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SHIFT WORK EFFECT TOWARDS MUSCULAR ENDURANCE AMONG
SECURITY OFFICERS OF HIGHER EDUCATION INSTITUTION
IN EAST COAST MALAYSIA

MUHAMMAD HAFIZUL HILMI BIN IBRAHIM

Thesis submitted in fulfillment of the requirements
for the award of the degree of
Bachelor of Occupational Safety and Health

Faculty of Engineering Technology
UNIVERSITI MALAYSIA PAHANG

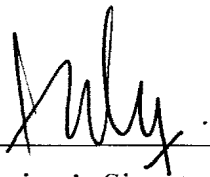
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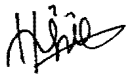
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I hereby declare that the work in this thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Universiti Malaysia Pahang or any other institutions.

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DEDICATION

Dedicated to my parents

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“By the name of Allah S. W. T, the Most Gracious and the Most Merciful”.

I am truly thankful and would like to express my deepest appreciation to all those who provided me the possibility to complete this report. A special sincere gratitude to Miss Nurliyana Binti Moh Hussin whom giving a huge contribution in stimulating suggestions and encouragement, helped me to coordinate my project especially in executing the research and writing this report. She has always gives me a lot of moral support in completing my research and providing a lot of brilliant ideas to this research. I appreciate her guidance which consistently improving my research studies and also my life-long learning experience. I am truly appreciated for her boosting my confidence towards my research and life and also being tolerate with my ingenuous mistakes.

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Last but not least, I would like to acknowledge my huge gratitude to my parents and families for their thoughts, support and prayers and also for the love all of this time.

ABSTRACT

This research study is about the shift work effect towards muscular endurance among security officers of higher education institution in East Coast Malaysia. The objective of this study was to determine the association between shift work and muscular endurance of security officers in higher education institution. Shift work cause sleep deprivation to the security officer as they are working outside normal hour. In this study, abdominal muscular endurance, upper body muscular endurance and also leg and full body are the muscular endurance that taken into account in this study. Male security officers (n = 15) and female security officers (n = 4) were participated as the subjects of this study. Muscular endurance was measured by sit-up test (1 minute), push-up test (1 minute) and burpee test (30 seconds). Correlation analysis was made between sleeping hour and muscular endurance. There is no association between shift work and muscular endurance ($r = - 0.126$, $p = 0.608$) and not significant at $p = 0.05$. In conclusion, shift work has no relationship with level of muscular endurance.

ABSTRAK

Kajian ini adalah mengenai kesan kerja syif terhadap ketahanan otot di kalangan pegawai keselamatan institusi pengajian tinggi di Pantai Timur Malaysia. Objektif kajian ini adalah untuk menentukan hubungan antara kerja syif dan ketahanan otot pegawai keselamatan di institusi pengajian tinggi. Kerja shift menyebabkan tidur yang kurang mencukupi kepada pegawai keselamatan kerana mereka juga bekerja di luar waktu bekerja biasa. Dalam kajian ini, ketahanan otot perut, ketahanan otot bahagian atas badan dan juga ketahanan otot kaki dan kerseluruhan badan adalah perkara yang diambil kira dalam kajian ini. Pegawai keselamatan lelaki ($n = 15$) dan pegawai keselamatan wanita ($n = 4$) telah mengambil bahagian sebagai subjek kajian ini. Ketahanan otot diukur oleh ujian sit-up (1 minit), ujian push-up (1 minit) dan ujian burpee (30 saat). Analisis hubungkait telah dilakukan antara tempoh waktu tidur dan ketahanan otot. Hasil analisis menunjukkan tiada hubungan antara kerja syif terhadap ketahanan otot ($r = - 0.126$, $p = 0.608$) dan tidak signifikan pada $p = 0.05$. Kesimpulannya, kerja syif tidak mempunyai hubungan terhadap tahap ketahanan otot.

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LIST OF ABBREVIATIONS

TDRS	Train Drivers
TCOS	Train Controllers
BMI	Body Mass Index
KTK	Körperkoordinationstest Für Kinder Test
VO ₂ max	Maximum Oxygen Intake

CHAPTER 1

INTRODUCTION

1.1 Introduction

In this chapter, the research background, problem statement, research objectives, research questions, research hypothesis, scope of study, significance of study, operational definitions, conceptual framework were discussed.

1.2 Research Background

Shift work nowadays are practiced in many sectors and occupations. Work shifts that include their work hours outside working after 6 o'clock in the evening and before 7 o'clock in the morning have been done by almost 20% of the labour force worldwide (Wright et al., 2013). All vital sectors including healthcare and safety need to shift work in order for society's welfare and devoted their lives as a shift worker (Wright et al., 2013).

However, getting enough sleep is essential as a human being including shift workers. Most of everyone knows that getting a good night's sleep is important, but only few of us actually make those eight or so hours between the sheets a priority. Sleep needs vary across ages and are especially impacted by lifestyle and health. For shift workers, the need to sleep differently depends on the shift that they on duty. Few days' sleep during daytime and the other days only they can have a proper sleep at night.

Consequently, the circadian rhythm of being are disturbed. A circadian rhythm is a biological process or biological clock that provide the sleepiness and alertness at regular intervals. Getting body to work against the natural sleep cycle causes such sleep disorders, as well as fatigue (Meretoja, 2009). Optimal sleep and wakefulness

requires proper timing and alignment of desired sleep-wake schedules and circadian rhythm-related periods of alertness (Kanathur et al., 2010).

For security officers, they need to work night day and night shifts which are against the circadian rhythm. According to Kenneth et. al, no methods have been found for human to go against the circadian rhythm (Wright et al., 2013). Only the proper sleep behaviour and management can reduce the sleepiness and sudden wakefulness (Wright et al., 2013). If and only if they aware of the effect caused by the shift work, many preventive and corrective action can be done to overcome the effect.

1.3 Problem Statement

Sleep is a vital indicator of overall health and well-being. Many people are overlooked the importance of sleep adequacy that essential in life especially the shift workers that are working in safety sectors including security officers that requires a good health physique. The health level may also decline without being realized due to lack of sleep as the body is fatigue which it might physically and mentally affected towards them. As a security officer, it is crucial to have a good quality of sleep to perform their duties very well in day and night.

However, the quality of getting sleep during daytime is different than during night time which also may lead to sleep deprivation. The security officer may sleep less during day compared to night time. This is because during daytime the condition is less productive compared to night time which is safe and sound and not surrounding with natural light unlike daytime. The sleep deprivation may cause a lower physical performance to conduct their duty well including on their muscular endurance. Therefore, by conducting the research, the association between shift work and muscular endurance can be known whether the difference sleeping hour among shift workers may affect the human muscular endurance. Besides, there is no studies had been conducted to determine the relationship between shift work effect on muscular endurance. Previous study of effect of shift work towards physical fitness is also inadequate which is the reason why need to be studied.

1.4 Research Objective

In order to carry out the research, the following objectives were established:

- 1.4.1 To assess the level of muscular endurance of the security officers in higher education institution.
- 1.4.2 To determine the relationship between the shift work and level of muscular endurance among security officers.
- 1.4.3 To determine the health effect of shift work towards security officers in higher education institution

1.5 Research Question

The following questions were established to carry out the research:

- 1.5.1 What are the level of muscular endurance of the security officers?
- 1.5.2 Is there any relationship between the shift work and level of muscular endurance of the security officers?
- 1.5.3 What are the consequences of shift work towards security officers' health?

1.6 Research Hypothesis

The hypothesis of this research is:

There is an association between shift work and the level of muscular endurance of security officers.

1.7 Scope of Study

The study will be carried out at Universiti Malaysia Pahang in Gambang campus. The security officers are practicing shift work which on night shift and day shift and suited with the research purpose. Throughout the research, the physical performance of the security officers will be assessed in order to determine the relationship between shift work towards the level of muscular endurance of the security officers.

1.8 Significance of Study

Shift work are practiced in many occupation nowadays. This including security officers as their services require 24 hours a day to be ensure the safety of the organization. However, its hidden effect for its continuing availability to keep safeness of the organization is being underestimated by employers even the employees itself too. The effects are hardly to be seen as the development takes time to be identified or being affected.

Therefore, by carrying out the research, we can find one of the effect which is towards the physical performance of the security officers as experiencing the shift work practices for a long time. From the physical performance result, the degrading fitness of the body also may be seen which shows how the shift work affect the health.

In addition, by proving the effect of shift work towards the worker in which affecting their health awareness towards the negative effect of the shift work can be instilled into the employees and employers mind. The employees will realize that shift work do affect the health which resulted from their quality of sleep. The proper sleep for those who need to stand in night shift also can be trained in order to maintain fitness. This also including management as the awareness inculcated, the will review if there are any management issues related to shift work that should be improved or need corrective action to be taken.

1.9 Operational Definition

1.9.1 Shift Work

Shift work is a practice of employment which designed for the services or duties running in 24 hours on every day on each week. Shifts, set periods of time requires the group of workers to perform their duties and another time are divided with another different group of workers in order to running in 24 hours. In higher education institution, the security officers are on duty for 8 hours per day which rotating within three shifts around the clock.

1.9.2 Muscular Endurance

Muscular endurance is the ability of a muscle to repeatedly exert force against resistance. In the study, the muscular endurance level was measured to determine the research hypothesis.

1.9.3 Working Hour

Working hour is a duration that the workers are perform their duties. The working hour also may differ depends on the occupation and the organization itself. Shift work which have day shift and night shift are also considered as working hour. There are three shifts around the clock which are:

- Morning shift: from 7.00 am to 3.00 pm
- Evening shift: from 3.00 pm to 11.00 pm
- Night Shift: from 11.00 pm to 7.00 am

1.9.4 Security Officers

Security officers are the officers that ensure the safety of the organization and secured the area of the organization own or resided. In higher education institution, the security officers are the responsible one in securing the safety of the higher education institution residents.

1.10 Conceptual Framework

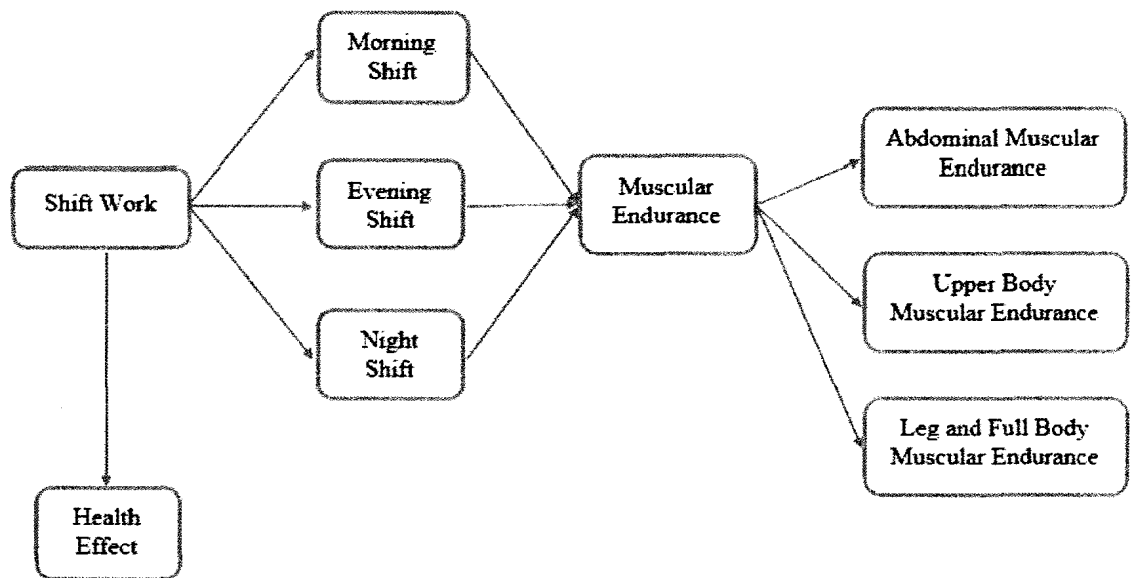


Figure 1.1 Conceptual Framework

1.11 Conclusion

The main idea of this study which includes problem statement, objectives, scope of study and significance of study are the introduction of the research study was explained generally.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

In this chapter, literature review focused on the published article related to shift work and muscular endurance of security officers. This review is also as a study on source of related information to conduct the research.

2.2 Shift Work

According to Mcnall (2010) after the Industrial Revolution took place in the world, shift work was introduced in industries. Nowadays, industries are relying heavily on shift work to ensure continuous operation around the clock (Mcnall, 2010 and Kamarulzaman et al., 2014). Shift work is frequently introduced for economic purposes in order to optimized the use of highly cost equipment (Kamarulzaman et al., 2014). This also applied and includes people who work in jobs that require shift schedules and vital in daily life including healthcare and safety (Wright et al., 2013) . Safety sectors are known for its importance in assuring safety of any organization that appointed by the management around the clock which required a 24-hours security provision.

2.2.1 Definition of Shift Work

Shift work is defined as any duty or work performed on a schedule which outside the normal working hour (National Sleep Foundation, n.d.). According to Kamarulzaman et al., (2014), shift work is commonly referred to as which the working shift of the employee is schedule based some regular basis which from daytime to evening time or nighttime. Shift work also interpreted by many researchers in which few groups of employee are performing their duty at different times around the clock

either 17-hour or 24-hour duration of time in their employment (Kamarulzaman et al., 2014).

2.2.2 Type of Shift Work

In normal working hour, employee starts their work at 8 o'clock in the morning and ended 5 o'clock in the evening. This differs from shift work which the working hour may involve in early morning shifts, evening or night shifts, and even rotating shifts (National Sleep Foundation, n.d.). There are also several types of shifts work are practiced in industries which are fixed, split, irregular and rotating shifts.

2.2.2.1 Fixed Shifts

Fixed shifts is the shift where the working hour have the same duration which starts and ends at the same times, for a period of days that have been specified (Metzner & Fischer, 2001). This kind of shift is a non-rotating shift system that have a fixed schedule for worker. The shift assigned also utilized by the worker regularly on the same schedule. The same shift is repeated for days by the worker along the employment in that organization. Nurses are most commonly to have fixed night-shift in their working schedule (Shamali et al., 2015).

2.2.2.2 Split Shifts

The second type of shift work is split shift in which the working hour may split into two parts or more in the working schedule (Zaller, 2012). Besides, the normal break in normal working hour for the worker to have meals or rest also does not account as a "split" stated in in the California IWC Wage Orders (Zaller, 2012). The employee may starts working, having time off, then continue the work and might have a time off or split time again before finishing the same shift. The split shift work systems are commonly known in which are applied in public transport employees. Figure 2.1 shows how the bus driver are working in split shift recommended by Driver and Vehicle Standards Agency of United Kingdom.

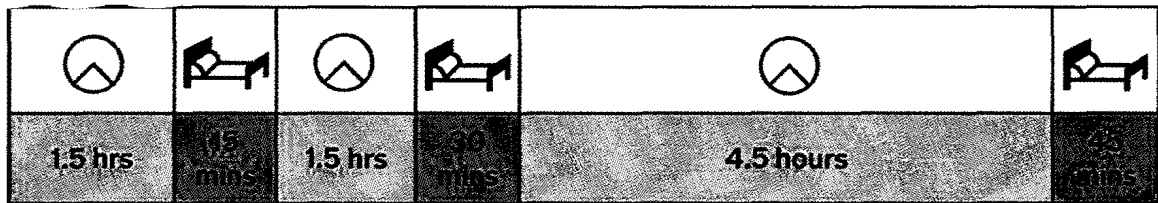


Figure 2.1 Split-break pattern for driver of buses and coaches

Source Gov.uk (2016)

Based on Figure 2.1, The rest time break must exceed more than 30 minutes per split to be considered as legal split time. The safe driving hour also must not be more than 4.5 hours to avoid fatigue and required to take a rest break if exceed the permissible driving hour.

2.2.2.3 Irregular Shift

Irregular shift is defined as a shift in which the duration of the working hour for each block of shift is varies for each occasion (Working Time Analysts, n.d.). For instance, the work schedule which the blocks of shifts are alternated for two or three days successively. The irregular shift schedules also may have a short time-off intervals between the shifts (Torsvall et al, 1989). Table 2.1 shows an example of irregular shift work that implemented in railway stations as they operating for 24-hours a day. For example, on the first working day, the morning shift may start at 5.30 am in the morning and on the next working day starts 30 minutes earlier than the first day.

Table 2.1 Irregular shift system in railway station

Shift Time	Morning shifts	Day shifts	Evening shifts	Night shifts
Starting time of the shift				
Tdrs	05.30 05.00	09.00 08.00	13.30 12.00	22.00 21.00
Tcos	06.00 05.40	07.30 07.00	13.00 12.30	21.00 20.50
Ending time of the shift				
Tdrs	13.30 12.00	16.00 14.30	22.00 21.00	06.00 04.30
Tcos	13.00 12.20	14.00 13.00	21.00 21.00	07.00 06.20
Shift length (h)				
Tdrs	7.8 6.5	6.2 4.0	8.3 7.0	8.0 6.0
Tcos	7.0 6.2	6.2 5.7	8.2 7.8	10.0 9.0

Abbreviation: Tdrs, Train drivers; Tcos, Train controllers

source: Ha'rma" et al. (2002)

2.2.2.4 Rotating Shift

Rotating shift systems, the shift have pattern for the employee's working schedule which the working time for rostered basis are changed and rotate between two or more groups in a decided duration (Working Time Analysts, n.d.). This kind of shift also may have two shift working hour or three shift working hour (Pan et al, 2011). The pattern for the shift system is planned by assigning which group goes on the first, second or third shift. The working shift have different time all shifts combined completing 24-hours a day. The pattern also designed based on speed of changes and direction of exchanging shift. The speed means the number of same shift worked before moving or rotating to another shift while the direction refers to direction of shift either the shift will be rotated goes backwards or forward (Knauth, 1995). Figure 2.2 shows an example of working schedule for rotating shift.

Team	Days 1-7	Days 8-14	Days 15-21	Days 22-28	Hours	Shifts
Team 1	Day Shift	Swing Shift	Night Shift	Day Shift	168.0	Day Shift (8 Hrs) 7:00 AM-3:00 PM
Team 2	Swing Shift	Night Shift	Day Shift	Swing Shift	168.0	Swing Shift (8 Hrs) 3:00 PM-11:00 PM
Team 3	Night Shift	Day Shift	Swing Shift	Night Shift	168.0	Night Shift (8 Hrs) 11:00 PM-7:00 AM
Team 4	Day Shift	Swing Shift	Night Shift	Day Shift	168.0	
Hours	168.0	168.0	168.0	168.0	672.0	

Figure 2.2 Slow rotating shift pattern that uses 4 teams and three 8-hr shifts

Source Business Management Systems, Inc (2017)

Based on Figure 2.2, the rotating shift system have a slow pattern for the working schedule as a team works for seven days in a row consecutively and the speed for this rotating system also considered as seven days. The teams also considered to have forward direction as the swing shift comes after the day shift, followed by night shift after swing shift and also day shift rotated night shift period which also moves in clockwise.

2.3 Sleep Deprivation

When an individual does not have enough sleep than required, it is considered as sleep deprivation that occurs on that particular individual (American Academy of Sleep Medicine, 2008). Abrams (2015) also defined sleep deprivation as inadequate sleep which lead to declining performance, individual alertness, and health deterioration. Besides, sleep deprivation also lead to many adverse effect towards health (Abrams, 2015). The amount of sleep that a person needs varies from one person to another (Hirshkowitz et al., 2015; American Academy of Sleep Medicine 2008), According to American Academy of Sleep Medicine, an average about seven to eight hours of sleep required for adults each night to feel alert and well rested while teens need an average of about nine hours of sleep per night (American Academy of Sleep Medicine, 2008). For children, a nine hours of nightly sleep or more required in daily life which also based on their age too (American Academy of Sleep Medicine, 2008). Figure 2.3 shows a chart of sleep duration recommendations across the life span from research conducted by Hirshkowitz et al., 2015 After reviewed by experts Panel including sleep researchers, experts in medical field and using RAND/UCLA Appropriateness Method

by researchers and experts, the sleep duration recommendation for all ages are generated. Based on Figure 2.3, sleep durations recommended are vary across ages. As the ages incline, the sleep needs are decreasing from newborn to the older adults.

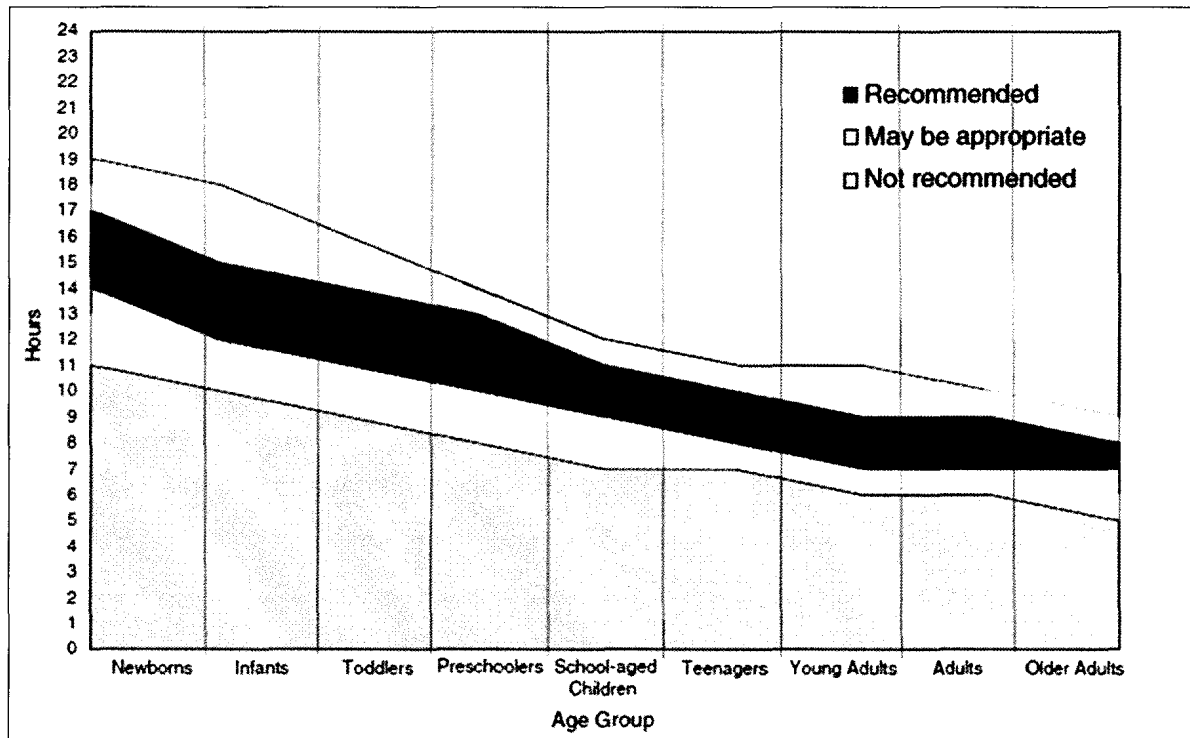


Figure 2.3 Sleep duration recommendations across the life span

Source Hirshkowitz et al. (2015)

2.3.1 Causes of Sleep Deprivation

2.3.1.1 Voluntary Behaviours

Self-limiting sleeping hour also leading to sleep deprivation as the person behaviorally restrict the sleep time (Smith, 2016). Besides, a chronic sleep deprivation is also related with a voluntarily restrict sleep schedule. Behaviorally induced insufficiently sleep syndrome is a sleep disorder associated with chronic sleep deprivation caused by a voluntary pattern of restricted sleep (Smith, 2016). This usually occurs because individuals are unaware that their body has higher demands of sleep and they choose to remain awake to socialize or enjoy hobbies, thus restricting sleep time. Alcohol and caffeine intake also may cause sleeping difficulties The use of stimulants including alcohol and caffeine also have an impact on sleep (Selvi et al., 2015). For

example, consuming alcohol or caffeine close to bedtime, can increase the difficulty to fall asleep (Smith, 2016).

2.3.1.2 Personal Obligations

Sleep deprivation can occur when personal obligations restrict sleep time. For example, a person may lose sleep while providing home care for a relative with a chronic illness. Babies, older babies and toddlers – parents almost always experience sleep deprivation because their young children wake frequently in the night for feeding or comfort (Victoria State Organization, 2014).

2.3.1.3 Work Hours

The work hours required by some occupations can produce sleep deprivation (Åkerstedt, 2003). The quality and quantity of sleep in workers can be affected by shift work (Halvani, Zare, & Mirmohammadi, 2009) . Night shift work people who work at night either in fixed shift or rotating shift system often experience sleep disorders, because they cannot sleep when they start to feel drowsy (Meretoja, 2009; Metzner & Fischer, 2001; Pan et al., 2011; Selvi et al., 2015). Their activities run contrary to their biological clocks (Pathak, 2017).

The working hours that against the biological clock force the body to work beyond limit and cause sleep disorder. The long working hours also may affect the rest time required by the worker especially in healthcare sector (Leonard et al., 1995). The doctors need to fulfill their task in curing the patient including performing duty against sleeping time (Leonard et al., 1995). The study conducted by Leonard et al., (1995) shows that sleep deprivation due to erroneous working hour lead to sleep deprivation thus adversely affect the doctors psychologically. In United states, an increasing of medical errors while performing duty and occupational injuries among medical workers also recorded as a consequence of sleep deprivation due to improper work hours (Landrigan et al., 2007).

2.3.1.4 Medical Problems and Sleep Disorder

Consuming hospital medications also may lead to sleep deprivation. Some drugs used to treat disorders such as epilepsy or attention deficit hyperactivity disorder (ADHD) can cause insomnia (Efron et al., 2014). Illnesses such as colds and tonsillitis which may cause snoring, gagging and frequent waking, and have a direct effect on sleep by fragmenting it. (Victoria State Organization, 2014). Other than that, the sleep deprivation is not the only cause of sleepiness on campus student, as sleep disorders may also play a role (Hershner & Chervin, 2014).

2.3.1.5 Environmental Factors

Light exposure during sleep also may effect sleep quality and lead to sleep disorder.(Hershner & Chervin, 2014) In human, the pineal gland secretes melatonin which aids in regulating human circadian rhythm for sleeping (Crowley et al., 2007). The presence of light made to melatonin secretion lower it is low during daytime or increase again about 2 hours before sleeping time. If melatonin is suppressed by light, and light sources as low However, if 200–300 lux which is room lights intensity present, the light will suppresses the human melatonin production (Hershner & Chervin, 2014).

2.3.2 Effect of Sleep Deprivation on Human and Physical Performance

There many effect of sleep deprivation towards human. Sleep disorder or sleep-related problem, including obstructive sleep apnea, insomnia, restless legs disorder and periodic limb movement disorder, circadian rhythm sleep disorders, and hypersomnia. (Gaultney, 2010; Hershner & Chervin, 2014; Patrick et al., 2017). Moreover, the sleep deprivation also strongly impairs human functioning (Pilcher & Huffcutt, 1996). Pilcher et al., (1996) also finds that mood impairment is more affected by sleep deprivation than either cognitive or motor performance and the partial sleep deprivation has a more highly affected on motor functioning than either long-term or short-term sleep deprivation.

2.4 Health Effects of Shift Work

This working system also contribute to degrading of Shift work has been always associated with gastrointestinal disease, cardiovascular disease, diabetes, several types of cancer, and metabolic disorders. (Kim et al., 2013). The mechanisms linking shift work to health problems are not clear, but changed circadian rhythm, sleep problems, stress, and lifestyle and behavioral changes such as diet and smoking might be potential mediators for (Harrington, 2001). Shift work also has been linked to some chronic diseases including cardiovascular diseases (Dine et al., 2012).

2.4.1 Sleep Disturbance

Sleep quantity and quality is often disrupted when the sleeping time is shifted from night to day due to shift work (LaDou, 1982). The quality of sleep is also affected by night shift work. Disruption on sleep hygiene also lead to sleep disorder on human (Gaultney, 2010).

2.4.2 Disturbance of Eating Patterns

In shift workers, particularly permanent night shift workers, may occur because of the change in normal eating times, the difficulty of obtaining hot, nutritious meals during the night shift and the inability to have social contact during mealtimes with family or friends (LaDou, 1982). Although calorie intake is not lessened in shift workers, appetite disturbances may be related to a dislike of eating outside the customary social environment (LaDou, 1982). The foregoing factors can result in gastrointestinal disorder towards shift workers (Scott, 2000 and LaDou, 1982).

2.4.3 Gastrointestinal Disorder

Many shift workers complain of digestive disorders, which may be a reflection on the poor quality of catering on some shifts. Night workers seem to have the most complaints of dyspepsia, heartburn, abdominal pains, and flatulence (Zhao et al., 2012). The data in these studies are not particularly robust (Costa, 1996). It is necessary to realise that psychosomatic disorders are common in the general population and to recognise the influence of several other factors including *Helicobacter pylori*, infection, family history, and lifestyle (Costa, 1996).

2.4.4 Anxiety and Depression

Shift working can be a potential psychosocial stressor (Dine et al., 2012). Stress is, however, a difficult concept to define, let alone measure. Anxiety and depression indices also point to the likelihood of an adverse effect on mental health from shift work and long working hours (Tamagawa et al., 2007).

2.4.5 Cardiovascular Disease

Cardiovascular disease is commonly known around the shift workers. A recent review of the data suggests that shift workers have a 40% increase in risk (Bøggild & Knutsson, 1999). Causal mechanisms are not well defined but contributing factors include disruption of circadian rhythm, disturbed socio temporal patterns and social support, stress, smoking, poor diet, and lack of exercise (Dine et al., 2012). The health outcomes are mainly angina pectoris, hypertension, and myocardial infarction (Dine et al., 2012).

2.4.6 Fatigue

Fatigue is a common complaint among those working abnormal hours. It is particularly noticeable after the night shift, less so on the morning shift, and least on the afternoon shift (Shen et al., 2006). Fatigue, however, is a complaint that is exceedingly difficult to measure (Wijesinghe et al., 2015). Some published evidence exists to suggest that there is a reduction in complaints of fatigue after objective improvement in physical fitness (Tamagawa et al., 2007). Nevertheless, it remains an important, if vague, symptom which is often cited as a major reason for intolerance to shift work (Tamagawa et al., 2007).

2.4.7 Obesity

Weight gain in shift workers may be related to several mechanisms which involved alternations of genetic factors, glucose and lipid homeostasis, thermogenic response due to a night eating pattern. As postulated by Garaulet et al., (2010) the disruption of the circadian rhythm and the lack of sleep at night may affect the

processes related to metabolism and the feeling of hunger, which may excess energy intake, especially in the evening time which lead high food intake and obesity

2.4.8 Reproductive Effect

There is increasing evidence to suggest that shift work and particularly night work, may present special risks to women of child bearing age (Knauth et al., 1980) The causative factors probably include disruption of the menstrual cycle and increased stress from the conflicts created by night work on family life (Knauth et al., 1980). Specific health outcomes linked to shift work include increased risk of spontaneous abortion, low birth weight, and prematurity (Scott, 2000).

2.5 Physical Performance

According to Battinelli (2007), physical performance is defined as the increased of proficiency and competency that acquired by body based on body structural and functional capacities, abilities, and skills relative to nutrient and metabolic utilization which can be demonstrated using designated physical activities. However, physiological and psychological fatigue also must be considered in the process as it may affect the result of the physical performance (Battinelli, 2007). Components of physical performance comprised of body build, physical fitness, motor abilities (Battinelli, 2007 and Patrick et al., 2017).

2.5.1 Body Build

Body build or physique can be characterized by both interactive which includes body structure, body size and body composition. Body structure is a distributive component parts of the body while body size refers to body mass, volume, length and surface area or the body. Body composition is the fat and fat-free ratio percentage components of the body. In order to measure the physical performance in terms of body build, somatotype and anthropometric somatotype assessment was introduced which may be designed based on the research needs (Battinelli, 2007). Stamm et al., (2003) had used the method in order to determine the performance of the volleyball player by using anthropometric assessment. This method used are successful to relate with the physical performance as the anthropometric factor are significant with the performance of the volleyball player (Stamm et al., 2003).

2.5.2 Physical Fitness

Physical fitness is defined as the ability to carry out vigorously and alertly on daily activities without fatigue (Carson Conrad, 1981). Battileni (2007) also defined physical fitness as performance gradated its level quantitatively and qualitatively along with the capacity to do the physical work. Physical fitness comprised of five components which are flexibility, cardiorespiratory endurance, body composition muscular endurance and muscular strength. Flexibility is the functional joint movement of the body and limbs through a range of movement. Cardiorespiratory endurance is the contributive metabolic energy force that is descriptive of the physiological work capacity of the body relative to the performance efficiency of the vascular and respiratory heart and lungs over extended periods of time. Body composition is the fat and fat-free composition in the body. Muscular endurance is submaximal repetitive or sustained of force against resistance while muscular strength is maximal repetitive or sustained of force against resistance. Fitness test is also one of a good method in measuring performance (Deforche et al., 2003; Patrick et al., 2017). A research conducted by Deforche et. al., (2003) have identified that fitness test give a good result in determining performance between two control groups which are obese and non-obese people even both group have physical activity before the test done.

2.5.2.1 Muscular Endurance

Muscular endurance is one of the main element that being studied which it is known as the the ability to move body or an object repeatedly without getting tired. For most activities, human body use both muscular strength and endurance (Battineli, 2007). Performing multiple repetitions of an exercise is a form of muscular endurance, as is running or swimming. If the muscles have to contract in a similar pattern more than one time, the muscular endurance are utilized in the movement. Human muscles are made up of different types of muscle fibres. The two main types are fast-twitch and slow-twitch. Slow-twitch fibres play the greatest role in muscular endurance. They do not generate much force, but they are far more resistant to fatigue than fast-twitch muscles. Fast twitch muscles go to work when the force is too great to handle for the slow-twitch muscles. The muscle will activate to perform short-duration powerful movements (Patrick et al., 2017).

Human muscular endurance consist of three parts which are abdominal, upper body, and also leg and full body muscular endurance. Findley et al. (1995) has conduct a research involving abdominal and upper body muscular endurance to determine the association between age and physical fitness. Regression analysis revealed a significant decline in abdominal muscular endurance by age group based on research by Findley et al. (1995) but no significant on upper body muscular endurance. Jiraishi et al. (2016) had studied effects of a systematized yoga practice on muscular endurance in young women which the muscular endurance of upper limbs using push-up and abdominal sit-up was assessed through the protocol suggested by Gettman and Golding resulting an association between systematized yoga practice on muscular endurance. Sakamaki (1953) had analysed the full body endurance step test and burpee test and both test results reliable in measuring trunk and full body muscular endurance.

2.5.3 Motor Abilities

Motor abilities is also known as motor skills is the ability for the muscle and nerves to produce movement. As muscle and nerves interact between muscular systems and nervous system, the motor skills help in determining how well does the interaction in the body. Besides, the psychomotor test used is also reliable in assessing physical performance (Graf et al., 2004). Graf et al., (2003) conducted a study based on the association between body mass index (BMI), leisure habits motor abilities among children and finds out that there are inversely correlation between BMI and the motor abilities of the children using body coordination test for children KTK (KTK and BMI $r = -0.164$ ($P < 0.001$)).

2.5.4 Body Mass Index

Body mass index (BMI) is one of anthropometric assessment that categorized human body weight and height which then are classified in few groups as the index will represent the individual's characteristics (Nuttal, 2012). Leyk et al., (2006) identified that body weight increases and fitness decreases in non-obese young adults in Germany. The same correlation also present in research conduction on 9-18 years old teenagers in Taiwan (Huang & Malina, 2007). This show how body mass index may affect an individual's physical performance.

2.6 Conclusion

In conclusion, this chapter provides an intensive review towards the research studied. The literature review also helps in improving understanding and increasing knowledge of a researcher.

CHAPTER 3

METHODOLOGY

3.1 Introduction

In this chapter, the method that used to conduct the research is discussed along the section including research design, study sample, study area, research process, research techniques and instruments including data analysis. The method also will be used to achieve research objectives and answering research questions. Methodology is a systematic and theoretical technique utilized in gathering and validating information related to the research studied.

3.2 Research Design

In order to conduct the research, the cross-sectional research design is used in this study. Cross-sectional research design is known as an observational study in which data collected by the researcher on a specified point in time. The population of the study might be selected entirely or the subset. Then the data collected then analysed to generate results after the analysis. This research design also usually used to determine the association between two variables that are studied. In this research, the study design is used to determine the correlation between shift work and physical performance of the security officers. The health effect of shift work towards security officers is also studied in this research by cross-sectional research design.

3.3 Study Sample

In order for a research to be executed, a study sample is required to identify what kind of subjects are required and determining how many sample size needed from a population for research which is done by studying sample. Sampling is very important in research because it will lead Besides, the validity and reliability of a research also

depends on how the sampling process are done as it is important to be done correctly including sample selection.

Table 3.1 shows Krejcie and Morgan (1970) sample size table which used in determining sample size from a population. For this research sample, the number of sample size is determined by using Krejcie and Morgan (1970) sample size table.

Table 3.1 Determining Sample Size from a Given Population

N	S	N	S	N	S
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	198	3000	341
80	66	420	201	2500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	100000	384

N is population size, S is sample size

Source: Krejcie & Morgan (1970)

For research sampling procedure, a census sampling will be utilized in order to select sample among security officers. This sampling method may present the data of the population too. Any confounding factor also can be neglected during sampling procedure.

3.4 Study Area

The study area for the research is the area selected to conduct the research. A higher education institution in East Coast, Malaysia is chosen as the study area which employs security officers in their organization that have rotating shift work system. The reason for the area selected in conducting research is because most of the security officers are employed permanently and already works for a long time. They also may have a long exposure towards shift work that are reliable to be studied for the research.

3.5 Research Techniques

A good reliability and validity of a research depends on a correct research technique which plays and important in research outcome. Every research has different technique utilized by researcher to generate a good result after analysed and interpreted specifically from the studies.

A research commonly uses more than one technique to complete their research successfully. Each technique also has its own strength and weaknesses when utilized as their approaches are varies between each other. Therefore, selecting and combining right techniques is important to fill in the gap of weaknesses of each technique used.

3.5.1 Experimental

Experimental method is a research method in which is used to test the research hypothesis scientifically. A researcher may manipulate one or more variables to determine the responding variables based on hypothesis formulated. This technique also may provide a good experience and understandings towards research studied as everything takes places and controlled by the researcher itself.

In determining association between shift work and physical performance level, an experimental method will be applied in this research. An instruction also will be given to the security officers before the fitness test will be done. The result of the

fitness test will be used to determine whether the hypothesis is accepted or rejected during data analysis

3.5.2 Survey

Survey method data collection in extracting a data which are specified from respondent in a list of questions. All research context which comes out from respondent thoughts and minds are extracted on the survey form. This method also avoid any information required information missed out by the researchers as the questions are stated on the form which then analysed and interpreted for final results.

In determining health risk of shift work, a survey will be conducted through questionnaire as it is a good technique in providing close-ended and open-ended questions to respondents. Smoking status and other factors that may affect physical performance also will be included in the questionnaire as it may be a confounder in research hypothesis.

3.6 Research Instruments

A research instrument is a tool that applied in gathering, collecting and analysing data attained in a research. Selection of suitable measurement tools is important in generating an absolute result. In order to measure muscular endurance, a fitness test is selected and will be introduced in the research. In determining health risk of shift work among security officers, questionnaire is also selected to conduct the research.

3.6.1 Muscular Endurance Test

In this research, the muscular endurance test assessed the abdominal muscular endurance, upper body muscular endurance and also leg and full body muscular endurance were assessed by using sit-up test, push-up test and burpee test.

3.6.1.1 Assessment of Abdominal Muscular Endurance

Abdominal muscular endurance was measured using sit-up test in a minute (1 min). The procedure was subject lies on the carpeted or cushioned floor with bending the knees at right angles with feet flats on the grounds. The hand was made sure to be in rest condition on the thighs. Then, the subject should squeeze the stomach, push back flat and raise high enough hands to slide along thighs and touch the top of knees but neck or head were make sure did not pulled and lower body kept on the floor. After that, returned to the starting position and repeat again until exhaustion. The sit-ups were recorded. Table 3.2 and Table 3.3 show the score and level of muscular endurance for men and women

Table 3.2 Sit-Up Test Score for Men

Age	18-25	26-35	36-45	46-55	56-65	65+
Excellent	>49	>45	>41	>35	>31	>28
Good	44-49	40-45	35-41	29-35	25-31	22-28
Above average	39-43	35-39	30-34	25-28	21-24	19-21
Average	35-38	31-34	27-29	22-24	17-20	15-18
Below Average	31-34	29-30	23-26	18-21	13-16	11-14
Poor	25-30	22-28	17-22	13-17	9-12	7-10
Very Poor	<25	<22	<17	<13	<9	<7

Source: Sport Centre Universiti Malaysia Pahang (adapted from Golding et al., 1986)

Table 3.3 Sit-Up Test Score for Women

Age	18-25	26-35	36-45	46-55	56-65	65+
Excellent	>43	>39	>33	>27	>24	>23
Good	37-43	33-39	27-33	22-27	18-24	17-23
Above average	33-36	29-32	23-26	18-21	13-17	14-16
Average	29-32	25-28	19-22	14-17	10-12	11-13
Below Average	25-28	21-24	15-18	10-13	7-9	5-10
Poor	18-24	13-20	7-14	5-9	3-6	2-4
Very Poor	<18	<13	<7	<5	<3	<2

Source: Sport Centre Universiti Malaysia Pahang (adapted from Golding et al., 1986)

3.6.1.2 Assessment of Upper Body Muscular Endurance

Upper body muscular endurance was measured by using push-up test in a duration of 1 minute. The procedure was the subject need kneel to the floor, keep hands beside of the chest and make sure the back is straight. Then, push up the body ups as many as possible until fatigue. The completed push-ups were recorded. Table 3.4 and Table 3.5 showed the score and level of muscular endurance for men and women.

Table 3.4 Push-Up Test Score for Women

Age	17-19	20-29	30-39	40-49	50-59	60-65
Excellent	> 56	> 47	> 41	> 34	> 31	> 30
Good	47-56	39-47	34-41	28-34	25-31	24-30
Above average	35-46	30-39	25-33	21-28	18-24	17-23
Average	19-34	17-29	13-24	11-20	9-17	6-16
Below average	11-18	10-16	8-12	6-10	5-8	3-5
Poor	4-10	4-9	2-7	1-5	1-4	1-2
Very Poor	< 4	< 4	< 2	0	0	0

Source: Sport Centre Universiti Malaysia Pahang (adapted from Golding et al., 1986)

Table 3.5 Push-Up Test Score for Women

Age	17-19	20-29	30-39	40-49	50-59	60-65
Excellent	> 35	> 36	> 37	> 31	> 25	> 23
Good	27-35	30-36	30-37	25-31	21-25	19-23
Above Average	21-27	23-29	22-30	18-24	15-20	13-18
Average	11-20	12-22	10-21	8-17	7-14	5-12
Below average	6-10	7-11	5-9	4-7	3-6	2-4
Poor	2-5	2-6	1-4	1-3	1-2	1
Very Poor	0-1	0-1	0	0	0	0

Source: Sport Centre Universiti Malaysia Pahang (adapted from Golding et al., 1986)

3.6.1.3 Assessment of Leg and Full Body Muscular Endurance

Leg and full body muscular endurance was measured by using burpee test in 30 seconds. The procedure was standing erect with the arms by the side. From standing position, squat down and place hands on the floor in front of the feet. Putting the bodyweight on the hands, the legs were thrust back to a push-up position with a straight line from shoulder to the heels. Next, pull the legs back and return to the squatting position, then up back to the standing position. One complete burpee is from standing back to the starting position. The number of burpees were recorded. Table 3.6 shows Burpee test score for men and women.

Table 3.6 Burpee Test Score for Men Women

	Men	Women
Good	≥16	≥12
Poor	< 16	<12

Source: “Burpee Test” Top End Sports (Wood, 2017)

3.6.2 Questionnaire

Questionnaire which comprised of a series of questions that used for research information gathering purposes also will be used this research studies. A collection of question may reduce time in collecting data as the exact information can be directly received on the piece of paper. A good questionnaire that is fully related to research context can be an effective tool during information gathering.

For the research, a questionnaire will be used in determining what health effects are received by security officers due to shift. A series of questions will be constructed consisted of 5 parts including demographic profiles, Health Effect from Work, Effect of Shift Work on Behaviour, Shift Work Effect on Daily Life and Shift Work Effect on Psychological Health. This questionnaire adapted from previous researcher's questionnaire and studies then modified to suit with the research studies. A pilot study also was also conducted on 10% of the research sample to determine the reliability of the questionnaire for the research.

3.7 Reliability Analysis

Reliability is a degree which indicates an assessment tool produced table and consistent result between multiple variable made up the scale on questionnaire. Cronbach's alpha was developed to measure reliability and internal consistency of correlation value. Table 3.7 shows the range of Internal Consistency Cronbach's Alpha.

Table 3.7 Range of Internal Consistency Cronbach's Alpha

Cronbach's Alpha (α)	Internal Consistency
$\alpha \geq 0.9$	Excellent
$0.9 > \alpha \geq 0.8$	Good
$0.8 > \alpha \geq 0.7$	Acceptable
$0.7 > \alpha \geq 0.6$	Questionable
$0.6 > \alpha \geq 0.5$	Poor
$0.5 > \alpha$	Unacceptable

3.8 Data Analysis

Data analysis is a process where the raw collected information is analysed, interpreted and summarized in terms of relationship, trends and patterns by with analytical and logical reasoning tools. The data analysis also helps in determining whether the research questions are answered in the studies. The data that will be analysed in the research are mainly the result of physical fitness of the security officers and the data from questionnaire on health effect of shift work suffered by security officers. Once the data analysed, the research objectives also can be determined whether they are achieved. In this research, Statistical Package for Social Science (SPSS) are the statistical tools that will be used in research data analysis.

3.8.1 Statistical Package for Social Science (SPSS)

Statistical Package for Social Science is a statistical technique that will be used to determine how research data will be analysed. There are two type of statistical technique which descriptive statistics and inferential statistics. Descriptive statistic is conversion of raw data collected into a situation of presentation such as charts and tables. For inferential statistics, it is different as it is a procedure in which used to analyse empirical data to identify whether the independent variable affecting the dependent variable based on research hypothesis which need to be accepted or rejected. In this study, descriptive statistics was used to analyse the data.

3.8.2 Descriptive Analysis

Interpretation of analysis in which the means, standard deviations and percentage of data in the research were calculated to define subject with respect to the physical characteristics and also performance in the test.

3.8.3 Correlation Analysis

Correlation analysis was used to determine the association between two variables. In this research, Spearman rho correlation was used to determine relationship between two variables whether the relationship is positive or negative when the significant level lower than 0.05. This correlation analysis shows of the value of one variable can be determined and correlated by knowing the value of other variable. A

correlation of 0 indicates no association between two variables. Table 3.8 was used to identify the strength of the correlation.

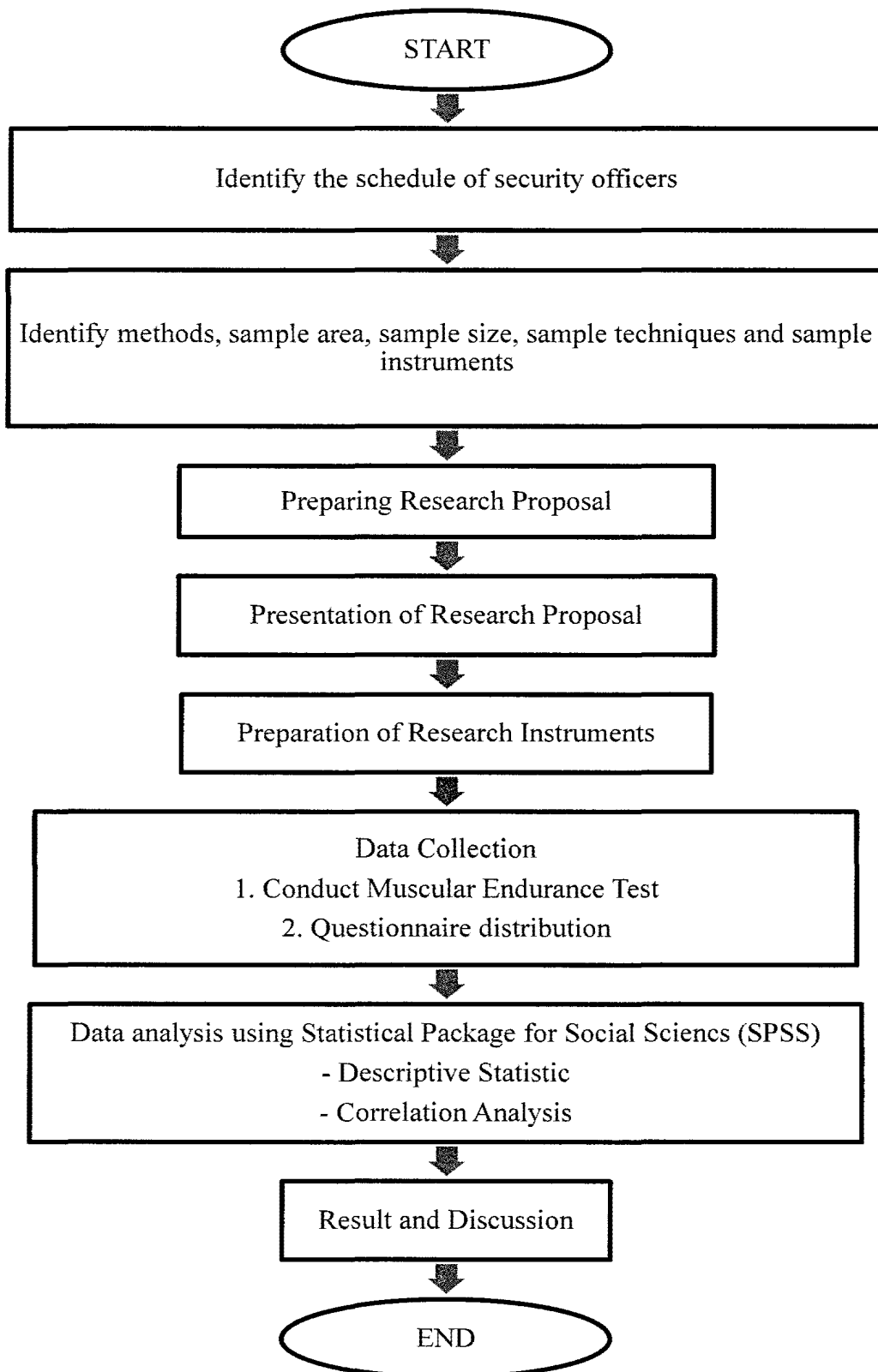
Table 3.8 Strength of Correlation (Pearson, 1948)

Value of r (Correlation Coefficient)	Correlation Strength
(-1 to -0.5) or (0.5 to 1)	Very Strong Correlation
(-0.5 to -0.3) or (0.3 to 0.5)	Strong Correlation
(-0.3 to -0.1) or (0.1-0.3)	Medium Correlation
(-0.1 to 0.1)	Weak Correlation

3.9 Study Ethics

In study ethics, security officers were the respondents of the research. A permission from Security Department of the higher education institution and the consent from each security officers was requested before conducting the research. All details information in research including purpose and contents of the research studied were informed on each respondents involved. The data generated from tests and questionnaires were only used as the reference to conduct the research.

3.10 Research Process



3.11 Conclusion

In conclusion, methodology is one of important elements in conducting a research. Selecting a right method is important to generate a reliable and valid result for the research studied. Overall this chapter has discussed the research design, study sample, study area, research process, techniques and instruments including data analysis.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents all data that have been collected for the research, the result and findings generated from this study was interpreted by using IBM statistics package for Social Science (SPSS). All data were analysed in order to answer all research questions and objectives. The data of sleeping hour and level of muscular endurance were analysed to determine the relatedness between two variables. This chapter also discusses the data obtained through questionnaire after being analysed.

4.2 Demographic Profile

Demographic profile is the statistical characteristics which represent the population of the study which is also known as the collection of data regarding a specific population. In this study, the data have been collected at a higher learning institution in East Coast Malaysia. A descriptive analysis was used in order to perform demographic analysis to identify the percentage and frequency which based on the questions that were given to the respondent. In this research, gender, age, working experience, smoking status and sleeping hour are included as demographic characteristics of the study. Table 4.1 shows all demographic characteristics of the sample.

Table 4.1 Demographic Profiles

Characteristic	Frequency	Percentage (%)
Gender		
Male	15	78.9
Female	4	21.1
Age		
18-25 years	1	5.3
26-30 years	1	5.3
31-35 years	5	26.3
36-40 years	7	36.8
41-45 years	4	21.1
More than 45 years	1	5.3
Working Experience		
1-5 years	1	5.3
6-10 years	10	52.6
11-15 years	4	21.1
16-20 years	2	10.5
More than 20 years	2	10.5
Smoking Status		
Casual Smoker	5	26.3
Heavy Smoker	2	0.5
Former Smoker	1	5.3
Non smoker	11	57.9
Sleeping Hour		
1-2 hours	1	5.3
3-4 hours	3	15.8
5-6 hours	15	78.9
7-8 hours	0	0
9-10 hours	0	0
More than 10 hours	0	0
Body Mass Index (BMI)		
Underweight	1	5.3
Healthy range	1	5.3

Overweight	9	47.4
Obese	8	42.1
Physical Activity in a week		
0-1 times	5	26.3
2-3 times	10	52.5
4-5 times	1	5.3
6-7 times	3	15.8

4.3 Descriptive Analysis

Descriptive analysis of means and standard deviations were generated by computing the data collected for this research. The descriptive analysis for sleeping hour, sit-up test, pus-up test, and Burpee test were tabulated as below. The data shows the average and standard deviation from the total of 19 respondents that participated in the study.

Table 4.2 Descriptive Statistics

Characteristics	Mean	Standard Deviation
Sleeping Hour	4.974	1.124
Level of Muscular Endurance		
Sit Up Test	10.421	6.483
Push Up Test	15.053	11.038
Burpee Test	8.158	6.388

4.4 Reliability

Reliability of scale used in research purpose was determined and computed by using Cronbach's alpha reliability test in order to know the Cronbach's alpha coefficient. From Table 4.3, the Cronbach's alpha coefficient of the overall components based on pilot study conducted for the questionnaire was 0.884.

Table 4.3 Reliability Statistics of Cronbach's Alpha

Component	Cronbach's Alpha	No of items
Health Effect from Work	0.869	18
Effect of Shift Work on Behaviour	0.827	6
Shift Work on Daily Life	0.850	3
Work Effect on Psychological Health	0.861	11

4.5 Normality Test

Normality test was performed to determine whether the sample data collected had been analysed from normally distributed population. Through this test, the data can be identified either the data are normally distributed or vice versa. In this study, Shapiro- Wilk method was used as the data is below 50 samples. This method used to test the null hypothesis which the sample comes from particular distribution. When the p- value (significant) is bigger than 0.05, the data does not reject null hypothesis and the data might be not normally distributed. If the p- value (significant) is smaller than 0.05, hypothesis being rejected and the data might be not normally distributed.

Table 4.4 Normality Test

	Test of Normality					
	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig
Sleeping Hour	0.470	19	0.000	0.536	19	0.000
Sit-up Test	0.181	19	0.102	0.869	19	0.014
Push-up Test	0.135	19	0.200*	0.918	19	0.105
Burpee Test	0.264	19	0.001	0.810	19	0.002

4.6 Level of Muscular Endurance

In this study, the level of muscular endurance was assessed on security officers of higher learning institution in East Coast Malaysia. Three muscular endurance test were done on the respondent which included sit-up test (in 1 minute), push-up test (in 1 minute) and Burpee test which had been done for 30 seconds. These tests were conducted respectively with intention to determine the level of abdominal muscular endurance, upper body muscular endurance and leg and full body muscular endurance.

4.6.1 Abdominal Muscular Endurance

The abdominal muscular endurance level was measured by sit-up test within a duration of 1 minute. This test has resulting the level of muscular endurance that achieved by the security officers as shown in Figure 4.1 in which about 78.9% (n = 15) of the respondent have poor level of abdominal muscular endurance while 21.1% (n = 4) have a very poor endurance of abdominal muscle.

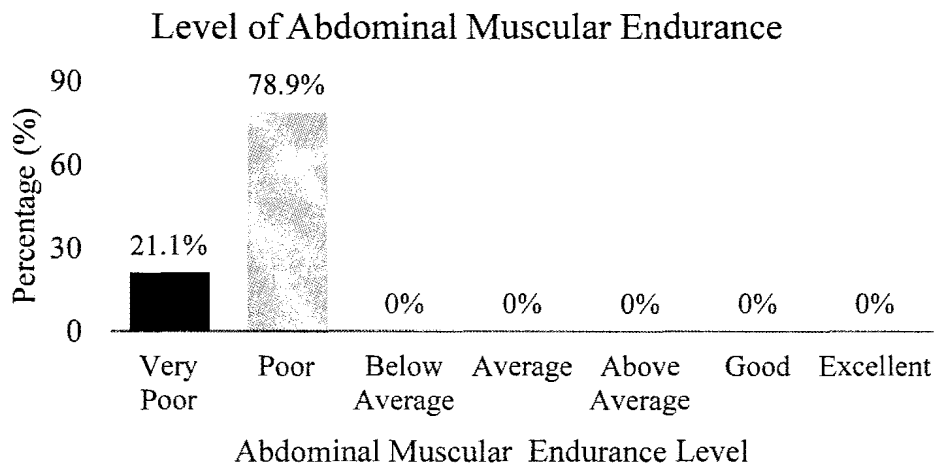


Figure 4.1 Percentage of abdominal muscular endurance level of security officers

The result in Figure 4.1 can be concluded that all of the respondents are in a range poor muscular endurance with weak muscle at the abdominal region.

4.6.2 Upper Body Muscular Endurance

A push-up test was used on each respondent to assess their upper body muscular endurance in a duration of 1 minute. The muscle area at the upper body includes triceps, biceps, chest, shoulders and back which involved in the muscular endurance test. The result of the tests conducted on the respondent is shown in Figure 4.2.

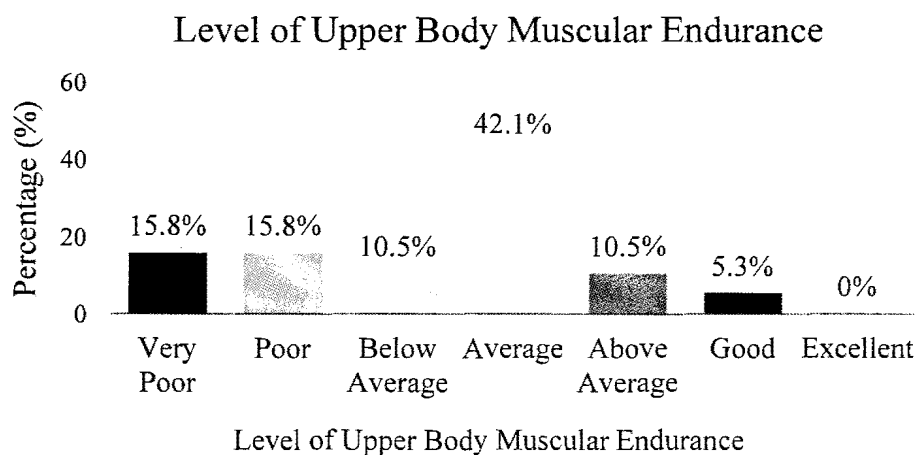


Figure 4.2 Percentage of upper body muscular endurance level of security officers

Based on Figure 4.2, about 15.8% (n = 3) of security officers have a very poor level and the other 15.8% (n = 3) also obtained poor level too. 42.1% (n = 8) security officers managed to get average muscular endurance level which is the highest number of security officers managed to achieved while 10.5% (n = 2) for below average and 10.5% (n =2) for above average. Only 5.3% (n = 1) obtained good level of upper body muscular endurance. None of the security officers managed to get excellent level of upper body muscular endurance.

4.6.3 Leg and Full Body Muscular Endurance

Leg and full body muscular endurance was measured by Burpee test as it measured full body muscular endurance focusing more on leg muscular endurance. The Burpee test result shown in Figure 4.3 yielded about 68.4% (n = 13) of security officers have poor leg and full body muscular endurance and only 31.6% (n = 6) of them have a good leg and full body muscular endurance.

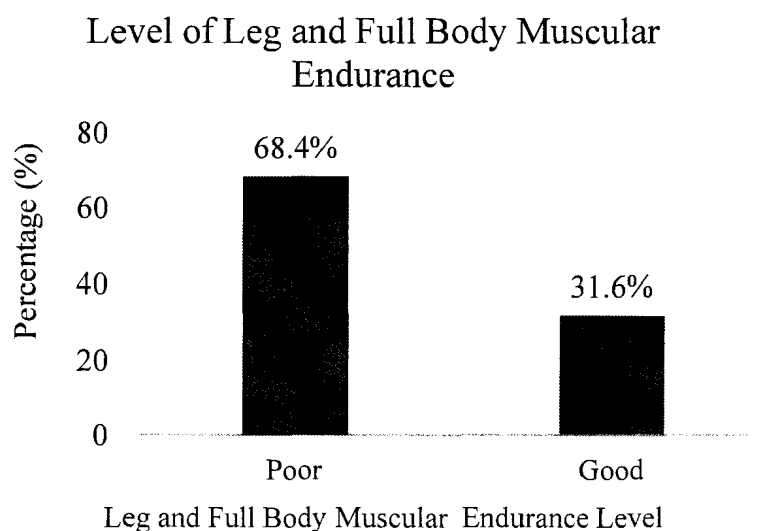


Figure 4.3 Percentage of leg and full body muscular endurance level of security officers

4.7 Association Between Shift Work and Muscular Endurance Level

The second objective of this study is determining the relationship of shift work with muscular endurance level of security officers of higher learning institution. As the data not normally distributed, Spearman rho correlation analysis was performed to determine the relationship between sleeping hour and level of muscular endurance.

Table 4.5 Correlation between sleeping hour and level of muscular endurance

		Sleeping Hour	Abdominal Muscular Endurance	Upper Body Muscular Endurance	Leg and Full Body Muscular Endurance
Spearman's rho	Correlation Coefficient	1.000	-0.126	-0.185	-0.006
	Sleeping Hour	Sig. (2-tailed)	0.608	0.448	0.980
	N	19	19	19	19
	Correlation Coefficient	-0.126	1.000	0.708**	0.573*
	Abdominal Muscular Endurance	Sig. (2-tailed)	0.608	0.001	0.010
	N	19	19	19	19
	Correlation Coefficient	-0.185	0.708**	1.000	0.818**
	Upper Body Muscular Endurance	Sig. (2-tailed)	0.448	0.001	0.000
	N	19	19	19	19
	Correlation Coefficient	-.006	.573*	.818**	1.000
	Leg and Full Body Muscular Endurance	Sig. (2-tailed)	0.980	0.010	0.000
	N	19	19	19	19

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Based on Table 4.5, the result of the correlation analysis showed the association between sleeping hour and abdominal muscular endurance, had a very weak correlation with correlation coefficient -0.126 at not significant at 0.05 level (2-tailed) ($p = 0.608$). The sleeping also had a very weak correlation between upper body muscular endurance same with leg and full body muscular endurance with correlation coefficient of -0.085 ($p = 0.448$) at significant 0.05 level and -0.006 ($p = 0.098$) a significant 0.05 level. Based on the three p-value of these associations, the p-value is higher than significant 0.05 level (2-tailed) which indicated that all these associations have no correlations between sleeping hour and the level of muscular endurance.

However, Ostwald (1962) mentioned that sleep deprivation and wakefulness cause muscle fatigue suffers from moving to stay awake from falling into deep sleep. Security officers need to move from one place to another place as they change their patrolling post every 2 hours in a shift. Reilley et al. (2007) also stated that sleep deprivation affects muscle performance as even there was no significant effect of sleep loss on performance of maximal biceps curl ($p > 0.05$) but a significant ($p = 0.05$) effect was noted on maximal bench press, leg press, and dead lift ($p < 0.001$) by eight male subjects aged 18-24 years.

The very weak correlation not significant between sleeping hour and level of muscular endurance might be affected by other factors too which might confound the study. Age, working experience, Body Mass Index (BMI), smoking status and physical activity done in a week were the factors that may be the confounder of this study and Spearman rho analysis also was performed as the data not normally distributed. Table 4.5 showed the result of the correlation analysis of these factors.

Table 4.6 Correlation analysis of other factors

Factor	Abdominal Muscular Endurance		Upper Body Muscular Endurance		Leg and Full Body Muscular Endurance	
	Correlation Coefficient	Sig. (2-tailed)	Correlation Coefficient	Sig. (2-tailed)	Correlation Coefficient	Sig. (2-tailed)
Age	-0.145	0.555	-0.418	0.750	-0.488	0.054
Working Experience	0.231	0.342	-0.047	0.848	-0.253	0.296
Body Mass Index (BMI)	-0.990	0.688	-0.198	0.416	-0.383	0.106
Smoking Status	-0.445	0.056	0.360	0.131	-0.398	0.092
Physical Activity in a week	0.287	0.233	0.295	0.220	0.015	0.951

In Table 4.6, age showed very weak correlation not significant at 0.05 level ($r = -0.145$, $p = 0.555$) for abdominal muscular endurance and negative and moderate correlation not significant at 0.05 level for upper body ($r = -0.418$, $p = 0.750$) and leg and full body ($r = -0.488$, $p = 0.054$). This shows there are no significant between age and level of muscular endurance but Tuna et al. (2009) indicated there was a relationship between age and muscular endurance as young elderly has better lower body strength (LBS) than older elderly which involving 229 elderly including male and female.

Working experience had a very weak positive correlation not significant for abdominal muscular endurance ($r = 0.231$, $p = 0.342$) but a very weak negative correlation not significant for upper body (-0.0047 , $p = 0.848$) and leg and full body (-0.488 , $p = 0.054$) muscular endurance. Based on this result, there is no association between working experience and level of muscular endurance. No study also had been found that working experience affected muscular endurance.

The next factor was Body Mass Index (BMI). Body Mass Index (BMI) had a very strong negative correlation not significant for abdominal muscular endurance ($r = -0.990$, $p = 0.688$) but a very weak correlation not significant for upper body (-0.198 , $p = 0.416$) and weak negative correlation not significant for leg and full body (-0.383 , $p = 0.106$) muscular endurance. This showed that there was no relationship between Body Mass Index (BMI) and level of muscular endurance. Hasan et al. (2016) states the BMI of 75 children had a positive correlation with the muscle strength of quadriceps, triceps, and abdominal muscles while a negative correlation with the endurance time of these muscles. Bosch et al. (2014) states that as body gets larger, the fat accumulated at abdominal region which total fat is higher than total lean mass that may reduce performance the football players which is the research subject.

The forth factor was smoking status. Smoking status had a weak positive correlation not significant for abdominal muscular endurance ($r = -0.445$, $p = 0.056$) but a positive correlation not significant for upper body (0.360 , $p = 0.131$) and weak positive correlation not significant for leg and full body (-0.398 , $p = 0.092$) muscular endurance. Based on this result, there is no association between smoking status and level of muscular endurance. However, Conway et al (1992) discovered that smoking was associated with lower exercise levels and lower physical endurance-both cardiorespiratory (using 1.5-mile run) and muscular (using sit-ups) which smokers will have lower physical endurance than non-smokers, even after differences in the average exercise levels of smokers and non-smokers are taken into account.

The fifth factor was physical activity. Physical activity had a weak positive correlation not significant for abdominal muscular endurance ($r = 0.287$, $p = 0.233$) and upper body (0.295 , $p = 0.220$) and very weak correlation not significant for leg and full body (-0.015 , $p = 0.951$). Based on the result, there is no association between physical activity and level of muscular endurance. However, Mayer et al. (2012) indicated that there is an association between physical activity and worker ability by testing their muscular endurance, muscular strength, and cardiovascular endurance as the results show significance difference in the association of worker's exercise program with work ability. Elavarasi et al. (2012) also proved that physical exercises affect human muscular endurance and vital capacity by physical exercise program involving forty-five sedentary working woman.

4.8 Health Effects of Shift Work

The third objective of this study is to determine the health effect from shift work towards security officers. In this study, a questionnaire consists of different sets of questions was given on each respondent. The questionnaire consists of four parts which are Health Effect from Work, Effect of Shift Work on Behaviour, Shift Work Effect on Daily Life and Shift Work Effect on Psychological Health.

4.8.1 Health Effect from Work

The first health effect determined is gastrointestinal disorder. Based on Table 4.7, a total of 94.7% (n = 18) of the security officers complained having mild gastrointestinal disorder and only 5.3% (n = 1) security officers complained having high gastrointestinal disorder. Mark et al. (2011) indicates that poor sleeping hour correlates with prevalence of having gastrointestinal disorder. However, those security officers might be having mild gastrointestinal disorder due to performing physical activity. Most of the security officers performing physical activity 2-3 times in a week. Luke et al. (2003) states that physical activity lowers the relative risk of colon cancer in most populations and improve gastric emptying. However, often exercise vigorously may give adverse effect on gastrointestinal tract based on research by Leyk et al. (2010). The security that recorded with high gastrointestinal disorder which is a female respondent might be high due to not performing any physical activity in a week as informed in the questionnaire by the security officer.

Table 4.7 Gastrointestinal Disorder Level

Gastrointestinal Disorder Health Status	Frequency	Percentage (%)
Mild	18	94.7
Moderate	0	0
High	1	5.3
Critical	0	0

The second health effect being assessed is cardiovascular disease. Most of the security officers which is 89.5% (n = 17) of the respondent have a mild cardiovascular disease health status while only 10.5% (n = 2) of the respondents have a moderate level of cardiovascular disorder as shown in Table 4.3. This shows that shift work also give effect on human cardiovascular system. Ha & Park (2005) also states there is association between shift work working hour and risk factor of cardiovascular disease among nurses. Akerstedt et al. (2000) mentioned that shift workers may have increasing risk of coronary heart disease based on his research. The moderate security officers are female which have a body mass index (BMI) of obese and overweight might be lead too cardiovascular diseases which proved by Kostis (2015) as the body mass index may affect the cardiovascular performance too.

Table 4.8 Cardiovascular Disorder Level

Cardiovascular Disorder Health Status	Frequency	Percentage (%)
Mild	17	89.5
Moderate	2	10.5

Fatigue is the third health effect that being determined. Table 4.9 showed that all of the security officers 100% (n = 19) had reported having mild level of fatigue. This show the respondent mildly declined immune system function, suffering muscle weakness and sore and muscle ache due to shift work. Shen et al. (2006) indicated that there is a correlation between shift work and fatigue due to sleepiness from performing job task on shift hours. The weakened muscle had affect the worker performing their task as the feel tired due to fatigue. The respondent also might get sick easily due to poor body immunity as the suffering fatigue (Richardson, 2002)

Table 4.9 Level of Fatigue

Fatigue Health Status	Frequency	Percentage (%)
Mild	19	100

4.8.2 Effect of Shift Work on Behaviour

The shift work effect towards behaviour also been determined to identify either the respondent may suffer anxiety and depression. Based on the result shown in Table 4.9, all of the security officers 100% (n = 19) have a mild behavioural disorder which indicates lower level of neuroticism. Neuroticism is a tendency of a person to be in a state of anxiety, depression, self-doubt and other negative feelings (Gulia, 1974). Based on the result in Table 4.10, the mild level which the respondents have indicates a lower tendency to be categorized as neurotic person. However, Foldal et al. (2016) stated that shift work tolerance is associated with personal difference and neuroticism. As working shift disrupt the circadian rhythm, the chemical releases or hormone secretion including dopamine and serotonin might also affect the body system (Crowley et al., 2007). The security officers that working in sleepless night might get moody in their life if the hormonal imbalance happen.

Table 4.10 Level of Behavioural Disorder

Behavioural Disorder Status	Frequency	Percentage (%)
Mild	19	100

4.8.3 Shift Work on Daily Life

This part determines whether the shift work really affects the security officers daily life. Based on the Table 4.6, the about 15.8 (n = 3) respondents have affected mildly while 73.7% reported moderately disrupted their life socially and domestically. However, 10.5% (n = 2) reported that shift work severely affect their daily life. might unable to manage their time for social and domestic matters due to working different time that normal work hour. Time constraint is a norm as a shift worker throughout their employment in order to manage things accordingly to follow people's time (Nielsen et al., 2011). Teixeira et al. (2004) also proves in their study that working shift affect the nap and sleep duration including the daily of school and extra-curricular activities spent base on her study on students who work and study on the same time.

Table 4.11 Level of Social and Domestic Disruption

Social and Domestic Disruption Level	Frequency	Percentage (%)
Mild	3	15.8
Moderate	14	73.7
Severe	2	10.5

4.8.4 Work Effect on Psychological Health

The forth part helps in determining the psychological effect towards the respondents due to shift work. In Table 4.12, the result shows about 52.6% (n = 10) security officers had mild level of psychological disorder and 36.8% (n = 7) with moderate level of psychological disorder. However, 10.5% of the respondent are in high level of psychological disorder which is quite worrying. This shows that the shift work do gives psychological effect on the security officers. The security officers might have a good support and family as their mental does not disrupted which help them boost their motivation and self-actualization based on the given questions to the respondents. Landrigan et al (2007) indicates that having good support system helps boost mental health among shift workers. However, Zhou et al (2016) stated that circadian misalignment still affects the sleep disorder which may affect the physical and mental health. The attention need to be given on those two high level respondents.

Table 4.12 Psychological Disorder Level

Psychological Disorder Status	Frequency	Percentage (%)
Mild	10	52.6
Moderate	7	36.8
High	2	10.5

4.9 Study Limitation

This study was carried with the aim to find out the association between shift work and muscular endurance among security officers in a higher learning institutions. One of the limitation while executing this research study is the small sample size. The number of sample is too small and required all security officers who are working shift in the study area to participate in the study. During data collection, two of them which were female and male security officers was unable to perform muscular endurance test due to poor health condition which one of them had a broken arm and the other female security officers just childbirth. Moreover, an individual from a small sample size can give huge effect on the data. The second one is time constraint. Shift workers perform their duty for 24 hours around the clock with rotating schedules. So, the data need to be collected based on their time availability including night. The third limitation that encountered during this research is the selection of muscular endurance test. There are various kind of tests which are suitable to measure muscular endurance effectively. However, due to job nature and small sample size, the tests must be selected suitably without disturbing their job nature in maintaining security of the campus.

CHAPTER 5

CONCLUSION

5.1 Introduction

This chapter discussed all of research findings in chapter 4. The conclusion was made through reviewing the data analysis from the previous chapter. The recommendation also suggested in this chapter based on the research executed to ensure the security officers have high level of muscular endurance and good shape in fulfilling their job in securing and maintaining the safety of the higher education institution.

5.2 Conclusion

This research was a study of shift work effect towards muscular endurance among security officers of higher education institution in East Coast Malaysia. This research was executed to assess the level of muscular endurance among security officers, to determine the association between shift work and level of muscular endurance and also to determine the health effect of shift work towards security officers of higher education institution.

Based on the research finding in the Chapter 4, the level of muscular endurance was break into three parts which included abdominal muscular endurance level, upper body muscular endurance level and level of leg and full body muscular endurance.

For abdominal muscular endurance, about 78.9% (n = 15) of the respondent have poor level of abdominal muscular endurance while 21.1% (n = 4) have a very poor endurance of abdominal muscle. The upper body muscular endurance resulted 15.8% (n = 3) of security officers have a very poor level and the other 15.8% (n = 3) also obtained poor level too. 42.1% (n = 8) security officers managed to get average muscular endurance level which is the highest number of security officers managed to achieved while 10.5% (n = 2) for below average and 10.5% (n = 2) for above average. Only 5.3% (n = 1) obtained good level of upper body muscular endurance. For the last part which was leg and full body muscular endurance, only 31.6% (n = 6) of them have

a good leg and full body muscular endurance while 68.4% (n = 13) of security officers have poor leg and full body muscular endurance. Through this findings, each part of the muscular endurance level indicated that not all of the security officers had a good level of muscular endurance to perform their job.

This research determining the association between shift work and level of muscular endurance. Through the finding in previous chapter, there was no association between shift work and level of muscular endurance among the security officers. Other factors such as age, working experience, Body Mass Index (BMI), smoking status and physical activity had no association with level of muscular endurance.

Health effect of shift work towards security officers had been determined through this research too. Gastrointestinal disorder, cardiovascular disorder, fatigue and effect on behaviour were reported to have mild and moderate health level only towards this three health effect. However, the shift work affected daily life severely to 10.5% (n = 2) of the security officers which is worrisome. This was worrying same goes to psychological disorder which 10.5% (n = 2) of the security officers reported to have high level for psychological health. An action should be taken to avoid the effect get worsen which may affect their lives and also their job performance as a security officer.

In conclusion, security officers should aware of how and what kind their job nature can deteriorate their health. Illness such as chronic diseases takes time to give complication on human health. Their physical endurance also might have degraded due negligence of health care including sleep hygiene.

5.3 Recommendation

Security officers are expected by society to be physically fit to perform their task efficiently. In order to fulfil their career responsibility towards the higher education institution and its people, security officers should reconsider and being encouraged on physical fitness including muscular endurance. From this research findings, few recommendations can be aligned for better job performance in securing premises and health status of the worker.

Medical surveillance can one of the intervention that suitable to track the health status of the security officers. This intervention targets actual health events or a change

in biological function of an exposed person or persons. Through medical surveillance, security officers will be more aware on how healthy the really are.

Sleep hygiene is one of the recommendation to promote a better sleep quality as some of the security officers have poor duration of sleeping hour. The sleep hygiene recommendation may include establishing a regular sleep schedule, not exercising physically or mentally too close to bedtime and others. A good quality of sleep may promote better workability in rotating working hours.

The third suggestion is the format for physical performance testing should be specified for security officers and established in order to measure an accurate physical performance of the security officers. This could be helpful in categorizing the security officers physically fit with the job nature. A specified training also should be generated in order to ensure the workability of a security officer in performing their task.

Finally, a standard operation procedure for working shift should be reviewed periodically to ensure the effectiveness of good shift working performance. Any complaint by security officers about the shift work should reconsidered to take action for improvement by top management of security unit.

5.4 Future Research

Future research that relate the between shift work and muscular endurance level among security officers should be continue because this study does not found association between shift work and muscular endurance level. The number of respondent should be added more from previous studies as the small sample size is hard to represent all population which influence the result. The confounder should be eliminated for future research in avoiding bias data which might affect the research data.

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**APPENDIX A
FITNESS FORM**

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Fitness Form

Name / Nama : _____

Age / Umur : _____

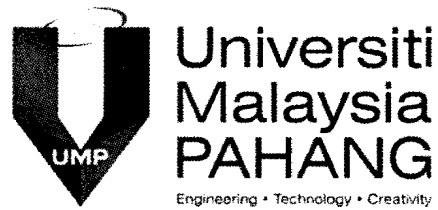
Last medical check-up / Pemeriksaan kesehatan kali terakhir: _____

How many times do you exercise in a week? _____ times / kali

Berapa kali anda bersenam dalam masa seminggu?

1.	Body Mass Index (BMI)	Height / tinggi: _____ (cm) Weight / berat: _____ (kg) BMI: _____
2.	Abdominal: Sit-Up (1 min)	_____ times / kali
3.	Upper Body: Push-Up (1 min)	_____ times / kali
4.	Leg and Full Body: Burpee Test (30 sec)	_____ times /kali

APPENDIX B QUESTIONNAIRE



PARTICIPATION INFORMATION SHEET

TITLE: SHIFT WORK EFFECT TOWARDS MUSCULAR ENDURANCE AMONG
SECURITY OFFICERS OF HIGHER EDUCATION INSTITUTION IN EAST
COAST MALAYSIA

The purpose of this study is to determine the association between shift work and physical performance among security officers of higher education institution in East Coast Malaysia. This questionnaire has been designed to collect information to achieve the desired target and will be used only for learning. All information to achieve desired target will be kept confidential and any personal information will be destroyed until the research is complete.

Please answer this question as best as you can. This question only takes 10 minutes to answer. Please return the questionnaire after you have filled in. Any enquiries related to this questionnaire, please contact **010-9151272** for any further enquiries.

Tujuan kajian ini adalah untuk menentukan hubungan antara kerja syif dan tahap ketahanan otot dalam kalangan pegawai keselamatan di institusi pengajian tinggi di pantai timur Malaysia. Soal selidik ini telah direka untuk mengumpulkan maklumat untuk mencapai target yang dikehendaki dan hanya akan digunakan untuk pembelajaran sahaja. Segala maklumat akan disulitkan dan sebarang maklumat peribadi akan dimusnahkan sebaik sahaja kajian ini selesai.

*Sila jawab soalan ini sebaik mungkin. Soalan ini hanya mengambil masa selama 10 minit untuk dijawab. Sila pulangkan soal selidik ini setelah anda sudah mengisinya. Sebarang pertanyaan yang berkaitan dengan soal selidik ini, sila hubungi **010-9151272** untuk sebarang maklumat lanjut.*

Sincerely,

Muhammad Hafizul Hilmi bin Ibrahim

Instruction: This questionnaire consists of five parts which are Part A, B, C, D and E. Please read the following questionnaire carefully and answers all questions.

Arahan: Soal selidik ini mengandungi tiga bahagian iaitu bahagian A, B, C, D, E. Sila baca soalan dengan teliti jawab semua soalan berikut.

Part A / Bahagian A: Demographic Information / Maklumat Demografi

Instruction: Answer all questions that have been provided. Please put a tick (/) in the give space.

Arahan: Sila jawab semua soalan yang telah disediakan. Sila tandakan (/) di ruangan yang telah disediakan.

1. Age / Umur:

[] **18-25 years / tahun** [] **26-30 years** [] **31-35 years** [] **36-40 years**

[] **41-45 years** [] **46-50 years** [] **50 years and above / 50 tahun**

dan ke atas

2. Working experience / Pengalaman bekerja:

[] **less than 1 year (please state): _____ month(s) / kurang dari setahun**

(sila nyatakan): _____ bulan

[] **1-5 years / tahun** [] **6-10 years** [] **11-15 years**

[] **16-20 years** [] **21-25 years** [] **more than 25 years / lebih 25 tahun**

3. Do you smoke?

Adakah anda merokok?

[] **Yes / Ya** [] **No / Tidak**

4. What are your status as a smoker?

Apakah status anda sebagai perokok?

- casual smoker / perokok biasa** **heavy smoker / perokok tegar**
 former smoker / bekas perokok **non-smoker / bukan perokok**

5. How many cigarettes do you smoke per day?

Berapa banyak rokok yang anda hisap dalam masa sehari?

- 0 cigarettes per day / sehari** **1-5 cigarettes per day**
 6-10 cigarettes per day **11-20 cigarettes per day**
 21-29 cigarettes per day **30+ cigarettes per day**

6. How many hours do you usually sleep in a day?

Berapa lamakah anda selalu tidur dalam masa sehari?

- 1-2 hours / jam** **3-4 hours** **5-6 hours** **7-8 hour**
 9-10 hours **more than 10 hours/ lebih daripada 10 jam**

7. How many hours do you think need to sleep in a day?

Berapa lamakah waktu yang anda rasa perlu tidur dalam masa sehari?

- 1-2 hours / jam** **3-4 hours** **5-6 hours** **7-8 hours**
 9-10 hours **more than 10 hours/ lebih daripada 10 jam**

Part B / Bahagian B: Health Effect from Work / Kesan kerja kepada kesihatan

1. Instruction: Answer all questions that have been provided. Please tick in the space provided.

Arahan: Sila jawab semua soalan yang telah disediakan. Sila tandakan (/) di ruangan yang telah disediakan.

	Almost never / Hampir tidak pernah	Quite seldom / agak jarang	Quite often / Agak kerap	Almost always / Hampir selalu
GASTROINTESTINAL DISORDER				
How often is your appetite disturbed? <i>Berapa kerap selera anda terganggu</i>				
How often do you have to watch what you eat to avoid stomach upsets? <i>Berapa kerap anda perlu melihat apa yang anda makan</i>				
How often do you feel nauseous? <i>Berapa kerap anda merasa mual?</i>				
How often do you suffer from heartburn or stomach-ache? <i>Berapa kerap anda mengalami pedih ulu hati atau sakit perut?</i>				
How often do you complain of digestion difficulties? <i>Berapa kerap anda mengadu mengenai masalah penghadaman?</i>				
How often do you suffer from bloated stomach or flatulence? <i>Berapa kerap anda mengalami kembung perut?</i>				
How often do you suffer from pain in your abdomen? <i>Berapa kerap anda mengalami kesakitan pada bahagian abdomen anda?</i>				

CARDIOVASCULAR DISORDER				
<p>How often do you suffer from heart palpitations? <i>Berapa kerap anda mengalami jantung berdenyut kencang?</i></p>				
<p>How often do you suffer from aches and pains in your chest? <i>Berapa kerap anda mengalami kesakitan pada bahagian dada anda?</i></p>				
<p>How often do you suffer from dizziness? <i>Berapa kerap anda mengalami pening kepala?</i></p>				
<p>How often do you suffer from sudden rushes of blood to your head? <i>Berapa kerap anda mengalami darah mengalir laju ke kepala anda secara tiba-tiba?</i></p>				
<p>How often have you been told that you have high blood pressure by doctor? <i>Berapa kerap anda diberitahu bahawa anda mempunyai tekan darah tinggi oleh doktor?</i></p>				
<p>How often do you feel "tight" in your chest? <i>Berapa kerap anda merasa sesak di dalam dada anda?</i></p>				
FATIGUE				
<p>How often do you suffer from minor infectious diseases? (e.g. colds, flu, etc.) <i>Berapa kerap anda mengalami penyakit berjangkit ringan seperti demam, selesema dan sebagainya?</i></p>				
<p>How often do you suffer from pain in your: <i>Berapa kerap anda mengalami kesakitan pada:</i></p> <ul style="list-style-type: none"> - shoulder and/or neck <i>bahu dan/atau leher</i> - arm and/or wrist <i>lengan dan/atau pergelangan tangan</i> - leg and/or knee <i>kaki dan/atau lutut</i> 	Blank / Kosong			

Part C / Bahagian C: Effect of Work on Behavior / Kesan kerja terhadap kelakuan

Instruction / Arahan :

- 1. This part consists of questions on which response option represents your usual way of acting or feeling.**

Bahagian ini mengandungi soalan mengenai pilihan respons menunjukkan diri anda dari segi kelakuan atau perasaan.

- 2. Instruction: Decide and answer all questions that have been provided. Please tick in the space provided.**

Arahan: Sila tentukan dan jawab semua soalan yang telah disediakan. Sila tandakan (/) di ruangan yang telah disediakan.

	Almost never / Hampir tidak pernah	Quite seldom / agak jarang	Quite often / Agak kerap	Almost always / Hampir selalu
Does your mood go up and down? <i>Adakah mood atau keadaan emosi anda bercelaru?</i>				
Do you feel 'just miserable' for no good reason? <i>Adakah anda berasa susah hati tanpa bersebab?</i>				
When you get annoyed do you need some-one friendly to talk to? <i>Apabila anda terganggu atau marah, adakah anda memerlukan seseorang yang peramah untuk meluahkan masalah tersebut?</i>				
Are you troubled about feelings of guilt? <i>Adakah anda bermasalah tentang rasa bersalah?</i>				
Would you call yourself tense or 'highly strung'? <i>Adakah anda merasakan diri anda tertekan atau 'sangat tertekan'?</i>				
Do you suffer from sleeplessness? <i>Adakah anda mengalami masalah kekurangan tidur?</i>				

Part D / Bahagian D : Shift Work Effect on Daily Life / Kesan kerja syif kepada kehidupan seharian

Instruction: Answer all question that have been provided. Please put a tick (/) in the given space.

Arahan: Sila jawab semua soalan yang telah disediakan. Sila tandakan (/) di ruangan yang telah disediakan.

	Not at all <i>Tidak sama sekali</i>	Somewhat <i>Serba sedikit</i>	Very Much <i>Sangat</i>
<p>How much does your shift system interfere with your leisure time? <i>Berapa banyak sistem syif anda mengganggu masa lapang anda?</i></p>			
<p>How much does your shift system interfere with your domestic life? <i>Berapa banyak sistem syif anda mengganggu kehidupan rumah tangga/berkeluarga anda?</i></p>			
<p>How much does your shift system interfere with your non-domestic life (e.g. going to doctor, library, bank, hairdresser, etc.)? <i>Berapa banyak sistem syif anda mengganggu kehidupan bukan rumah tangga anda (seperti berjumpa doktor, perpustakaan, bank, pendandan rambut dan sebagainya)?</i></p>			

Part E / Bahagian E : Work Effect on Psychological Health / Kesan kerja terhadap kesihatan psikologi

Instruction: Read all questions CAREFULLY and answer all question that have been provided. Please put a tick (/) in the given space.

Arahan: Sila baca soalan dengan TELITI dan jawab semua soalan yang telah disediakan. Sila tandakan (/) di ruangan yang telah disediakan

Have you recently / Pernahkah anda baru-baru ini :

	More than usual / Lebih dari biasa	Same as usual / Sama seperti biasa	Less than usual / Kurang daripada biasa	Much less than usual / / Sangat kurang daripada biasa
been able to concentrate on what you are doing? <i>mampu menumpukan perhatian terhadap perkara yang dilakukan?</i>				
felt that you are playing a useful part in things? <i>merasakan bahawa anda memainkan peranan yang berguna dalam apa-apa perkara?</i>				
felt capable of making decisions about things? <i>berasa mampu membuat keputusan dalam apa-apa perkara?</i>				
been able to enjoy your normal day to day activities? <i>dapat bergembira menikmati hari normal anda hingga ke hari beraktiviti?</i>				
been able to face up to your problems? <i>dapat menangani masalah anda?</i>				

Have you recently / Pernahkah anda baru-baru ini :

	Not at all / <i>Tidak sama sekali</i>	No more than usual / <i>tidak lebih daripada biasa</i>	Rather more than usual / <i>lebih daripada biasa</i>	Much more than usual / <i>lebih banyak daripada biasa</i>
been feeling unhappy and depressed? <i>berasa tidak gembira dan tertekan/depresi?</i>				
been losing confidence in yourself? <i>hilang keyakinan diri terhadap diri anda?</i>				
been thinking of yourself as a worthless person? <i>memikirkan diri anda sebagai orang yang tidak berharga atau berguna?</i>				
been feeling reasonably happy all things considered? <i>telah merasa cukup gembira semua perkara yang dipertimbangkan?</i>				
lost much sleep over worry? <i>kehilangan banyak waktu tidur kerana kerisauan?</i>				
felt constantly under strain emotionally? <i>berasa sentiasa di bawah ketegangan atau tekanan emosi?</i>				

End of question / Soalan tamat

THANK YOU / TERIMA KASIH

**APPENDIX C
GANTT CHART**

Research Activities	2018											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Title Selection	■	■										
Discussion with supervisor		■										
Introduction		■	■									
Literature Review			■									
Methodology			■									
Submit first draft proposal			■	■	■							
Submit second draft proposal					■							
Submission of proposal					■							
FYP1 Viva Presentation						■						
Develop framework							■	■				
Develop Questionnaire								■	■			
Ask authority's approval									■			
Collect data									■			
Thesis writing										■		
Thesis draft submission										■		
Thesis presentation											■	
Thesis submission												■