≥ 5 (2)	8.0	0.0		

RULA = Rapid Upper Limb scale
[a] Ssignificant at $p < 0.05$

4.4. Relationship between MSS and psychosocial risk factors

The second risk factor was psychosocial risk factors with three main elements of job decision latitude, job demand and social support. Based on result from Table 4.5, it concluded that there was no significant association between MSS with psychosocial risk factors such as job demands (p-value = 0.953), job decision latitude (p-value = 0.316), supervisor (p-value = 0.543) and co-worker support (p-value = 0.385).

However, this study showed an indirect relationship between co-worker support with MSS, meanwhile other psychosocial factors such as job demands, job decision latitude and supervisor support shows a direct relationship with MSS.

Table 4.5: Relationship between MSS and psychosocial risk factors among female tailors in Temerloh.

Dependent variable	Elements	Spearman coefficient (r_s)	p-value
Musculoskeletal symptoms	Job demands	0.013	0.953
	Job decision latitude	0.209	0.316
	Supervisor support	0.149	0.543
	Co-worker support	0.211	0.385

4.5. Relationship between MSS and socio-demographic factors

Other risk factor that can contribute to MSS was socio-demographic factors with eight different elements as shown in Table 4.6. Out of eight elements, only one element shows the result that was not relevant with MSS which was pregnancy because none of the respondents were pregnant during carried out this study. The rest of these elements such as age, race, education level, marital status, pregnancy, physical activity, part-time job and BMI show no significant association with MSS ($p > 0.05$) because these elements were not suitable to run Chi-square test with the expected count less than 5. Chi-square test was used to discover the relationship between two categorical variables.

Table 4.6: Relationship between socio-demographic background and MSS among female tailors in Temerloh

Variables (n)	Musculoskeletal symptoms		Statistics (x^2)	Significant (p-value)
	Yes (n=16) %	No (n=9) %		
Age			0.435	0.509
20 – 44 (16)	44.0	20.0		
45 – 69 (9)	20.0	16.0		
Race			0.586	0.444
Malay (24)	60.0	36.0		
Other (1)	4.0	0.0		
Education level			2.679	0.102
Primary/Secondary school (21)	48.0	36.0		
University/College (4)	16.0	0.00		
Marital status			0.043	0.835
Single (9)	24.0	12.0		
Married (16)	40.0	24.0		
Pregnancy			NR	NR
Yes (0)	0.0	0.0		
No (25)	64.0	36.0		
Physical activity			0.618	0.432
Yes (8)	24.0	8.0		
No (17)	40.0	28.0		
Part-time job			1.392	0.238
Yes (3)	4.0	8.0		
No (22)	60.0	28.0		
Body mass index			0.435	0.509
Normal (16)	44.0	20.0		
Abnormal (9)	20.0	16.0		

CHAPTER 5

DISCUSSION, CONCLUSION AND RECOMMENDATION

5.1. Discussion

5.1.1. Socio-demographic of respondents

In this study, the total of 25 female respondents participated from 18 sewing shops in Temerloh, Pahang. This study was conducted to determine the relationship between MSS with psychosocial and ergonomic risk factors. There was no specific inclusion criterion chosen in this study. Socio-demographic information was assessed

including age, race, education level, marital status, pregnancy, physical activity, part-time job, and BMI.

5.1.2. The prevalence of MSS

In this study, the prevalence of MSS 32% was lower than other studies. In Turkey, a study conducted among female SMOs shows high prevalence of MSD with 50-55% (Civitci *et al.,* 2004) and 89.1% in a study conducted by Wu *et al.* (2009) among female wafer-handlers. However, finding of this study shows high prevalence on MSS than a previous study conducted by Kaergaard and Andersen (2000) with only 14.4%. The prevalence of MSS from this study shows quite different from previous study because there was no record available on total population of female tailors in Temerloh, Pahang.

In previous studies, the most affected regions of bodies among SMOs reported the most affected regions were neck, shoulders, upper arm, lower arm, wrist and fingers (Eerd *et al.,* 2003; Dahlberg *et al.,* 2004). Similarly, findings of this study support the observation that the most common areas with MSD were upper back (52%), lower back (44%), and shoulder (40%).

5.1.3. Relationship between MSS and ergonomic risk factors

This study was based on RULA method to assess the awkward posture of female tailors while performing their task for ergonomic risk factor. It was a tool that can perform in a quick and quite accurate evaluation towards awkward posture. A few studies conducted among SMOs in developing countries used this method (Esin and Öztürk, 2011). According to McAtamney and Corlet (1993), investigation and modification was required immediately to reduce excessive loading of musculoskeletal system and the risk of injury to the operator which referred as action level (Table 1.1).

Based on RULA scores, most of the respondents achieved quite high with 3 to 4 grand scores (Table 4.3). Based on action level provided in Table 1.1, the score shows an action level of 2 which indicate further investigation and changes required. Unfortunately, none of the respondents achieved grand scores of 1 to 2 which indicates the best neutral posture and acceptable if it was not maintained or repeated for long periods. However, a few of female tailors while performing their task with working postures which were not within suitable ranges of motion such as repetitive movements, static muscle work and required to exert force. They were categorized under Action level 3 which need to be investigated and made changes soon as well as planning a long term measures aim to reduce the levels of exposure to awkward posture.

The result of this study shows that only dominant hand used shows a significant association with MSS ($p < 0.05$). Other ergonomic factors such as working experience, working duration and awkward posture shows no significant association with MSS. This finding contradict with a previous study by Esin and Öztürk (2011) revealed that there was a significant difference between MSD with RULA score, as well as having a chronic disease, using scissors, and to feel pressured because of work.

However, the result was consistent with other study by Syazwan *et al,* (2009) which shows that no significant association between MSD and the increment of RULA score (above 5). Possibility of high RULA scores was related to workstation design such as workstation adjustment can induced the MSS because from our observation none of the female tailors were using adjustable chairs and back rest as well as the table height.

In many ergonomic literatures, "ergonomic" risk factors were also referred as physical risk factors because it includes the work aspects that reduce its fit to worker characteristics. According to Warren (2001), ergonomic risk factors were categorized into three: biomechanical or physical risk, psychosocial risk, and organizational risk. The basic physical risk factors were force, awkward posture, static posture, repetition, dynamic factors, compression and vibration. However, there were several modifying factors classified under these factors such as intensity, duration, temporal profiles, and cold temperature. Therefore, working experience and working duration were classified

under ergonomic risk factors in this study because it measure on how long of exposure to the risk factor lasts. A study conducted by Johnson *et al.* (1988) among SMOs concluded that the prevalence of neck and shoulder disorders was increased with years of employment. Dominant hand used was also classified under these factors because every task need hands to work together and it might influence the physical factors while performing any task.

5.1.4. Relationship between MSS and psychosocial risk factors

In this study, the finding shows no significant association between MSS and psychosocial risk factors. There were three main elements of psychosocial risk factors concerned in this study which were job decision latitude, job demand and social support. Previously, these factors become concerned because it may influence changes toward posture, movement and forces exerted which induced the impact on biomechanical load as well as increased muscle tension or hormonal excretion influencing the pain perception. These may affect the ability of an individual to cope with that pain (Hoogendoorn *et al.,* 2000; Linton, 2001).

A previous study conducted among nurses found that social support, job demand, and job content had significant relationship with low back pain (Habibi *et al.*, 2012). The evidence revealed by Bongers *et al.* (1993) concluded that MSS were related with low job control and social support. In other systematic review, there was an evidence revealed that at least one psychosocial factor associate with musculoskeletal system in upper limb such as shoulders, elbows, wrists and hands (Bongers *et al.,* 2002).

The result from this study shows no significant relationship between MSS and psychosocial factors was because it could be unsuccessful to assess in cross-sectional study (Bongers *et al.,* 1993; Sauter and Swanson, 1996). It was suggested to conduct longitudinal study for determining this factor with MSSs. Bongers *et al.,* (1993) also add that cross-sectional study not suitable to examine causality rather than longitudinal study because the collection of data conducted over time and the symptoms can be measured before the onset of the MSS. Daily collection for this factor can make the relationship to be possible (Teuchmann *et al.,* 1999).

5.1.5. Relationship between MSS and socio-demographic factors

In many literatures study revealed socio-demographic factors such as physical activity, BMI, and education level were increased with the prevalence of MSD (Andersen and Gaardboe, 1993; Ming and Zaproudiana, 2003; Waersted and Westgaard, 1991). However, there was no significant association was found between these factors in this study.

Much of study relates these factors with LBP rather than other body regions. According to Grotle *et al.* (2004), increased with age was associated with the increase of LBP severity because intervertebral discs will undergo degenerative changes with aging. This finding was supported with another study by Paajanen *et al.* (1997) showing that the percentage of subjects with degenerated discs increased with age and rapidly increases among subjects with LBP.

LBP severity also associated with obesity due to several reasons such as higher mechanical stresses and abnormal loads on the spine due to the additional weight, loss of endurance, and reduced healing to inability of blood flow and vital nutrients to reach injured areas due to presence of fatty acid (Orvieto *et al.,* 1996; Manchikanti, 2000). A longitudinal studies conducted by Da Costa and Vieira (2010) concluded that high BMI was one of the identified risk factors with WRMD.

5.1.6. Limitation of study

One of the limitations of this study was conducting cross-sectional study which does not suitable to examine causality rather than longitudinal study because the collection of data conducted over time and the symptoms can be measured before the onset of the MSS. For example, to determine the relationship between psychosocial risk factors need to be conducted in longitudinal study. Daily collection for this factor and makes the relationship to be possible (Teuchmann *et al.,* 1999).

Other limitations of this study was that the small sample size may give impact to significant of the dependent and independent variables rather than the study design conducted which only carried out in a short period. However, there was some study conducted with a small sample size of 5 among SMOs in the Netherlands (Delleman and Dul, 2002) and 6 SMOs in Mexico (Punnet *et al.,* 1985).

This study conducted and become concerned was because of limited numbers of study among tailors in Malaysia and they had a probability to experienced MSD which give impact to their performance and productivity similar with SMOs in other developing countries. Even lots of tailors can be found in each states of Malaysia, but they are the minority group of workers that being concerned about their health status

because mostly they are self-employed and low in awareness aspect of health with their work environment.

In future suggestion, a longitudinal study is recommended with large and diverse tailors participating from different states in Malaysia to achieve the goal of objectives in this study as well as representativeness of all tailors in Malaysia.

5.2. Conclusion

The objective of this study was to determine the prevalence of musculoskeletal symptoms and its associated factors among female tailors in Temerloh, Pahang. The first and second hypotheses were rejected because there was no significant relationship between psychosocial and ergonomic risk factors with MSS. However, the prevalence of MSS was quite high in this study.

The high prevalence of MSS such as neck, shoulder, upper and lower back pain can contribute to experience MSD among female tailors after a long period of exposure to ergonomic and psychosocial risk factors if there were no any action taken by those

individuals even there was no significant relationship between these factors with MSS in this study. This was because other previous study revealed evidence that ergonomic and psychosocial factors show an effect on the development of MSD in variety types of occupation worldwide.

5.3. Recommendation

There are few recommendations which are appropriate to enhance this kind of study in the future. First, the prevalence of MSS associated with psychosocial and ergonomic risk factors among female tailors needs to be done in a longitudinal study with a large number of tailors participating from different state in Malaysia to achieve the objectives in this study as well as representativeness to all tailors in Malaysia. In addition, increased in sample size will show more representative sample.

Secondly, any institution that provide a course on sewing skills and learning to become a tailors or fashion designer need to provide a subject on ergonomics and other factors which can contribute to health problems related to it in their syllabus to increase

the awareness on how to prevent them of getting health problems due to ergonomic factors such as MSD.

Thirdly, increase the awareness of tailors regarding their impact of works on their health. This can be improved by healthcare professional including doctors who received the complaint regarding the pain and examined the patients. They should take into account the occupational background of the patients to give a brief explanation on the impact of works to their health and proposed any relevant practice to their work and preventing their health become worst.

Lastly, ergonomic instrument should be improved by manufacturer to design the suitable chairs and sewing machine which can be adjusted due to difference of individual anthropometry measurement.

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APPENDICES

Appendix 1

Ethical approval letter from UPM

Appendix 2

Application form for research project

Appendix 3

Respondent's information sheet

BORANG B1: PENERANGAN DAN PERSETUJUAN RESPONDEN

Sila baca maklumat berikut dengan teliti. Sekiranya anda mempunyai sebarang pertanyaan, sila kemukakan kepada penyelidik

1. TAJUK KAJIAN

Prevalens simptom muskuloskeletal (MSS) dikaitkan dengan faktor-faktor risiko psikososial dan ergonomik kalangan tukang jahit wanita di Temerloh, Pahang.

2. PENGENALAN

Tukang jahit wanita kebanyakannya mengalami simptom otot kerana aktiviti-aktiviti mereka dalam tugasan menjahit. Tujuan soal selidik ini adalah untuk menyiasat prevalens MSS yang berkaitan dengan faktor-faktor risiko psikososial dan ergonomik kalangan tukang jahit wanita di Temerloh, Pahang.

3. APAKAH YANG PERLU ANDA LAKUKAN?

Peserta akan diminta untuk menjawab soalan kaji selidik bagi mendapatkan maklumat berhubung dengan kajian. Masa 20 minit diperlukan untuk melengkapkan soalan kajian.

4. SIAPA YANG TIDAK BOLEH MENYERTAI KAJIAN INI?

Hanya tukang jahit wanita yang bekerja di kedai-kedai jahit akan dimasukkan ke dalam kajian ini.

5. APAKAH FAEDAH MENYERTAI KAJIAN INI?

a) KEPADA ANDA SEBAGAI PESERTA?

Melalui ujian ini anda dapat menyedari tentang prevalance MSDs yang berkaitan dengan faktor-faktor risiko psikososial dan ergonomik di kalangan tukang jahit wanita dan mengambil beberapa langkah untuk mencegah dan mengawal risiko mendapat MSDs yang akan memberi kesan kepada kehidupan harian mereka dan prestasi kerja.

b) KEPADA PENYELIDIK?

Kajian ini membantu penyelidik untuk mengenal pasti faktor-faktor risiko yang berkaitan akan menyumbang kepada MSDs dan mencadangkan beberapa langkah-langkah yang akan membantu tukang jahit untuk mencegah dan mengawal risiko MSDs.

6. ADAKAH IA BERISIKO?

Ujian-ujian yang dijalankan tidak berisiko.

7. ADAKAH MAKLUMAT DAN IDENTITI SAYA KEKAL RAHSIA?

Semua maklumat yang diberikan oleh responden di dalam borang kaji selidik dijamin sulit. Tiada huraian individu akan dibuat pada mana-mana bahagian kajian atau penerbitan.

8. SIAPA YANG SAYA PERLU HUBUNGI SEKIRANYA SAYA MEMPUNYAI SOALAN TAMBAHAN SEMASA MENGIKUTI PENYELIDIKAN INI?

Jika anda mempunyai sebarang soalan tambahan, anda boleh menghubungi kepada Profesor Madya Dr Haliza Abdul Rahman, Penyelia penyelidikan di 03-89472396 atau Nurhasnida binti Mohd Piah, penyelidik di 017-9213928.

Sila tandatangan disini sekiranya anda telah membaca dan memahami kandungan halaman ini

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9.PERSETUJUAN

Saya…… No Kad Pengenalan. ……
beralamat……
……dengan ini bersetuju untuk mengambil bahagian secara sukarela dalam penyelidikan yang tersebut di atas *(kajian klinikal/percubaan ubat-ubatan/rakaman video/kumpulan sasaran/temuduga/ soal selidik).

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

Saya* berminat / tidak berminat untuk mengetahui keputusan kajian yang melibatkan saya.
I setuju/tidak bersetuju untuk imei/gambar/rakaman video/ rakaman suara digunakan dalam apa jua bentuk penerbitan atau pembentangan. (sekiranya berkaitan).
*potong yang tidak berkenaan

Tandatangan ……
(*Responden*)
Tarikh :……

Tandatangan ……
(*Saksi*)
Nama :……..
No. K/P: ……..

Saya mengesahkan bahawa saya telah menerangkan kepada responden ini sifat dan tujuan penyelidikan yang tersebut di atas.

Tarikh ……

Tandatangan ……
(Penyelidik)

Appendix 4

Questionnaire form

UNIVERSITI PUTRA MALAYSIA

FAKULTI PERUBATAN DAN SAINS KESIHATAN
JABATAN KESIHATAN PEKSEKITARAN DAN PEKERJAAN
BACHELOR SAINS (KESIHATAN PEKSEKITARAN DAN PEKERJAAN)

SOAL SELIDIK MENGENAI PREVALENS SIMPTOM MUSKULOKELETAL BERKAITAN DENGAN FAKTOR RISIKO PSIKOSOSIAL DAN ERGONOMIK ANTARA TUKANG JAHIT PEREMPUAN DI TEMERLOH, PAHANG.

Latar belakang:

Tukang jahit wanita kebanyakannya mengalami simptom muskuloskeletal kerana aktiviti-aktiviti mereka dalam tugas jahitan. Tujuan soal selidik ini adalah untuk menyiasat prevalens simptom muskuloskeletal berkaitan dengan faktor-faktor risiko psikososial dan ergonomik kalangan tukang jahit wanita di Temerloh, Pahang.

Semua maklumat yang diperolehi daripada soal selidik ini adalah SULIT dan maklumat yang hanya digunakan untuk Tahun Akhir Projek Penyelidikan saya. Kerjasama anda adalah dihargai. Terima kasih.

ID RESPONDENT : | | | | | |

Tarikh Kajian : _____

BAHAGIAN A: MAKLUMAT DEMOGRAFI

Arahan: Sila tandakan (/) pada ruangan yang disediakan.

1. Umur:

2. Bangsa:
   - ☐ Melayu
   - ☐ India
   - ☐ Cina
   - ☐ Lain-lain

3. Status pendidikan
   - ☐ Sekolah rendah
   - ☐ Sekolah menengah
   - ☐ University/kolej

4. Status perkahwinan
   - ☐ Bujang
   - ☐ Berkahwin
   - ☐ Cerai/balu

5. Adakah anda sedang hamil?
   - ☐ Ya
   - ☐ Tidak

6. Adakah anda selalu bersenam?
   - ☐ Ya
   - ☐ Tidak

   Jika ya, sila nyatakan berapa kali seminggu. _____ Kali/minggu

7. Adakah anda mempunyai sebarang kerja sambilan?
   - ☐ Ya
   - ☐ Tidak

   Jika ada, apakah kerja tersebut?

   _____

BAHAGIAN B: FAKTOR RISIO PSIKOSOSIAL (JOB CONTENT QUESTIONNAIRE)

Arahan: Sila tandakan (/) pada ruangan yang disediakan.

1 – Sangat tidak setuju	3 – Setuju
2 – Tidak setuju	4 – Sangat setuju

		1	2	3	4
1.	Tugas saya memerlukan saya belajar sesuatu yang baru.				
2.	Kerja saya melibatkan banyak kerja berulang-ulang.				
3.	Tugas saya memerukan saya untuk menjadi kreatif.				
4.	Tugas saya memerlukan saya membuat keputusan bergantung pada diri sendiri.				
5.	Tugas saya memerlukan tahap kemahiran yang tinggi.				
6.	Di tempat kerja, saya diberi banyak kebebasan untuk membuat keputusan bagaimana saya melakukan kerja.				
7.	Saya mampu melakukan pelbagai perkara di tempat kerja.				
8.	Saya mempunyai banyak perkara untuk diberitahu mengenai apa yang berlaku di tempat kerja saya.				
9.	Saya mempunyai peluang untuk mengembangkan kebolehan khusus.				
10.	Tugas saya memerlukan saya bekerja dengan cepat.				
11.	Tugas saya memerlukan saya bekerja keras.				
12.	Saya tidak diminta untuk melakukan kerja yang berlebihan.				
13.	Saya mempunyai masa yang cukup untuk menyiapkan pekerjaan yang diberi.				
14.	Saya tidak memihak kepada mana-mana permintaan yang menimbulkan koflik.				

Adakah anda mempunyai pembantu untuk membantu dan meringankan kerja anda? Jika ada, jawab soalan berikut.

1.	Rakan sekerja mahir dalam melaksanakan tugasan mereka.				
2.	Rakan sekerja mengambil tahu kehidupan peribadi saya.				
3.	Rakan sekerja seorang yang mudah mesra.				

4. Rakan sekerja sangat membantu dalam menyiapkan tugasan. ☐☐☐☐
5. Pembantu saya mengambil berat tentang kebajikan rakan sekerja. ☐☐☐☐
6. Pembantu saya memberi perhatian terhadap apa yang dinyatakan. ☐☐☐☐
7. Pembantu saya sangat membantu dalam menyiapkan tugasan. ☐☐☐☐
8. Pembantu saya sentiasa bekerjasama dalam kerja berkumpulan. ☐☐☐☐

BAHAGIAN C: KAJIAN SIMPTOM BADAN BERPUSAT (SOAL SELIDIK NORDIQ)

I) SOAL SELIDIK UMUM

1. Tarikh siasatan
   _____/_____/_____
   Tahun Bulan Hari

2. Tahun apakah anda dilahirkan?
   _____

3. Berapa lama anda telah melakukan kerja ini? (Nyatakan dalam bulan dan tahun)
   _____/_____
   Tahun Bulan

4. Secara purata, berapa jam seminggu anda bekerja?
   _____ jam/seminggu

5. Berapakah berat anda?
   _____ kg

6. Berapakah ketinggian anda?
   _____ cm

7. Adakah anda menggunakan tangan kanan atau kiri?
   ☐ Tangan kanan
   ☐ Tangan kiri

II) LOCOMOTIVE ORGAN TROUBLE QUESTIONNAIRE *[Soal selidik masalah organ lokomotif]*

Adakah anda pada bila-bila masa dalam tempoh 12 bulan lepas mempunyai masalah (sakit, tidak selesa) dalam:	Perlu dijawab hanya kepada orang-orang yang mempunyai masalah	
	Adakah anda pada bila-bila masa dalam tempoh 12 bulan lepas telah dihalang daripada melakukan kerja-kerja biasa anda (di rumah atau jauh dari rumah) kerana masalah ini?	Adakah anda mengalami masalah pada bila-bila masa dalam tempoh 7 hari lepas?
i) Leher/tengkuk ☐ Tidak ☐ Ya *Jika ya, sila jawab soalan ii dan iii. Jika tidak, terus ke soalan berikutnya.*	**ii)** ☐ Tidak ☐ Ya	**iii)** ☐ Tidak ☐ Ya
ii) Bahu ☐ Tidak ☐ Ya *Jika ya, sila jawab soalan ii dan iii. Jika tidak, terus ke soalan berikutnya.*	**ii)** ☐ Tidak ☐ Ya	**iii)** ☐ Tidak ☐ Ya
iii) Siku ☐ Tidak ☐ Ya *Jika ya, sila jawab soalan ii dan iii. Jika tidak, terus ke soalan berikutnya.*	**ii)** ☐ Tidak ☐ Ya	**iii)** ☐ Tidak ☐ Ya
iv) Pergelangan tangan/tangan ☐ Tidak ☐ Ya *Jika ya, sila jawab soalan ii dan iii. Jika tidak, terus ke soalan berikutnya.*	**ii)** ☐ Tidak ☐ Ya	**iii)** ☐ Tidak ☐ Ya
v) Bahagian atas pinggang ☐ Tidak ☐ Ya *Jika ya, sila jawab soalan ii dan iii. Jika tidak, terus ke soalan berikutnya.*	**ii)** ☐ Tidak ☐ Ya	**iii)** ☐ Tidak ☐ Ya
vi) Bahagian bawah pinggang ☐ Tidak ☐ Ya *Jika ya, sila jawab soalan ii dan iii. Jika tidak, terus ke soalan berikutnya.*	**ii)** ☐ Tidak ☐ Ya	**iii)** ☐ Tidak ☐ Ya

Appendix 5

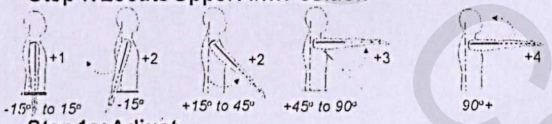
Rapid Upper Limb Assessment (RULA)

RULA Employee Assessment Worksheet

Complete this worksheet following the step-by-step procedure below. Keep a copy in the employee's personnel folder for future reference.

A. Arm & Wrist Analysis

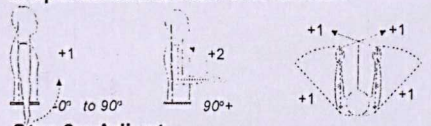
Step 1: Locate Upper Arm Position



Step 1a: Adjust...

If shoulder is raised: +1;
If upper arm is abducted: +1;
If arm is supported or person is leaning: -1

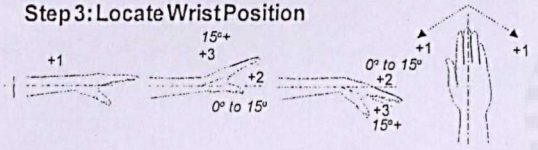
Step 2: Locate Lower Arm Position



Step 2a: Adjust...

If arm is working across midline of the body: +1;
If arm out to side of body: +1

Step 3: Locate Wrist Position



Step 3a: Adjust...

If wrist is bent from the midline: +1

Step 4: Wrist Twist

If wrist is twisted in mid-range =1;
If twist at or near end of range = 2

Step 5: Look-up Posture Score in Table A

Use values from steps 1,2,3 & 4 to locate Posture Score in table A

Step 6: Add Muscle Use Score

If posture mainly static (i.e. held for longer than 1 minute) or;
If action repeatedly occurs 4 times per minute or more: +1

Step 7: Add Force/load Score

If load less than 2 kg (intermittent): +0;
If 2 kg to 10 kg (intermittent): +1;
If 2 kg to 10 kg (static or repeated): +2;
If more than 10 kg load or repeated or shocks: +3

Step 8: Find Row in Table C

The completed score from the Arm/wrist annlysis is used to find the row on Table C

SCORES

Final Upper Arm Score =

Final Lower Arm Score =

Final Wrist Score =

Wrist Twist Score =

Posture Score A =

\+

Muscle Use Score =

\+

Force/load Score =

=

Final Wrist & Arm Score =

Table A

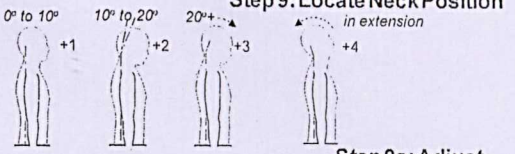
Upper Arm	Lower Arm	Wrist 1 Wrist Twist 1	1 2	Wrist 2 Wrist Twist 1	2 2	Wrist 3 Wrist Twist 1	3 2	Wrist 4 Wrist Twist 1	4 2
1	1	1	2	2	2	2	3	3	3
	2	2	2	2	2	3	3	3	3
	3	2	3	2	3	3	3	4	4
2	1	2	2	2	3	3	3	4	4
	2	2	2	2	3	3	3	4	4
	3	2	3	3	3	3	4	4	5
3	1	2	3	3	3	4	4	5	5
	2	2	3	3	3	4	4	5	5
	3	2	3	3	4	4	4	5	5
4	1	3	4	4	4	4	4	5	5
	2	3	4	4	4	4	4	5	5
	3	3	4	4	5	5	5	6	6
5	1	5	5	5	5	5	6	6	7
	2	5	6	6	6	6	7	7	7
	3	6	6	6	7	7	7	7	8
6	1	7	7	7	7	7	8	8	9
	2	7	8	8	8	8	9	9	9
	3	9	9	9	9	9	9	9	9

Table C

	1	2	3	4	5	6	7+
1	1	2	3	3	4	5	5
2	2	2	3	4	4	5	5
3	3	3	3	4	4	5	6
4	3	3	3	4	5	6	6
5	4	4	4	5	6	7	7
6	4	4	5	6	6	7	7
7	5	5	6	6	7	7	7
8+	5	5	6	7	7	7	7

B. Neck, Trunk & Leg Analysis

Step 9: Locate Neck Position

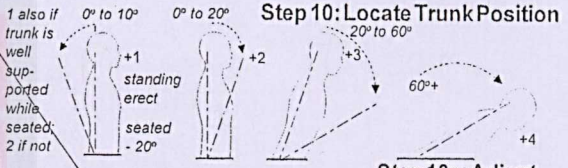


Step 9a: Adjust...

If neck is twisted: +1; If neck is side-bending: +1

=Final Neck Score

Step 10: Locate Trunk Position



Step 10a: Adjust...

If trunk is twisted: +1; If trunk is side-bending: +1

= Final Trunk Score

Step 11: Legs

If legs & feet supported and balanced: +1;
If not: +2

= Final Leg Score

Trunk Posture Score

Table B

Neck	1 Legs 1	1 Legs 2	2 Legs 1	2 Legs 2	3 Legs 1	3 Legs 2	4 Legs 1	4 Legs 2	5 Legs 1	5 Legs 2	6 Legs 1	6 Legs 2
1	1	3	2	3	3	4	5	5	6	6	7	7
2	2	3	2	3	4	5	5	5	6	7	7	7
3	3	3	3	4	4	5	5	6	6	7	7	7
4	5	5	5	6	6	7	7	7	7	7	8	8
5	7	7	7	7	7	8	8	8	8	8	8	8
6	8	8	8	8	8	8	8	9	9	9	9	9

Step 12: Look-up Posture Score in Table B

Use values from steps 9, 10 & 11 to locate Posture Score in Table B

= Posture B Score

\+

= Muscle Use Score

\+

= Force/load Score

=

= Final Neck, Trunk & Leg Score

Step 13: Add Muscle Use Score

If posture mainly static or;
If action 4/minute or more: +1

Step 14: Add Force/load Score

If load less than 2 kg (intermittent): +0;
If 2 kg to 10 kg (intermittent): +1;
If 2 kg to 10 kg (static or repeated): +2;
If more than 10 kg load or repeated or shocks: +3

Step 15: Find Column in Table C

The completed score from the Neck/Trunk & Leg analysis is used to find the column on Chart C

Final Score

Subject: _____ Date: __/__/__

Company: _____ Department: _____ Scorer: _____

FINAL SCORE: 1 or 2 = Acceptable; 3 or 4 investigate further; 5 or 6 investigate further and change soon; 7 investigate and change immediately

Appendix 6

Anatomical body areas