WORK-RELATED MUSCULOSKELETAL DISORDERS (WMSDs) AMONG TEACHERS AND STUDENT'S MANAGEMENT ASSISTANTS IN SPECIAL EDUCATION SCHOOLS IN MALAYSIA

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Field of Study: School Ergonomics

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ABSTRACT

A student with Special Educational Needs (SEN) requires more attention and assistance in school compared to peers of their age. Teachers and Student's Management Assistants (SMAs) in these schools will have to be highly responsible for meeting the students' daily needs which results in symptoms of musculoskeletal systems. In conjunction with this issue, the objectives of this study are to determine of risk factors that lead to Work- Related Musculoskeletal Disorders (WMSDs) on educators at school and to suggest on ways to overcome the disorder as preventive measures for higher productivity at work. Questionnaires consisting of personal information, job specification and work-related information were distributed in 5 Special Education Schools. This study shows 96.23%prevalence rate meaning that WMSDs occurs in 9 out of 10 teachers and Student's Management Assistant. The most affected regions were upper back with 90.6% (n=48), lower back with 81.1% (n=43), knee with 67.9% (n=36) and shoulder with 47.2% (n=25). Results show that there are multiple risk factors that lead to WMSDs among teacher and Student's Management Assistant at Special Education Schools. Risk factors at work (such as the work-related risk factors and individual-related risk factors) were determined and suggestion on ways to overcome WMSDs as preventive measures relating to engineering, administrative control and application of ergonomics for high productivity at work were included in this study to decrease number of injuries and prevent WMSDs at work. The study recommends thatthe effort of teachers and Student's Management Assistant to apply safe working practice should be encouraged by the school management and Ministry of Education Malaysia to prevent WMSDs.

ABSTRAK

Pelajar Pendidikan Khas memerlukan lebih banyak perhatian dan bantuan berbanding rakan sebaya mereka di sekolah. Guru dan pembantu pengurusan murid di sekolah-sekolah ini perlu bertanggungjawab untuk memenuhi keperluan harian pelajar yang menyebabkan gejala system muskuloskeletal. Dengan ini, objektif kajian ini adalah untuk menentukan factor risiko yang membawa kepada Gangguan Muskuloskeletis Berkaitan Pekerjaan terhadap pendidik di sekolah dan mencadangkan cara untuk mengatasi gangguan ini sebagai langkah pencegahan untuk mencapai produktiviti tinggi di tempatkerja. Soalselidik yang berkaitan dengan maklumat berkaitan peribadi, spesifikasi pekerjaan dan maklumat berkaitan pekerjaan telah diedarkan di 5 Sekolah Pendidikan Khas di Selangor. Kajian ini menunjukkan kadar prevalensi WMSDs sebanyak 96.23% yang bermaksud WMSDs berlakudalam 9 daripada 10 guru dan pembantu pengurusan murid. Anggota badan yang paling terjejas adalah bahagian atas belakang tubuh 90.6% (n = 48), bahagian bawah belakang tubuh 81.1% (n = 43), lutut67.9% (n = 36) dan bahu 47.2% (n = 25). Kajian ini menunjukkan bahawa terdapat pelbagai factor risiko yang membawa kepada WMSDs di kalangan pengajar di Sekolah-sekolah Pendidikan Khas. Faktor risiko di tempat kerja (seperti factor risiko yang berkaitan dengan pekerjaan dan individu) telah ditentukan dan cadangan mengenai cara untuk mengatasi WMSDs sebagai langkah pencegahan yang berhubungan dengan kejuruteraan, kawalan pentadbiran dan penggunaan ergonomic untuk produktiviti tinggi di tempatkerjadisertakan di dalam kajian ini untuk mengurangkan bilangan kecederaan dan mencegah WMSDs di tempat kerja. Oleh itu, kajian ini mencadangkan agar usaha setiap pengajar untuk mengetahui akan disokong dan digalakkan oleh pengurusan sekolah dan Kementerian Pendidikan Malaysia untuk mencegah WMSDs.

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LIST OF SYMBOLS AND ABBREVIATIONS

SEN	:	Special Educational Needs
MSDs	:	Musculoskeletal Disorders
WMSDs	:	Work-Related Musculoskeletal Disorders
SMAs	:	Student's Management Assistants
OT	:	Occupational therapy
yo	:	Years old (age)

LIST OF APPENDICES

CHAPTER 1: INTRODUCTION

1.1 Background of Study

Musculoskeletal disorders (MSDs) are an injury affecting the human body movement. It covers a wide range of degenerative and inflammatory conditions affecting the musculoskeletal system such as the muscle, tendon, ligaments, nerves, discs, blood vessels and etc. It mostly arises from occupational exposures also known as Work-Related Musculoskeletal Disorders (WMSDs). This can occur from any single event or repetitive tasks when the system is overused.

The numbers of physical strains faced by workers are increasing by year. About 1/3 of all worker injury and illness cases were musculoskeletal disorders. Studies show that regular school teachers were reported with WMSDs prevalence rate of 39% to 95% whereas the rate for teacher and Student's Management Assistants from SES is 85.8%. (Cheng, Wong, Yu & Ju, 2016)

WMSDs indirectly decrease the productivity at work. This is because; WMSDs has the possibilities to affect the quality of life. It is known to be one the biggest contributors to loss of working time for employees due to the restriction of working hour, followed by work place injuries and illnesses. It also results in early retirements and increased medical leave.

As the most common occupational health problems, WMSDs has to be controlled from affecting the population from this profession. Multiple precautions such as identifying possible risk factors, complying with regulations related to workplace health promotion and environment modification besides implication of safe working practice must be taken into consideration to reduce the disorders.

1.2 Problem Statement

A student with Special Educational Needs is deferred in growth that requires more assistance in daily routines. They are ought to be heavier than their typically developing peers before 3 years old. The risk for this phenomenon will consistently increase in size when they are 3 and 5 years old. In contrast to workers in child care centers, educators at SEN will manage disabled students for meeting the daily needs. Thisrequires teacher's extra attention with more physical effort while teaching them.

Examples of daily activities are when feeding, supporting for movement, assisting in transportation and etc. These daily activities, if not observed or conducted in a correct way, will lead to Work-Related Musculoskeletal Disorders. The most significant Musculoskeletal Disorders are Carpal Tunnel Syndrome, Tendonitis, Muscle / Tendon Pressure, Sputum Ligament, Neck Tension Syndrome.

The importance of highlighting this issue is to decrease the possibilities that leads to reduced productivity at workplace, applying sick leave, and leaving the profession before retirement can impose a major economic burden because of compensation costs, lost wages, medical costs, lower productivity, lower product quality and a damaged safety culture.

Therefore, in this study, five primary schools have been chosen to conduct surveys and as measures to aid in determination of the risk factors of WMSDs among teachers and SMAs in Special Education Schools for prevention of potential causes and suggestion were made accordingly. The problems being addressed in this issue are portrayed through the following questions:

a) What are the risk factors that lead to MSDs in this profession?

b) What are the preventive measures that can be applied to minimize the Musculoskeletal Disorders occurring on educators?

1.3 Objectives

The objectives of the study are:

a) To determine the risk factors that lead to WMSD on teachers and Student's Management Assistants at school

b) To suggest ways to overcome the disorder

1.4 Scope of the Study

This study was carried out in five Special Education government primary schools located in Selangor. The selected schools consists of hearing, vision impairments and learning disabilities students.

Below are the detailed scope carried out to achieve the objectives.

a) Visit and conduct surveys in schools on teachers and Student's Management Assistants to observe the environment and understand the process

b) Collection of data on personal related questions, job specification and work-related information.

1.5 Report Layout

The chapters in this report were divided into five main categories. Description of the chapters are as following:

a. Chapter 1: Introduction

Introduction of Work-Related Musculoskeletal Disorders, Special Education background and problem statement of the research were discussed. Objectives and scope of the study are also defined precisely.

b. Chapter 2: Literature Review

This chapter includes defined information regarding Work-Related Musculoskeletal Disorders, details on Special Education Schools, students, teachers and Student's Management Assistants. Descriptions of the multi-factorial risk factors causing the disorders were also covered.

c. Chapter 3: Methodology

The study was performed in five primary Special Education Schools. In this chapter, the methodology shows sequenced orders of research conducted to examine the risk factors causing and ways to overcome the disorders. The orders were planned to achieve the objectives of study.

d. Chapter 4: Results and Discussion

Results collected from the school based on methodology were tabulated and shown in tables and figures this chapter. The results were then discussed accordingly in this section.

e. Chapter 5: Conclusion, Limitation and Recommendation

This chapter includes conclusion based on findings obtained in the results. Few limitations were identified in this study and listed out in this section. Recommendations based on observation and results are also plotted here.

CHAPTER2: LITERATURE REVIEW

This chapter includes defined information regarding Work-Related Musculoskeletal Disorders, details on Special Education Schools, students, teachers and Student's Management Assistants. Descriptions of the multi-factorial risk factors causing the disorders were also covered.

2.1 Special Education

Special Education School (also known as aided education, or exceptional education) is the education for students who needs Special Educational Needs which addresses their individual differences and capabilities. In this process, arrangement of teaching procedures is planned for each individual with systematically monitoring such as the accessible settings and adapted materials and equipment. This design for early intervention students is to assist them achieve a higher level of personal self-sufficiency and success in their community which may not be able to meet with a typical classroom education.

Types of several common impairments of these special students are learning difficulties (such as dyslexia), communication, emotional and behaviour difficulties (such as ADHD and ADD, or intellectual, sensory, physical impairments, hearing or vision impairments (NewZealand.gov.nz, 2008).

According to Terzi (2014), inclusive education must be seen as tool for education equality, well-being and justice for these children as the government now realizes the inclusivity in education sector for children with disabilities.To reach the goals of inclusive education practice, need for integration of Special Education and mainstream education funding, initiatives in special education must be redesigned to prevent divided

focus in mainstreaming educational inclusivity for these children with practices as special schools and inclusive schools (Nasir & Efendi, 2017).

2.1.1 In Malaysia

According to Unicef (2014), 33 Special Education Schools were establishedin Malaysia. Twenty eight of them are primary schools and 5 are secondary schools. Twenty two from the primary schools are for children with hearing disabilities, five for visual disabilities and one for learning disabilities.These schools provide children with disabilities with equal opportunity to experience study in schools which are equipped with environment and materials as per their needs.

Nasir and Efendi (2017), have mentioned in their study that progresses could be seen in special education since its introduction in Malaysia. Six universities in this country namely University of Malaya (UM), International Islamic University Malaysia (IIUM), National University of Malaysia (UKM) MARA, University of Technology (UiTM), Sultan Idris University of Education (UPSI) and University of Science Malaysia (USM) have offered several courses for level of degree in special education besides the Special Education Teachers' Training Institute in Cheras.

2.1.2 Legislation History

In this section, policy development of special needs education sector in Malaysia will be overviewed. Malaysia has been rapidly progressing since the year 1990 on special education. Development of segregated teacher preparation program for mainstream and special educators, establishment of Special Education Department in 1995 (currently known as Special Education Division) followed by inclusion of a chapter on special education in the Education Act 1996 and introduction of the Education Rules (Special

Education) by the Ministry of Education in 1997 (Nasir&Efendi, 2017). There are three special education programmes such as inclusive programme, special school and integrated programme in the Education Rules (Special Education).

In 2006, monthly allowance was allocated to all students who registered with the special education programmes. In 2008, the adoption of the Persons with Disabilities Act has brought a paradigm shift from welfare model to human rights model. It states that the persons with disabilities should not be excluded from formal education system due to their impairments (Nasir&Efendi, 2017).

In 2011, Education Rules (Special Education) 1997 was replaced with new education regulations for special education by Ministry of Education. The inclusion of special education could be found in the Preliminary Report of the National Education Blueprint 2013-2025 (Nasir&Efendi, 2017). This shows the speedy development of Malaysia in special education along the year with several challenges to be faced especially on the awareness of the citizens regarding inclusive education for all Malaysians.

2.1.3 Teaching Scheme/Methods of Provision

Different approaches are used by schools to provide the service to Special Educational Needs students. In overall, these approaches can be grouped into four categories depending on the connection between non-disabled and general students (using North American terminology).

The very first approach is inclusion where special students spend most of the time at school with students who do not need special needs due to the substantial modification of the general curriculum which is used by schools only for selected students with mild to moderate special needs. This is widely accepted as a best practice because specialized services will be provided depending on the type of service either inside or outside the

regular classroom. Students occasionally attend the more intensive instructional sessions, or related services that might require specialized equipment or such as speech therapy, physical therapy, rehabilitation counseling and etc in a resource room (Smith, 2007).

Second approach, mainstreaming is practiced in classes with non-disabled students where students with special needs will be educated during specific time periods based on their skills. This means students with special needs are scattered in separate classes for the rest of the school day (Zittleman&Sadker, 2006)

Segregation refers to providing separate classroom or in certain cases even separate schools (special school) for students with special needs. Students with special needs do not attend classes with non-disabled students in this approach. In segregated schools, students spend all instructional time exclusively in a separate classroom to be educated with pupils of their impairments whereas in segregated classrooms where their classes are located in general schools, they are provided with opportunities to experience social integration outside the classroom, such as by eating meals with non-disabled students (Ashurst, 2014)

The last model is exclusion. This is where a student is excluded from school if receive instruction is not received in any school. This has occurred in the past particularly in poor, rural areas of developing countries and in conditions of student is detained by the criminal justice system, in hospital or housebound. To date such exclusion has and still affects about 23 million disabled children worldwide. For students in hospital and housebound are optioned to receive one-on-one instruction or group instruction but it is not considered for those been expelled or suspended (Hicks, 2011).

2.2 Teachers and Student's Management Assistant

Teachers and Student's Management Assistants or better known as SMA do teaching and apart from it, performs nursing care duties as a substantial part of their work content at Special Education Schools for disabled students, mostly for mental and physically affected pupils. This is due to the inability of the students at such schools to hold coordination, adapt themselves to new environment and condition or control themselves on their own (Sagirani, Ferdiana, & Kumara, 2013).Moreover, students with impairments tend to exhibit abnormal muscle tone and are slightly overweight compared with their typically developing peers.

Physical demand is highly required in working with these students as they have delayed development compared to non-disabled pupils. More assistance is needed in their daily routines from educators. According to Cheng, Cheng, and Ju (2013), teachers and SMAs are responsible for meeting the daily needs of such students from these schools. Their physical strength is needed to frequently carrying students, transferring students from one place to another, lifting, assisting in positioning, pushing and pulling, feeding, prolonged standing and changing diaper but are not limited to only these activities. They are also frequently required to perform activities that require sustained stooping, constant trunk flexion periods of kneeling, bending and squatting (Wong, Lee, &Yeung, 2009)

Hence, teachers and student's management assistants in Special Education Schools are exposed to musculoskeletal disorders (Sagirani, Ferdiana, & Kumara, 2013).

2.2.1 Job Specification Information

Teachers and Student's Management Assistants in Special Education Schools are responsible to support students physically besides educating and monitoring them. They also guide these pupils in developing communication skills and perform speech and language therapies to the studentsin the form of services (Smith, 2007).

Students receive language and speech therapy, occupational therapy, special education and various other services. These services are more effective when it is performed in natural environment with their peers (Allen &Cowdery, 2014), (SAGE, 2008). Hence, it is teachers and SMAs duty to provide the student with the natural environment settings.

Activity such as rehabilitation are performed duly due to aiding pupils with impairments and multiple disabilities to minimize the impact and complications caused by their disease or disorders. It is provided to those with neurological disabilities, and those with musculoskeletal impairments including the loss of limbs.

To aid in the learning process, certain schools are also equipped with assistive technology including low vision aids, adaptive technology, sound field systems, FM systems and etc while assist children in rehabilitation process (Education, 2010).

These interventions were designed by occupational therapy practitioners for students with motor control deficits to participate in their desired activities. CaseSmith (2010) explains the functions of the therapies theoretically as such; a child learns movement more easily and when the movement is performed in variable situations. Consequently, the child is allowed to actively problem-solve the actions required; and therefore the activity is become productive to the child (SAGE, 2008).

2.3 Work-Related Musculoskeletal Disorders

Work-Related Musculoskeletal Disorders or widely known as WMSDs are subset of MSDs. The fact that differ work-related musculoskeletal disorders from musculoskeletal disorders is that WMSDs is caused or worsened by work activities performed at workplace (Erick & Smith, 2011). WMSDs forms due to actions associated to an individual's occupation exposure (Kim & Junggi Hong PhD, 2013).

According to (Leigh, 2000), an average 22 to 65 aged American individual spends 40 to 50 percent of their day at the workplace which results in a strong correlation between MSDs and occupational tasks. Therefore, when it comes to a duty of an educator, a teacher has most probably ended up with WMSDs at working hours which must have lasted a day or more and consequently affected daily events in the last 6 months (Cheng, Wong, Yu & Ju, 2013).

In a annual report of United States, work-related musculoskeletal disorders are a crucial issue with major economic implications due to its nature to be the most common but non-fatal injury at present (Putz-Anderson et al., 1997). Bureau of Labor Statistics on Workplace Injuries and Illnesses of 2010 recorded 2.9 million work-related injuries was reported in the United States (Kim &Junggi Hong PhD, 2013).

Consequently, a general estimation of the economic implications related to WMSD highlighted total costs of $46 billion due to nonfatal injuries and illnesses from 2007 (Leigh, 2000).Bureau of Labor Statistics on Employer-Reported Workplace Injuries and Illnesses recorded 2.9 million non-fatal workplace injuries and illnesses reported by private industry employers in the United States (BLS, 2016).

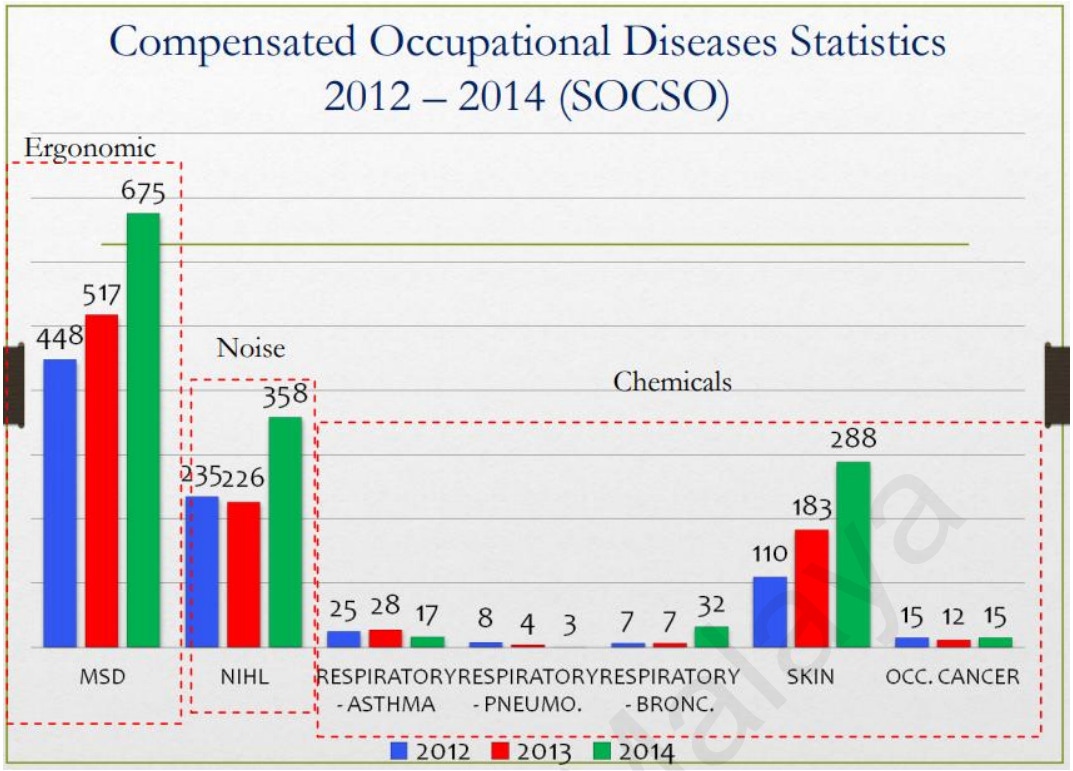


Figure 2.1: Compensated Occupational Diseases Statistics (SOCSO) (DOSH, 2016)

According to DOSH (2016), 448 cases were reported to SOCSO in 2012 on WMSDs and the numbers are increasing by year (Figure 2.1). The second highest case was on Noice-Induced Hearing Loss (n=358 in 2014) and followed by Skin diseases (n=288 in 2014).

The latest information retrieved from the DOSH website is on 2014 where WMSDs cases increased up to 675 cases and the highest among all other occupational diseases as shown in (Figure 2.2).

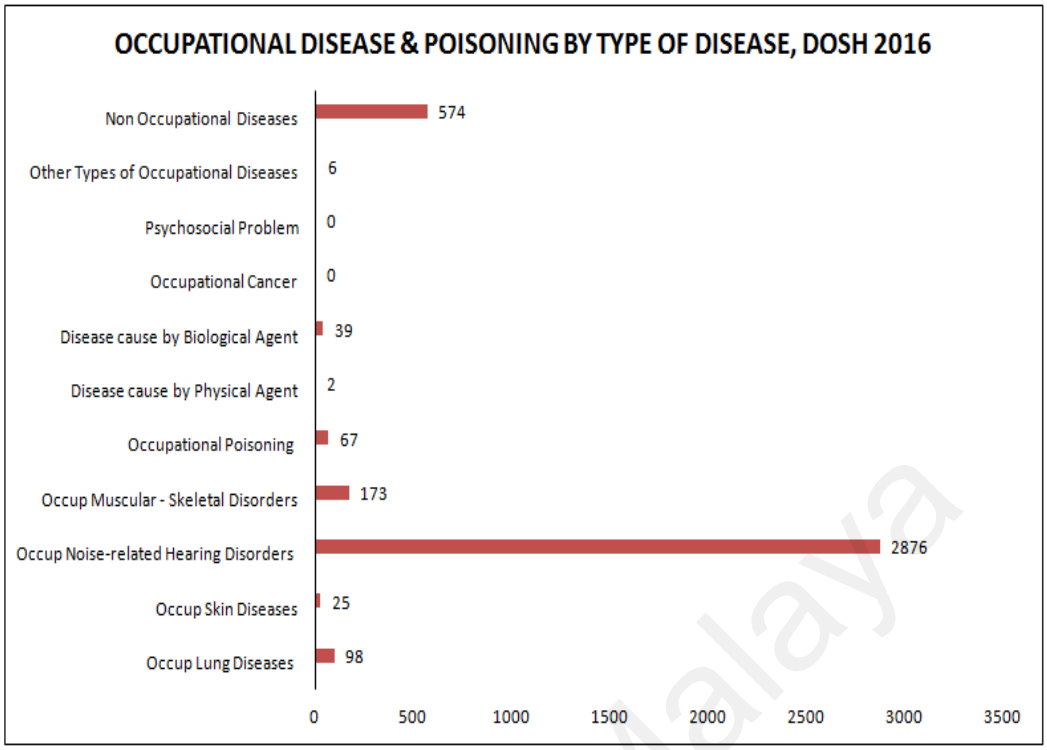


Figure 2.2: Occupational Disease and Poisoning By Type of Disease (DOSH, 2016)

In 2016, (as shown in Figure 2.2), occupational noise-induced hearing disorderswhich includes Hearing Impairment, Permanent Standard Threshold Shift and Noise-induced Hearing Loss (NIHL) were recorded as the most common occupational disease experienced by workers with (n=2876). It shows a percentage of 74.5% when compared to other reported diseases in 2016. Followed by occupational musculoskeletal diseases (n=173, 4.5%) and occupational lung diseases of 98 cases (2.5%) (DOSH, 2016).

WMSDs cause psychological stress, overexertion, a variety of other negative health-related symptoms and chronic pain to parts of body. Organizational risk factors are also been identified as contributing to the prevalence of WMSD. There are various work-related movements and body positions that can contribute to WMSDs which are awkward postures, lifting with improper technique, general overloading, typing for extended periods of time and cradling with the shoulders. WMSDs are formed from consistent damaged in tissues of the musculoskeletal system from variety of ways (Kim

& Junggi Hong PhD, 2013). Diagnosis and treatment for this disorder are difficult to name due to complexity of WMSDs and multi-factorial nature of it.

2.3.1 Common MSDs

Musculoskeletal Disorders are injuries in the musculoskeletal system which includes bones, joints and muscles and it can arise from repeated motions or exertions.There are numbers of common MSDs. They include conditions such as:

a) Osteoarthritis (OA)

In Osteoarthritis, the joints of the body such as the hips, spine and knees are affected. It is a degenerative condition and occurs when the joints coated by cartilage are damaged or worn away. Farmers and male workers have a significant higher risk of suffering from hip Osteoarthritis whereas professions at high risk forknee Osteoarthritis are miners, floor layers and cleaners (HSE, 2017). The figure below (Figure 2.3) shows a healthy knee joint at the top and affected knee joint below.

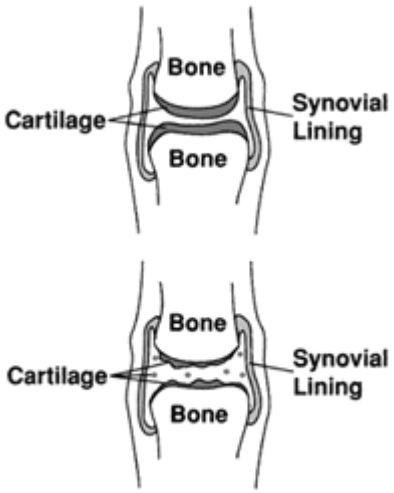


Figure 2.3An image of healthy and affected knee joint (Block, 2017)

b) Back pain

Injuries on muscles, ligaments, joints or discs are resulted from acute low back pain.It begins with inflammation and ranges in severity of pain. According to Peloza (2017), it could be difficult for the brain to precisely identify the senses causing pain due to significant overlap of nerve supply muscles, discs, ligaments and other spinal structures. Ligaments and muscles could heal faster but the time taken for a tom disc may not be identified as it also may not heal.Determination of the cause of pain is done by the time course.

c) Tendonitis

Repetitive action is the common cause of this disorder. This is because tendons perform movements over and over again. This can result in development of tendinitis if frequently similar motion is conducted while working. As all other MSDs causes, injuries, particular disease such as rheumatoid arthritis or Diabetes and aging could end up in tendinitis. Professions requiring activities with overhead lifting, repetitive motions, physical exertion are exposed to higher risk of this disorder. The risk of tendinitis could be reduced with correct performance of the task involving repetition of muscle movements (Simoneau, 1996). Tendons connect muscles tobones (as shown in Figure 2.4) and most of the muscles are attached to the finger bones by long tendons and they controls movements of hand (Figure 2.5).

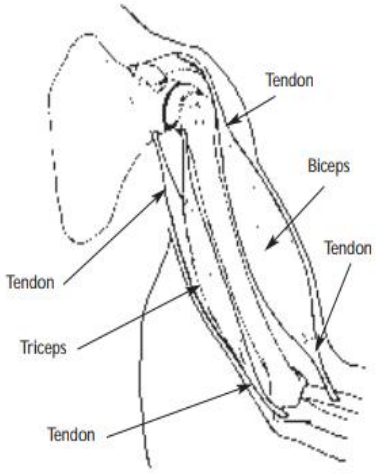


Figure 2.4: An image of Tendonitis bones (Simoneau, 1996)

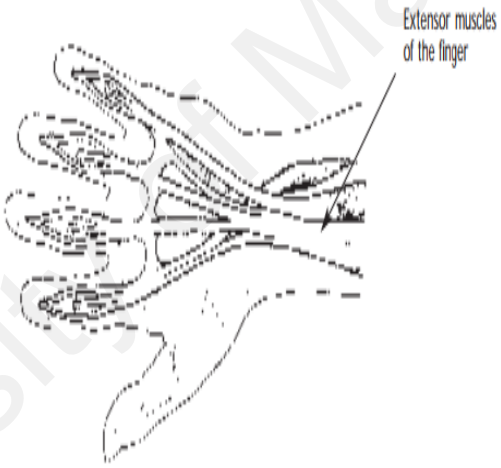


Figure 2.5: A second image of Tendonitis (Simoneau, 1996).

2.3.2 Symptoms

Pain is the most common symptom associated with work-related musculoskeletal disorders. Muscle tightness, swelling, joint stiffness and redness are observed in the affected area. A number of employees could experience sensations of sharp needle on their muscle, changes of skin color and numbness.

According to Healthcare consultants, work-related musculoskeletal disorders may develop from mild to severe in three stages; first stage, second stage and third stage. These stages will not be similar to all affected workers and is difficult to predict the when one stage ends and the next begin. Symptoms of each stage are defined precisely in (Table 2.1). The signal indicating the muscles and tendons need rest to recover will be the first pain experienced. Without proper rest, a worker is most probably in fatigue state.

Fatigues are where it begins when a worker exposed to MSD risk factors. When fatigue outruns the body's recovery system, it develops a musculoskeletal imbalance. Along the time, once fatigue repetitively occurs and outruns recovery, it develops musculoskeletal disorder as the musculoskeletal imbalance persists. (Table 2.2) shows the symptoms of each disorder in detail.

Stage of WMSDs	**Stage of symptoms**	**Symptoms**	**Work Performance Reduction**
First stage	Early stage	Tiredness and aching of the affected limb to arise during the working hours but fade during the off- period from work	None
Second stage	Intermediate stage	Tiredness and aching arise during the early working hours and remains at night	Partially reduced for repetitive work
Third stage	Late stage	Fatigue, weakness and aching remains even at rest	Highly reduced. Inability to sleep at night and to perform light duties.

Table 2.1: Identification of musculoskeletal disorders, occupational risk factors and symptoms of the most common disorders (CCOHS, 2014).

Disorders	Occupational risk factors	Symptoms
Tendonitis	Repetitive wrist and shoulder motions. Prolonged load on shoulders	Pain, burning sensation, weakness and swelling
Epicondylitis	Repeated rotation of the forearm while bending wrist	Symptoms are similar as tendonitis
Carpal tunnel syndrome	Repetitive wrist motions	Burning sensations, pain, tingling, dry palm and numbness.
Tension neck syndrome	Prolonged restricted posture	Pain

Table 2.2: Occupational risk factors of musculoskeletal disorders and symptoms of the most common disorders (CCOHS, 2014).

2.3.3 Risk factors

Causal factors are also known as risk factors. In 1985, World Health Organization (WHO) has remarked the causes of work-related injuries to be multi-factorial where these injuries are the consequences of the related employee exposed to a number of work related risk factors such as awkward posture, environmental factors, personal background factors, organizational factors, force, repetitive motion, stress and vibration (Nunes & Bush, 2012).

These causal factors were identified to damage the musculoskeletal system differently in each case. For example, a fracture on the bone caused by aging could result in loss of bone density; osteoporosis. In conjunction, if caused by trauma, it could be derived from a fall and if it is caused by work it could be due to a stress fracture. In this case, all these fractures would have a different clinical diagnosis and treatment.

The fracture from fall requires an x-ray and a splint while the age-related fracture, requires an x-ray, bone density scan and drugs that help strengthen the bones. Therefore knowing the cause of MSDs are essential for improvisation of diagnosis, treatment and rehabilitation to simplify these injuries as causal factors (Nunes & Bush, 2012).

2.4 Previous Studies

There are many studies on WMSDs on various professions performed world-wide. Most of the studies indicated the variable which causes risk to the disorder. Studies from Malaysia and abroad are discussed below.

2.4.1 In Malaysia - Other Professions

WMSDs were identified and studied in many research in Malaysia. It was discovered common among dental personnel. This profession requires sitting in awkward posture, statically using excessive force, and performing accurate repetitive hand and wrist movements due to the demands on vision in their field. Prevalence of WMSD was analyzed in many studied amongst dentist and the pain experience ranged as high as 64% and 93%. The causes of WMSD were noticed as multi-factorial; workplace conditions, workplace exposures, organizational, psychosocial and socio-cultural variables, amongst others (Khan & Chew, 2013).

2.4.2 In Malaysia - Teaching Professions

This is a study on high school teachers regarding prevalence of occupational low back pain and associated factors. The prevalence rates of musculoskeletal disorder in high schools teachers were recorded greater than primary school teachers at various points, at that time, last month, last six months, annual, and lifetime, were reported as 21.8%, 26.3%, 29.6%, 31.1%, and 36.5%, respectively. The risk factors were identified to be both personal and job related such as length of employment, job satisfaction, age and, body mass index (Bandpei, Ehsani, Behtash, & Ghanipour, 2014).

2.4.3 In World-wide - Other Professions

Kushwaha and Kane (2016), worked on a study on shipping crane cabin in steel industry with ergonomic assessment and workstation design. The research was conducted after identifying continuously suffering from muscular pain by most of the crane operator in different body parts. 27 cabin crews were selected as respondents and based on the anthropometric data of 50 percentile Indian male, ergonomic assessment, evaluation of crane cabin and redesigning of work-station was carried out in CATIA-V5 software. Rapid upper limb assessment (RULA) was used to check the compatibility of the design, for both existing as well as modified crane cabin was performed. Invention of ergonomics showed positive results and increases the workplace comfortableness for the crews.

2.4.4 In World-wide - Teaching Professions

According to Erick and Smith (2011), systematic reviews on WMSD prevalence among school teachers proves that the factors such as age, awkward postures, length of employment and sex are associated with a high prevalence of WMSDs. Cheng et al. (2013) in a research sampling have noticed that the most common occupational health problems in the working population are represented by this group of disorders.

Based on Muto et al. (2006) in his review paper, focus on pain in a single specific body region is common in most studies investigating WMSDs among Special Education School teachers. The study concluded that lower back is associated with a long-time static trunk flexion posture. Its associated factors are ergonomic risk factors such as Assistance in feeding, transferring and toileting. Regardless of these findings, sufficient attention was not given to this profession and lower counts of studies have investigated on the prevalence and possible associated factors.

2.5 Current Studies

A group of researchershave studied on the prevalence of WMSDs on teachers and SMAs and attempted to evaluate the relationship between risk factors of both ergonomic and personal with WMSDs (Cheng, Cheng, & Ju, 2013). According to the study, results revealed that this occupation has been impacted destructively by the high prevalence of WMSDs. The study concluded that the schools should implement regulations to prevent musculoskeletal injury occurrence related to environment modification, training to the employees for better understanding on muscles exercise, and health promotion at workplace.

However the similar group worked on another research in 2016 to investigate the risk factors for WMSDs on teachers and evaluate their correlation. Through the study it was then concluded 86% out of 388 teachers and teacher's aides experienced MSDs. The most affected regions were lower back, shoulder, and wrist. Statistics showed that the participants' background such as the years of working experience and handling students with multiple disorders and tasks at work such as assisting in lifting and feeding are the factors leading to these disorders. The study suggested that the upcoming research should focus more on safe student-handling ergonomics, enforcing on recommendation to school management on student-teacher ratio and emphasize on compulsory break times between transitions of classes(H.-Y. Cheng, M.-T. Wong, Y.-C. Yu, & Y.-Y. Ju, 2016).

2.6 Summary of Literature Review

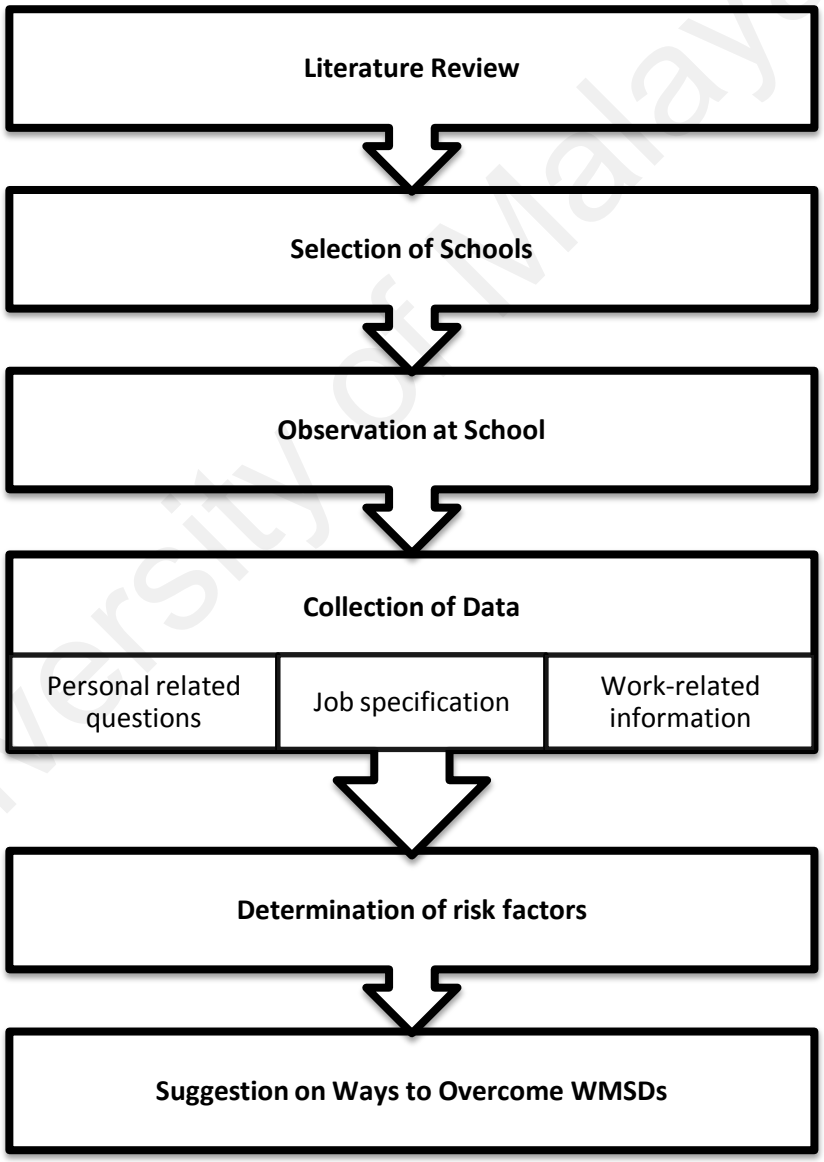
Despite the fact that there are numbers of studies being conducted on the teachers and Student's Management Assistants in Special Education Schools,insufficient knowledge were provided to these personnel on management of the risk factors and preventive measures. At such, this study will examine the factors leading to Work-Related Musculoskeletal Disorders and suggestion to overcome it.

CHAPTER 3: METHODOLOGY

The study was performed in five primary Special Education Schools. In this chapter, the methodology shows sequenced orders of research conducted to examine the risk factors causing and ways to overcome the disorders. The orders (Table 3.1) were planned to achieve the objectives of study.

3.1 Overall Methodology Flow Chart

Table 3.1: Research flow-chart



3.1.1 Selection of Schools

The Ministry of Education has established 33 Special Education Schoolsin Malaysia. Twenty eight of them are primary schools and 5 are secondary schools. Twenty two from the primary schools are for children with hearing disabilities, five for visual disabilities and one for learning disabilities (Unicef, 2014).

In Selangor, there are more schools compared to other states in Malaysia. Therefore, five random schools in this state were chosen to carry out the research. A letter of permission was sent to Ministry of Education Malaysia to perform the study and collect related data. Throughout the process, numbers of documents such as a confirmation letter from supervisor (Appendix C), a copy of completed proposal (comprised of Chapter 1: Introduction, Chapter 2: Literature Review and Chapter 3: Methodology) and a set of questionnaire (Appendix A)were attached with the application form and submitted manually in Putrajaya.Once the approval was received from Ministry of Educational Malaysia, the letter and project proposal were then emailed to each selected schools to request for suitable date to proceed with the study.The list below contains the details of schools chosen to conduct the research.

Table 3.2: Details of Selected Schools

Num	Identified as	Address	Nature of school
1.	School A	Puchong,	Learning disabilities
2.	School B	Putrajaya.	Learning disabilities
3.	School C	Shah Alam	Hearing impairments
4.	School D	Kuala Lumpur.	Hearing impairments
5.	School E	Kuala Lumpur	Vision impairment

3.1.2 Observation at Schools

Each visit at school was initiated by discussion with Principal, Senior Assistant of Co-Curricular and Senior Administrative Assistant. This was considered as a pre-visit to observe the school environment and daily routines of teachers and SMAs in classroom.

Daily tasks of educators in Special Education Schools are supporting in positioning and performing, carrying and lifting students, prolonged standing, transferring students from the vehicle, assisting for movement, pushing and pulling chairs and tables, and implementing rehabilitation program.Most of the schoolswere equipped with similar chairs and tables for small sized students. Teachers and SMAs utilize the available facilities throughout the day.

Each school consisted of 9 to 58 teachers and SMAs in overall.All the schools consist of educators handling students' ages 7 to 14. According to the school management, both teachers and SMAshave been working for more than 3 months and none suffered from any injuries before joining the schools.

School A and B which is located in Puchong and Putrajaya respectively consists of students with learning disabilities, School C in Shah Alam and D inKuala Lumpur is occupied with pupils certified havinghearing disabilities and finally School E in Kuala Lumpur as well is for children with vision impairment (Table 3.2).Due to the different eligibility of the pupils, educators in each school carry out various tasks from one another. Information from the observation was used toalter the existing questionnaire to meet variousteaching management approachesutilized in each school.Pictures of students in class were forbidden from capturing. Information on the schools, students, teachers and SMAs are captured in result; School demographic section.

3.1.3 Collection of Data

On the second visit which was planned approximately a week lateraccording to the school's schedule. Twelve forms were distributed in each schoolto be attended by teachers and Student's Management Assistants and contents of the questionnaires were explained in detail.It was then collected within the second week.

The survey form was designed by H.-Y. K. Cheng, M.-T. Wong, Y.-C. Yu, and Y.-Y. Ju (2016),based on job specification information of special education school's teachers and SMAs. The questionnaire was constructedafter reviewing previous studies investigated on this similartopic.The instrument contains questions regarding personal, job specification andwork-related information. Respondents are required to fill in details on theactivities that were performed in schools which are affecting their body as in causing pain to the muscles.Thissection captures information on past, current and future WMSDs.

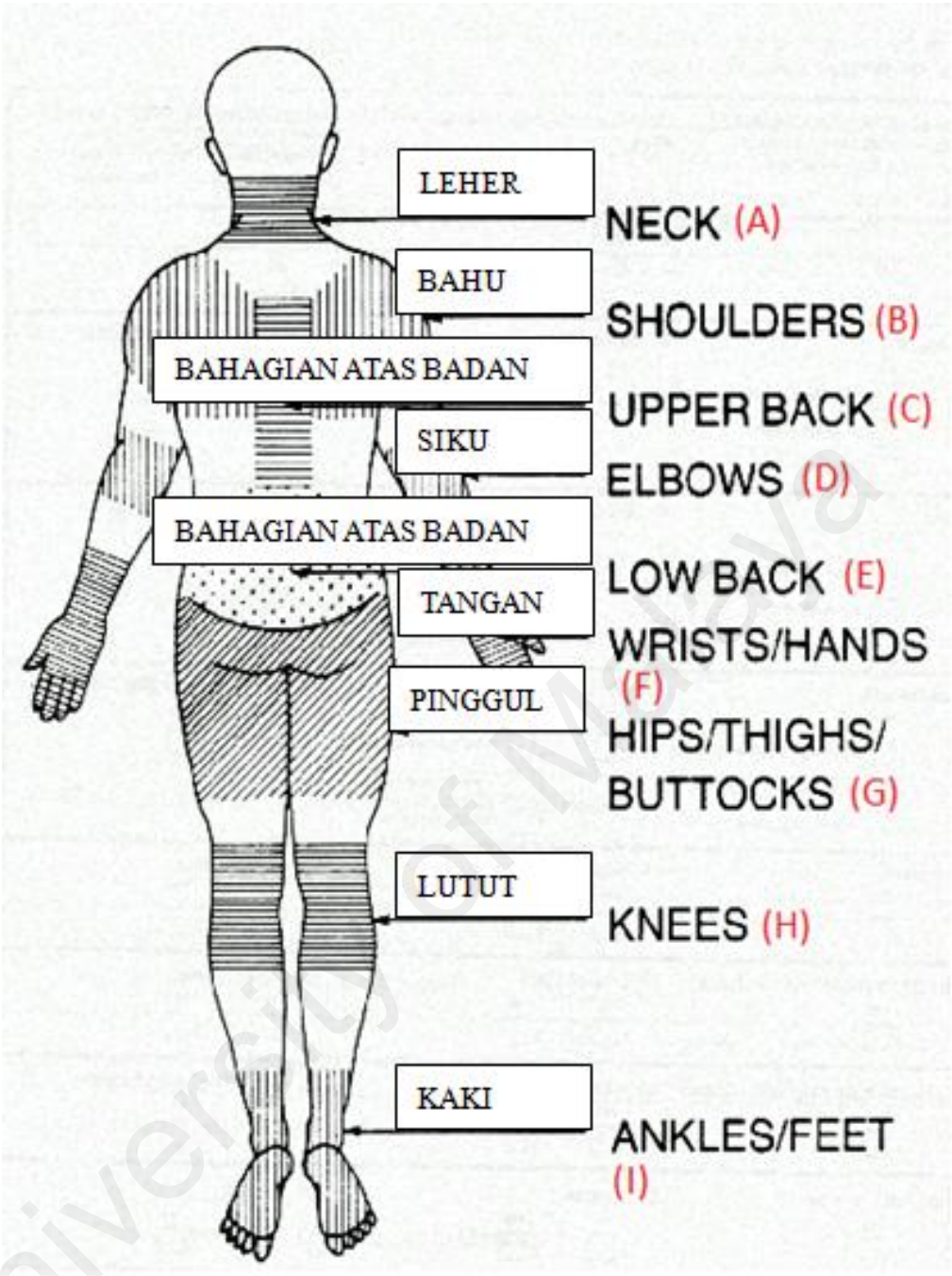


Figure 3.1: Body Regions Labeled in Bilingual (Antonopoulou, 2004)

On the last page, an image of body regions (as shown in Figure 3.1) was inserted in the questionnaire. The picture was referred and modified according to Standardized Nordic Musculoskeletal study for accessibility of both teachers and SMAs in school (Antonopoulou, 2004). The regions were: (A) Neck, (B) Shoulder, (C)Upper Back, (D) Elbow, (E) Lower Back, (F) Wrist/ Hand, (G) Hip/Thigh/Buttock, (H) Knee, (I) Ankle/Feet.

Table 3.3: Research Framework

<table>
<tr><th colspan="2">First Section:</th></tr>
<tr><td>Personal Information</td><td>Job Specification</td></tr>
<tr><td>• Marital status
• Position
• Years of experience</td><td>• Work hours per week
• Work days per week
• Type of service
• Break time between class transition
• Age range of children served
• Diagnosis of children served
• Numbers of coworkers in same class</td></tr>
<tr><td colspan="2">∇</td></tr>
<tr><th colspan="2">Second Section:</th></tr>
<tr><td colspan="2">Work – Related Information</td></tr>
<tr><td>• Activities Affecting Body Regions</td><td>• Protective equipment usage
• Seeking treatment
• Affecting work performance
• Regions affected over:
➢ Severity
➢ Duration since onset
• Occurrence rate</td></tr>
</table>

Table 3.3 shows the questions covered in the survey form. The first section contains two sub-sections which are on questions on marital status, position, years of experience, work hours per week, work days per week, type of service, break time between class transition, age range of children served, diagnosis of children served and numbers of coworkers in same class.Data obtained on these questions were presented in results as respondent's demographic. Each variable was evaluated by the risk it possesses, where the counts of responds by subjects were divided by the total number of participants with WMSDs identified.

In the second section,work-related information were included such asactivities that affect the body region, protective equipment usage, seeking treatment, affecting work performance and regions affected over severity, duration since onset and occurrence rate. Question on Severity of pain was ranged 0 (no pain) to 4 (unbearable pain) for all

body regions. Scores more than or equal to 1 responded by all participants were taken as sign of WMSDs. Similarly, the calculation for this section was done by counting the number of responds for each variable was divided by the total number of participants with WMSDs identified.

The third section questions the activities which causes pain onregions while assisting students with daily activities. Educators gave random answers and the most repeated activities were presented to be acknowledged for suggestion on ways to overcome the problem.

3.1.4 Determinationof Risk Factors for WMSDs

Risk factors for Work-Related Musculoskeletal Disorders were to be identified and grouped into two categories.The factors causing WMSDs was classified intowork-related risk factors and individual-related riskfactors. For each risk factors determined through the data processing and observation in schools, the mechanism of the risk factors was determined. The sources of the risks were identified as following:

a. High task repetition
b. Forceful exertions
c. Repetitive or sustained awkward postures
d. Poor work practices
e. Poor self-care habits
f. Poor health habits

3.1.5 Method to Provide Suggestion to Overcome WMSDs

Based on risk factors determined in this study, prevention measures wereretrieved from the previous studies on similar topics related to Work-Related Musculoskeletal Disorders researches. The suggestion to overcome these disorders includes the consideration of multi-factorial risk factors as WMSDs commonly occur as a result of a combination and interaction among them. The data from result on each variable was related to provide suggestion in discussion. The suggestions were listed as below:

a. Engineering control
b. Administrative control
c. Application of ergonomics

Policies from other countries to handle Special Educational Needs students are considered and enclosed in Chapter 4; Result and Discussion.(Nasir & Efendi, 2017), (CDC, 2016). The measures are equally as important as identifying the causes of disorders for high productivity at work, reduction in number of injuries and prevention of WMSDs at work.

CHAPTER 4: RESULT AND DISCUSSION

Results collected from the school based on methodology were tabulated and shown in tables and figures in this chapter. The results were then discussed accordingly in this section.

4.1 School Demographics

Table 4.1: Information obtained from school management

Identified as	(A)	(B)	(C)	(D)	(E)
Space Allocated by School	Ground-floor	Ground-floor	Whole school	Ground-floor	One block
Nature of Students	Learning disabilities	Learning disabilities	Multiple disorder (Hearing impairment, Speech disorder Learning disabilities)	Hearing impairment, Speech disorder	Multiple disorder (Vision impairment, Learning disabilities)
Number of Students	86 (7-13yo) 1 (< 7yo)	80 (7-14yo)	83(7-13yo)	40 (7-14yo) 2 (< 7yo)	23 (7-14yo) 1 (< 7yo)
Number of Teachers	18	6	41	24	35
Number of SMAs	7	3	17	5	4
SMAs : Student (Ratio)	1:2	1:10	1:5	1:4	1:7
Students with Moving Disabilities	1	None	None	2	None
Number of Classrooms	9	8	18	6	4
Number of Students in Each Class	10	10	5-6	7	8
Guidance from OT	Yes	Yes	Yes	None	None

[a]SMAs: Student Management Assistants
[b]OT: Occupational therapist
[c]yo: Years old (age)

The demographic of school including numbers of students enrolled and student management assistants for each school are shown in (Table 4.1).On the visit, it was clarified that the students from a school having multiple disabilities (identified in School C and School E) has students whom has hearing impairment and learning disabilities or speech disorder and learning disabilities. As stated by Individuals with Disabilities Education Act's (IDEA), a child with intellectual disability and blindness or intellectual disability and orthopedic impairment, or the combination as so are referred as a person with multiple disabilities. The term deaf-blindness is not included in this category (IDEA, 2011).

In addition, the number of students in a class limited by Ministry of Education is 7 pupils but due to insufficient number of classes available, there were more than 8 in School A and School B. The class environment in School B was small and congested as the teachers built non-sound proof partitions to divide the classroom into two separated space. The exceeded number of students in a class was only monitored by 1 SMA due to insufficient counts of assistants and teachers in School B, C and E. Dialogue session with the teachers revealed that the there is no guidance received from Occupational Therapist on appropriate handling and management of students.

4.2 Respondent demographics

60 questionnaires were distributed in total which is 12 forms in a school after taking into account the counts of teachers and SMPs in each school. 56 were returned which covers 93.33% response rate. 3 forms were considered invalid due to incomplete responses. 2 respondents marked no pain for all regions.

Table 4.2: Job specification of Special Education teachers and Student's Management Assistants (N=53)

Variables	Items	N	%
Marital status	Married	44	83.0%
	Unmarried	9	17.0%
Work days per week	<5	8	15.1%
	5	40	75.5%
	>5	6	11.3%
Work hours per day	8	32	60.4%
	>8	10	18.9%
	>12	11	20.8%
Break time	Yes	36	67.9%
	No	17	32.1%
Years of experience in SEN	<3 months	7	13.2%
	3-12 months	9	17.0%
	1-5 years	21	39.6%
	>5 years	16	30.2%
Type of service	Daycare-full day	34	64.2%
	Daycare-half day	10	18.9%
	Daycare-hourly session	7	13.2%
	Others	2	3.8%
Age range of students	<7	7	13.2%
	7 till 12	25	47.2%
	>12	21	39.6%
Diagnosis of students	Hearing impairment	20	37.7%
	Vision impairment	9	17.0%
	Learning disabilities	19	35.8%
	Others (Multiple disabilities)	5	9.4%
Number of coworkers in a class	Yes	34	64.2%
	No	19	35.8%
Seeking treatment	Ignored	26	49.1%
	Massage	13	24.5%
	Rehabilitation treatment	5	9.4%
	Surgery	6	11.3%
	Others		0.0%
	Oral medication	3	5.7%
Personal protective equipment	Yes	4	7.5%
	No	49	92.5%

[a]SEN: Special Educational Needs

The job specification of teachers and Student Management's Assistant in Special Education School are provided in (Table 4.2).According to the study of (H.-Y. K. Cheng et al., 2016), there are several factors from personal that might lead to MSDs such as the years of experience, number of coworkers in a class and the negligence in use of supporting devise.

In this study,most of teachers and SMAs in Special Education Schools has experience of 1 between 5 years which is 60 months (n=21, 39.6%) and more than 5 years (n=16, 30.2%). 29.2% of teachers and SMAs has experience lesser than 12 months. Based on oral communication with the respondents, teachers and student's management assistants who has more experience in handling students are more likely to be assigned with difficult tasks as they more familiar with assisting students and could perform the duty in a short period of time. This lead to stress and development of microtraumafrom repetitive caregiving duties in daily basis which accumulated over time(Nunes & Bush, 2012), (Kim & Junggi Hong PhD, 2013).

Another factor that aids in the WMSDs is the numbers of teaching partners in the similar class. 64.2%, (n=34) mentioned that they had coworkers in the class which are mostly consisted of the teachers and 35.8%, (n=19) mentioned they had none. This is due insufficient number of SMAs in schools with higher number of students and least number of SMAs. In addition, through verbal communication with the school management person-in-charge, it was recorded that in these schools, the SMAs had to work with 5 to 7 students. Coworkers are required to work together in dealing with the workload without burdening oneself which allows them to recover from fatigues. This will indirectly reduce the possibilities of WMSDs formation (Cheng et al., 2013). Da Costa and Vieira (2010), have reported that increased in physical demand will cause WMSDs among the subjects. Sharing workload is important as it increases the work

productivity. Thus, adequate allocation of worker is needed to equally put their energy to work.

Other than that, negligence in use of supporting devise also affects the WMSDs prevalence. Based on the data exported from the questionnaire, only7.5% which is (n=4), responded to usage of personal protective equipment the rest 92.5% (n=49) responded "No". In accordance with treatment seeking subjects which revealed that most of them simply ignored the pain (n=26/53, 49.1%), there are high prevalence rate of WMSDs. Supporting device is equally important to prevent injuries in conjunction with seeking for treatment. Lower back pain could be reduced with the support of lower back brace and similarly usage of knee supportive device is needed to avoid reimbursement of work-related injury claims (H.-Y. K. Cheng et al., 2016). Hence, it is advisable for all teachers and student's management assistants to educate themselves with proper knowledge to prevent WMSDs.This shows the affect of WMSDs on educators are also from the job specification.

4.3 Daily Task Performed

Based on questionnaires, there are numbers of daily task performed by both teachers and student's management assistants in the school. These activities are carried out repetitively over the day at work namely repeatedly carrying and lifting students, transferring students from the vehicle, pushing and pulling chairs and tables, prolonged standing, assisting for movement, supporting in positioning and performing rehabilitation service. These activities are frequently related to the lower back pain (Claus et al., 2014). To perform such activities teacher and SMAs commands muscles involvements on sustained periods of stooping, squatting, bending, and kneeling (Muto et al., 2006).

The upper back region is affected while teachers and SMAs are carrying out these daily tasks which require them to work with these body parts. Gratz and Claffey (1996), discovered in a study that back functions as a stabilizer while carrying a child, whereas the wrist, elbow, neck and shoulder work together as the primary mover.Biomechanical links causes the pain in one of these regions to imposes extra loads on the others and consequently inducing pain in the other regions.

Moreover, assisting in these activities increases with the presence of students with multiple disabilities. This is due to the fact that these students often depend more on people surrounding them for their daily routines activities. Assisting in these activities adds more impacts on their musculoskeletal systems (Yamamoto, Saeki, & Kurumatani, 2003).

Students from 2 out of 5 schools that were chosen possess a multi-sensory room. School A has two rooms for therapy purpose and they are named multi-sensory room.This shows that teachers and SMAs in each Special Education Schools require guidance in safe student handling courses in atleast twice a year. At such, they will be alarmed of the correct postures and proper method to assist students. This will eventually prevent the muscle injuries and reduce the number of WMSDs prevalence (Wong, Lee, & Yeung, 2009).

Figure 4.1: Equipments in multi-sensory room

4.4 Musculoskeletal Disorder Information

Table 4.3: Work-Related Musculoskeletal Disorders in Special Education Schoolsteachers and Student's Management Assistants (N = 53**)**

Variables	Neck	Shoulder	Upper back	Lower back	Elbow	Hands	Thigh	Knee	Feet	Overal count
WMSDs occurrence/53	6 (11.3%)	25 (47.2%)	48 (90.6%)	43 (81.1%)	17 (32.1%)	2 (3.8%)	23 (43.4%)	36 (67.9%)	11 (20.8%)	
Severity										
No pain	47 (88.7%)	28 (52.8%)	5 (9.4%)	10 (18.9%)	36 (67.9%)	51 (96.2%)	30 (56.6%)	17 (32.1%)	42 (79.2%)	
Moderate pain	1 (1.9%)	15 (28.3%)	7 (13.2%)	24 (45.3%)	14 (26.4%)	2 (3.8%)	10 (18.9%)	14 (26.4%)	9 (17.0%)	
Severe pain	3 (5.7%)	9 (17.0%)	30 (56.6%)	11 (20.8%)	3 (5.7%)	0 (0.0%)	10 (18.9%)	19 (35.8%)	2 (3.8%)	
Unbearable pain	2 (3.8%)	1 (1.9%)	11 (20.8%)	8 (15.1%)	0 (0.0%)	0 (0.0%)	3 (5.7%)	3 (5.7%)	0 (0.0%)	
Duration since onset										
<1 month	5 (83.3%)	12 (48.0%)	11 (22.9%)	38 (88.4%)	6 (35.3%)	0 (0.0%)	10 (43.5%)	17 (47.2%)	6 (54.5%)	
1 -6 months	1 (16.7%)	8 (32.0%)	20 (41.7%)	1 (2.3%)	3 (17.6%)	2 (100.0%)	12 (52.2%)	14 (38.9%)	2 (18.2%)	
6 - 12 months	0 (0.0%)	5 (20.0%)	0 (0.0%)	4 (9.3%)	8 (47.1%)	0 (0.0%)	1 (4.3%)	2 (5.6%)	2 (18.2%)	
>1 year	0 (0.0%)	0 (0.0%)	17 (35.4%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	3 (8.3%)	1 (9.1%)	
Occurrence rate										
Almost everyday	4 (66.7%)	12 (48.0%)	37 (77.1%)	15 (34.9%)	4 (23.5%)	0 (0.0%)	16 (69.6%)	23 (63.9%)	8 (72.7%)	
Once a week	1	8	6	14	7	0	7	9	3	

	(16.7%)	(32.0%)	(12.5%)	(32.6%)	(41.2%)	(0.0%)	(30.4%)	(25.0%)	(27.3%)	
Once every two weeks	0 (0.0%)	5 (20.0%)	4 (8.3%)	10 (23.3%)	6 (35.3%)	0 (0.0%)	0 (0.0%)	4 (11.1%)	0 (0.0%)	
Once a month	1 (16.7%)	0 (0.0%)	0 (0.0%)	4 (9.3%)	0 (0.0%)	2 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Affecting work performance										
Not affecting										13 (25.5%)
Slightly affecting										28 (54.9%)
Highly affecting										6 (11.8%)
Could not work										4 (7.8%)
Affected region										
1 region										5 (94.3%)
> 1 region										46 (86.8%)

[a]WMSDs: Work-Related Musculoskeletal Disorders

Questionnaires with responds on the severity level with 'no pain' box checked and also filled out 'occurrence rate' and 'duration since onset' are included because they are most likely to experience numbness or other discomforts. This proves that the teachers and student management assistants have responded are having musculoskeletal symptoms on at least one area of body region (H.-Y. K. Cheng et al., 2016).Therefore, 51 over 53 teachers and Student's Management Assistants from 5 Special Education primary schools were reported with MSDs symptoms in overall which is 96.23% of prevalence rate. Comparison with regular school teachers, their WMSDs was only reported to be between 39% to 95%.

According to the questionnaire, severity in MSDs was grouped into five levels; level 0 to level 4 (no pain to unbearable pain). The returned questionnaire were all marked with severity level 0 onwards which shows that all respondents were likely to experience pain at musculoskeletal region for at least once. Prevalence rates shows high MSDs on the upper back with 90.6% (*n*=48), lower back with 81.1% (*n*=43), knee with 67.9% (*n*=36) and shoulder with 47.2% (*n*=25) representing pain at each respective regions. 46 respondents experienced MSDs symptoms at more than one body region. The rest; 5 respondents reported that their symptoms involvements were only on one region.

Based on Middlesworth (2017) study, MSDs occurs due to the balance between soft tissue fatigue and the particular person's ability to recover from that fatigue. This is the most crucial factor of MSDs formation. The important factor which could control soft tissue fatigue is the adequate blood supply. Through maintained sufficient supply of blood flow to the local soft tissues, excessive fatigue can be prevented while metabolic balance can be sustained and work can be performed accordingly. Therefore, maintaining the relationship between work and human factors is crucial at workplace.

4.5 Determination of Risk Factors

Observation through site visit and questionnaire evaluation has concluded that there are multi-factorial factors causing risk to the teachers and Student's Management Assistants in this case. It was also compared with previous study and similar factors identified are discussed below.

4.5.1 Risk Factors at Work

The risk factors can be divided into two groups:

a) work-related

b) individual-related

4.5.2 Work-Related Risk Factors

WMSD is a development from designation of workplace. The importance given to this role is crucial as it displays the complex relationship between work environment and the human body systems. The intersection between these systems provokes WMSDs. Consequently, that is the reason for many causative risk factors that leads to the formation of Musculoskeletal Disorder. For an example, an employee performing tasks beyond his body capabilities is initiating risk to his musculoskeletal system. The fatigue that caused by performing the job will not be recovered in short period of time by the worker's recovery system. In these situations, an objective evaluation projects that ergonomic risk factors are present, the worker is at risk of developing a musculoskeletal imbalance and a musculoskeletal disorder. There are three primary ergonomic risk factors (Middlesworth, 2017), (Kim &Junggi Hong PhD, 2013), (CCOHS, 2014).

a) High Task Repetition.

In the first place, high undertaking redundancy. Many work assignments and cycles are redundant in nature, and are every now and again controlled by hourly or day by day creation targets and work forms. High assignment redundancy, when joined with different dangers factors such high power as well as cumbersome stances, can add to the arrangement of MSD. A work process is considered distinctly repetitive if the cycle time is 30 seconds or less.

b) Forceful Exertions.

Second, powerful efforts. Many work errands require high power stacks on the human body. Muscle exertion increments in light of high power necessities, expanding related exhaustion which can prompt MSD.

c) Repetitive Or Sustained Awkward Postures

Third, dreary awkward postures.Awkward postures put extreme power on joints and over-burden the muscles and ligaments around the affected joint. Joints of the body are most effective when they work nearest to the mid-run movement of the joint. Danger of MSDs is expanded when joints are worked outside of this mid-run tediously or for maintained timeframes without satisfactory of recuperation time.

Presentation to these working environment chance elements puts laborers at a more elevated amount of MSDs chance. It is a presence of mind: high task repetition, repetitive/sustained awkward postures and forceful exertions prompting a musculoskeletal unevenness and in the long run a MSD.

4.5.3 Individual-Related Risk Factors

Individuals are multi-dimensional. Constraining ourselves to a particular reason for MSDs will restrain our capacity to make an anticipation procedure that locations the multi-dimensional laborer. Both working environment hazard elements and individual hazard factors are addressed below.

The essential individual hazard factors are:

a) Poor work practices:

Workplace competitors who utilize poor practices, lifting procedures and body mechanics are presenting unnecessary hazard factors that can add to MSDs. These poor practices make superfluous weight on their bodies that expand weariness and abatements their body's capacity to legitimately recoup.

b) Poor self-care habits

Poor self-mind propensities: MSDs created when exhaustion beats the working environment competitor's recuperation framework, causing a musculoskeletal awkwardness. Laborers who don't appropriately warm-up for work or get sufficient rest and recuperation after work put themselves at a higher danger of building up a MSD.

c) Poor health habits:

Workers who do not smoke, drink too much, are stout, or show various other weakness propensities are putting themselves in danger for musculoskeletal disorders, as well as for other chronic diseases that will abbreviate their life and wellbeing range.

4.6 Suggestion on Ways to Overcome WMSDs

Upcoming research should concentrate on enforcing the safe student-handling ergonomics due to the nature of MSDs which is reversible by applying ergonomics on the work design if guided and followed-up accordingly (Khan & Chew, 2013).

4.6.1 Preventive measures

Henceforth, designing engineering controls, administrative controls and application of ergonomics are required to counteract and control WMSDs. The favored approach of engineering approach is to plan the activity to assess the abilities and confinements of the workforce utilizing designing controls, for example, changing workstation format, which may incorporate utilizing stature customizable workbenches or finding devices and materials inside short achieving distances separations.

In terms of facilities, the obstacles to a specialized curriculum exist in types of infrastructural barriers and absence of exceptional devices arrangement. More school structures must be made open and handicapped cordial, particularly for understudies with physical impairment. Universal Design application must be polished broadly and as an obligatory piece of any school structures, either government funded schools or non-public schools. Regarding innovation and assistive devices, there is still a great deal of ailing in its arrangement to empower youngsters and youths with disability to encourage their learning procedure in schools. Assistive devices assume an immense part and convey a huge effect to people with handicaps in their instruction, and in addition in different parts of their day by day lives (e.g. work, mingling and so forth). Thus, government must augment the arrangement of assistive gadgets to all schools that have understudies with unique needs (Nasir and Efendi, 2017).

Figure 4.2: Facilities in visited Special Education Schools

Administrative control techniques are arrangements and practices that lessen WMSDs chance yet they don't take out work environment risks, for example, changes in job procedures and rules for example, schedulingmore breaks to take into consideration rest and recuperation. In spite of the fact that engineering controls are favored, administrative controls can be useful as brief measures until the point that designing controls can be actualized or when engineering controls are not in feasible.

Resourcesare the real test which keeps down administrativecontrol in current extraordinary needs education sector in Malaysia. Issues, for example, monetary constraint, absence of mediator benefit, absence of educator who has abilities to performsign language and conflicting teaching practices for students with hearing impairment.The majority of the issues above call for effective human capital improvement and administration with the goal that enough assets can be utilized to satisfy the inclusivity objective. National planning must likewise incorporate an

inclusive planning for comprehensive education provision, and research(Nasir & Efendi, 2017).

Ergonomics is the exploration of fitting work environment conditions and employment requests to the capacity of the working populace. The objective of ergonomics is to decrease pressure and eliminate injuries associated with the bad posture, overuse of muscles, and repeated tasks.A work environment ergonomics program can intend to avoid or control injuries and ailments by diminishing worker exposure to WMSD chance components utilizing engineering and administrative controls. PPE is additionally utilized as a part of a few cases yet it is the slightest compelling working environment control to address ergonomic hazards. Risk factors incorporate awkward postures, repetition, material handling, force, mechanical compression, vibration, temperature extremes, glare, inadequate lighting, and duration of exposure.For instance, representatives who spend numerous hours at a workstation, may create ergonomic-related issues resulting in musculoskeletal issue (MSDs).

Quite compelling in assessment of projects to counteract WMSDs is the Centers for Disease Control and Prevention's (CDC) and National Institute for Occupational Safety and Health (NIOSH), seven stages to address WMSDs are proposed by Elements of Ergonomics Programs. Each progression fits an assessment measure (CDC, 2016).

1. Look for indications of a potential WMSD in the working environment, for example, frequent reports from employees on pains and aches or errands requiring monotonous compelling efforts (social insurance costs, wellbeing results) and act to diminish them
2. Show administration commitment by tending possible issues and empowering laborer’s inclusions in critical thinking exercises (authoritative change)

3. Offer training to increase management structure and and laborer capacity to assess potential WMSDs (wellbeing results, authoritative change).
4. Gather information to recognize employments or work conditions that are most tricky, utilizing sources, for example, damage and sickness logs, medicinal records, and occupation examinations (wellbeing results)
5. Identify effective controls for assignments that represent a danger of WMSDs and assess these approaches once they have been instituted to check whether they have diminished and decreased (authoritative change)
6. Establish medicinal services management to stress the significance of early identification and treatment of WMSDs for impairment hindrance and inability (wellbeing results).
7. Minimize hazard factors for WMSDs when arranging new work procedures and operations (hierarchical change)

CHAPTER 5 CONCLUSION

This chapter includes conclusion based on findings obtained in the results. Few limitations were identified in this study and listed out in this section. Recommendations based on observation and results are also plotted here.

5.1 Limitations

There are few limitations found in this study. Regression analysis to identify the effects of independent variables on MSDs is not performed due to insufficient of data counts. Consequently, the subjects exposed to MSDSs were not identified. Similarly, analysis to distinguish exposure of personal and job related information on body region to identify WMSDs occurrence were not performed. Therefore the accurate factors leading to WMSDs could not be figured.

Besides, the data from questionnaire shows that are n=8/53, (15.1%) of the respondents working less than 5 days in a week. That number comprises of SMAs in the schools because all teachers work for minimum 5 days a week. Thus, there are possibilities of them working in other places. That might be the reason for the likelihood of MSDs formed due to overuse of similar muscles groups.

Moreover, the data from this research are based on questionnaires which are self-reported. Therefore the output might be bias due to subjective perception of WMSDs of respondents.The limitations in this study could have been conquered with detailed research.

5.2 Recommendation

Besides the effort of each teachers and SMAs to familiarize with safe working method, it is also essential for the school management and Ministry of Education Malaysia to overview the options to feed all educators with relevant guidelines to prevent WMSDs and provide support for treatment

5.3 Conclusion

This study shows prevalence rate of WMSDs of 85.0 % meaning that it could occurs in 9 out of 10 teachers and student's management assistants in Special Education Schools. The most affected regions were upper back, lower back, knee and shoulder descending order. Results show that there are multiple risk factors that lead to WMSDs among teacher and Student's Management Assistant at Special Education Schools. Risk factors at work (such as the work-related risk factors and individual-related risk factors) were determined and suggestion on ways to overcome WMSDs as preventive measures relating to engineering, administrative control and application of ergonomics and for high productivity at work were included in this study to decrease number of injuries and prevent WMSDs at work. Therefore, the objectives of this study which is to determine the risk factors that lead to the symptoms of WMSD on teachers at school and to suggest way to overcome the disorder were accomplished.In future, analysis to identify the effects of independent variables on MSDs and to distinguish exposure of personal and job related information on body region to identify WMSDs occurrence are required.

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