UNIVERSITI PUTRA MALAYSIA

PREVALENCE OF ASTHENOPIA AND ITS RISK FACTORS AMONG WHITE COLLARED POLICE OFFICERS IN BUKIT AMAN

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BY

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Thesis submitted in fulfilment of the requirement for the degree of Bachelor Science (Environmental and Occupational Health) from the Faculty of Medicine and Health Sciences, Universiti Putra Malaysia

ACKNOWLEDGEMENTS

I am grateful to the perfect conditions that brought upon my existence as a human being to complete this Final Year Project for the year 2015/2016 in excellent vitality.

First and foremost, I would like to express my utmost gratitude to my supervisor, Dr. Irniza Rasdi for the continuous guidance throughout my Bachelor study thesis research. Her deliberate motivation and enthusiasm made me an individual capable of doing what I could today. With her immense knowledge and patience, Dr. Irniza had guided me throughout the writing of this thesis with ease. Without her mentoring as my supervisor, I am sure I am incapable of completing this final year project as part and parcel of my graduation requirement.

Special thanks and utmost appreciation to my co-supervisor, Dr. Emilia Zainal Abidin for additional guidance throughout my Bachelor study thesis research. Her consistent advice and critical guidance had assisted me in smooth writing of my thesis. She is always the person who I go and seek advice from in order to write my thesis smoothly.

Not forgetting to thank the Royal Malaysia Police for allowing my supervisor, co-supervisor, and I to conduct our research in the Bukit Aman Police Headquarters. They had provided us a strong foundation and all necessary facilities including important individuals as respondents to our research findings. Their allowance to our research is a great sacrifice which needs to be highlighted as it is not easy to allow public like us to access information from the Royal Malaysia Police.

My sincere thanks to the Department of Environmental and Occupational Health, Universiti Putra Malaysia and all the staffs for providing me an in depth knowledge during the four year course of the Bachelor of Environmental and Occupational Health. Also, the department had funded a huge portion of my study as well as providing necessary instruments for the research. These contributions are valuable for my completion of this Final Year Project.

Lastly, I would like to cease this opportunity to appreciate my father, Lee Hock Chuan and my mother, Tan Ka Choo, my supportive siblings, and fellow friends for their financial and morale support. They are the pillars that erect and motivate me towards completion my Bachelor's Degree.

ABSTRACT

PREVALENCE OF ASTHENOPIA AND ITS RISK FACTORS AMONG WHITE COLLARED POLICE OFFICERS IN BUKIT AMAN

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Introduction: Asthenopia or visual discomfort symptoms had become a problem among white collared police officers whereby lifestyle, workplace environment, and psychosocial factors were probable risk factors. This study was done since ocular health was an important career aspect among white collared police officers as deleterious ocular health means reduction of productivity. **Objective:** To determine the relationship between individual, environmental, and psychosocial risk factors with prevalence of asthenopia among white collared police officers. **Methodology:** This cross-sectional study involved 191 white collared police officers from Royal Malaysia Police Bukit Aman Headquarters. Stratified random sampling of departments was done, followed by purposive sampling of respondents according to inclusion and exclusion criteria. Self-administered questionnaires collected socio-demographical information, occupational description, usage of Visual Display Units (VDUs), perceived workplace environment, lifestyle and dietary habits, physical and mental health status, family health status, and ocular health status. Body composition monitoring instruments were used to measure BMI and body fat percentage, while lux meter was to measure workbench illumination adequacy. **Results and Discussion:** More than half (51.8%) of respondents reported asthenopia. Top five asthenopia symptoms were headache (mean 0.74 ±0.674), blurred vision (mean 0.64 ±0.704), burning (mean 0.61 ±0.587), photophobia (mean 0.59 ±0.682), and tearing (mean 0.57 ±0.610). Correlation analysis revealed significant relationship ($p < 0.05$) between wearing contact lens ($r_s = 0.146$), both family history of hypertension ($r_s = 0.150$) and heart attack ($r_s = 0.191$), and prolong working hours ($r_s = 0.166$) with asthenopia. Doing physical exercise ($r_s = -0.162$), and perceived good ventilation ($r_s = -0.161$) were found to decrease asthenopia complaints. **Conclusion:** Sedentary lifestyle, wearing contact lens, family history of diseases, perceived poor ventilation, and prolong working hours were risk factors of asthenopia, therefore an ocular health risk for white collared police officers.

Keywords: asthenopia, risk factors, white collared police officers

ABSTRAK

PREVALEN ASTENOPIA DAN FAKTOR-FAKTOR RISIKO DALAM KALANGAN PEGAWAI POLIS BERKOLAR PUTIH DI BUKIT AMAN

MELVIN LEE HAN JEAN

Pengenalan: Astenopia atau simtom ketidakselesaan visual telah menjadi masalah dalam kalangan pegawai polis berkolar putih, dimana gaya hidup, persekitaran tempat kerja, serta faktor psikososial berkemungkinan faktor-faktor risikonya. Kajian ini telah dilakukan kerana kesihatan okular merupakan aspek yang penting dalam kerjaya pegawai polis berkolar putih di mana kemerosotan kesihatan okular bermakna penurunan kadar produktiviti. **Objektif:** Menentukan perhubungan antara faktor-faktor risiko individu, persekitaraan, dan psikososial dengan prevalen astenopia dalam kalangan pegawai polis berkolar putih. **Metodologi:** Kajian keratan rentas ini melibatkan 191 pegawai polis berkolar putih dari Ibu Pejabat Polis Diraja Malaysia Bukit Aman. Kaedah persampelan rawak berstrata untuk persampelan jabatan-jabatan telah digunakan, seterusnya menggunakan kaedah persampelan bertujuan bagi persampelan responden mengikut kriteria kemasukan dan pengecualian. Borang soal selidik yang ditadbir sendiri mengumpul maklumat sosio-demografi, penerangan pekerjaan, penggunaan Unit Paparan Visual (UPV), persepsi persekitaran pejabat, gaya hidup dan tabiat pemakanan, status kesihatan fizikal dan mental, status kesihatan keluarga, dan status kesihatan mata. Instrumen pemantauan komposisi badan telah digunakan untuk mengukur Jisim Berat Badan dan peratusan lemak badan, sekaligus meter lux digunakan untuk mengukur kecukupan illuminasi meja kerja. **Keputusan dan Perbincangan:** Lebih daripada separuh (51.8%) responden melaporkan astenopia. Lima tanda paling kerap astenopia adalah sakit kepala (min 0.74 ±0.674), penglihatan kabur (min 0.64 ±0.704), mata pedih (min 0.61 ±0.587), fotofobia (min 0.59 ±0.682), dan mata berair (min 0.57 ±0.610). Analisia korelasi menunjukkan hubungan signifikan antara memakai cermin kanta sentuh (r_s= 0.146), kedua-dua penyakit keturunan hipertensi (r_s= 0.150) dan sakit jantung (r_s= 0.191), dan tempoh bekerja yang panjang (r_s= 0.166) dengan astenopia. Melakukan senaman fizikal (r_s= -0.162), dan persepsi pengudaraan yang baik (r_s= -0.161) pula didapati mengurangkan aduan astenopia. **Kesimpulan:** Gaya hidup sedentari, memakai cermin kanta sentuh, faktor-faktor penyakit keturunan, persepsi pengudaraan yang kurang baik, serta tempoh bekerja yang berpanjangan berhubung kait dengan kejadian astenopia, justeru mencadangkan faktor-faktor risiko kesihatan mata dalam kalangan pegawai polis berkolar putih.

Kata kunci: astenopia, faktor-faktor risiko, pegawai polis berkolar putih

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LIST OF ABBREVIATIONS

BMI	Body Mass Index
CVS	Computer Vision Syndrome
DOSH	Department of Occupational Safety and Health
IAQ	Indoor Air Quality
JIPS	Jabatan Integriti dan Pematuhan Standard
JKDN/KA	Jabatan Keselamatan Dalam Negeri/ Ketenteraman Awam
JKEUPM	Jawatankuasa Etika Universiti Melibatkan Manusia
JP	Jabatan Pengurusan
JPJKK	Jabatan Pencegahan Jenayah dan Keselamatan Komuniti
JSJ	Jabatan Siasatan Jenayah
JSJK	Jabatan Siasatan Jenayah Komersil
JSJN	Jabatan Siasatan Jenayah Narkotik
MOHR	Ministry of Human Resources
OSHA	Occupational Safety and Health Act
PTF	Precorneal Tear Film
RH	Relative Humidity
RMP	Royal Malaysia Police
SB	Cawangan Khas (Special Branch)
StaRT	Jabatan Sumber Strategik dan Teknologi
UPM	Universiti Putra Malaysia
VDUs	Visual Display Units
WHO	World Health Organization

CHAPTER 1

INTRODUCTION

1.1 Background

With the ever changing lifestyle, workplace environment, and job demand, asthenopia in which an ocular health issue was commonly seen among white collared workers (Segui, Cabrero-Garcia, Crespo, Verdu, & Ronda, 2015). In today's situation, many office works involves a range of activities including reading, writing, and typing were seen to contribute to visual discomfort among white collared professions (Drew et al., 2013). These desk and chair orientated work were addressed as near activities by Iribarren, Fornaciarr, & Hung (2001) which requires constant visual demand. Usually near activities such as reading, taking notes, documentations, computer use, and so on can be difficult for some individual due to frequent symptoms of asthenopia, perceptual distortions, leading to reduced comprehension (Drew et al., 2013) therefore, affecting ocular health and wellbeing in general.

Personal modern lifestyle today had also encouraged convenience and sedentary habits which also a risk factors to ocular health. Wide availability of computers, laptops, and smartphones in assisting daily task as well as decision making was a gradual factor towards inactivity, and hence, a contributing factor for prevalence of asthenopia in workplace (Blehm, Vishnu, Khattak, Mitra, & Yee, 2005; and Chu, Rosenfield, & Portello, 2014). In another study, Han et al., (2013) highlighted the importance to maintain healthy lifestyle and good sense of social identity since they were protective factors towards the deterioration of ocular health and development of asthenopia.

Workplace environment especially in administrative settings determines the ocular health of workers. Common symptoms like eye discomfort reported in office may partly reflect poor indoor office environment (Wolkoff, 2008). In previous study led by the same author, indoor air climates were contributing factors affecting tear film stability (Wolkoff, Skov, Franck, & Petersen, 2003). Additionally, long working hours under inadequate lighting can cause eye tiredness, resulting to frequent need for breaks, deterioration of work performance, and safety in general (Wolkoff, Nojgaard, Troiano, & Piccoli, 2005; and Wolkoff, 2008). In a long run, cumulative damaging effects towards ocular health may potentially set in if this issue was not tackled properly (Wagel, Kamath, Tiwari, & Mayya, 2015).

The Royal Malaysia Police as a national institution in providing safety and security to the nation (Royal Malaysia Police, n.d.) most often have extended 8 a.m. to 5 p.m. work hours. Unlike other governmental service sectors in Malaysia, persistent long working hours among white collared police officers was an alarming psychosocial risk factor. Studies have shown that long working hours both in indoor and outdoor settings can contribute to eye discomfort symptoms therefore asthenopia (Gobba, Broglia, Sarti, Luberto, & Cavalleri, 1988; and Iribarren et al., 2001). The increasingly ever job demand even among administrative workers were notable and worrying towards deterioration of ocular health.

All in all, this study was done to highlight how these three main risk factors that were identified in this study which were individual risk factors, workplace environmental risk factors, and psychosocial risk factors related to the prevailing issue of asthenopia among white collared police officers in the Royal Malaysia Police Bukit Aman Headquarters as studied location.

1.2 Problem Statement

Service sectors throughout Malaysia were prone to various hazards according to the Department of Occupational Safety and Health (DOSH) under the Ministry of Human Resources. Among listed were service sectors, job scopes in administrations, receptions, manual handling workers, inventory and stocktaking jobs, and other general government service sectors were exposed to workplace hazards (DOSH, 2004). This problem was very relevant to the conditions among white collared police officers since they were among the groups at risk to factors that brings upon deleterious health status, specifically in the ocular health aspects because of the nature of work that requires constant visual demand.

Based on studies by Han et al., (2013) and Rosenfield (2011), the prevalence of occupational related visual symptoms which comprises ocular discomfort, asthenopia, and non-visual symptoms ranges between 57% and 90% in both Asian and Western modern society. The prevalence value was very worrying since more than half of workers were experiencing ocular health deterioration in their work place. Besides, individual, workplace environment, and psychosocial factors were among risk factors that contributed to asthenopia development were found in most occupational settings (Segui et al., 2015) including the white collared police officers. This was the reason behind why this study should be conducted.

Generally, about one-third of the day was spent at workplace (Gobba et al., 1988). Prior to recruitment of members into the force, only those candidates with perfect ocular health were the possible recruitments as probationary police officers. With much intrigue, more and more police officers who were once baseline with perfect ocular health were now having ocular problems, suggested that asthenopia occurrences could probably originated from workplace. As suggested by Iribarren et al., (2001) in their study, asthenopia does not happened overnight but of a cumulative ocular health deterioration. Therefore, there must be presence of both intrinsic and extrinsic factors that causes the deterioration of ocular health. If issue of asthenopia was not tackled quick enough, this matter could decrease productivity of work among white collared police officers in a long run (Rosenfield, 2011).

1.3 Study Justification

As the requirement by the National Law Occupational Safety and Health Act (OSHA) 1994 (Act 514) First Schedule (Subsection 1 (2)), item number 10, Public Services and Statutory Authorities like the Royal Malaysia Police were obliged to comply with this law. Since this study objective was to determine the relationship between the related risk factors and prevalence of asthenopia occurrences among white collared police officers in Bukit Aman, it serves the purpose to help empowering their safety committee through providing updated information on workplace ergophthalmological problems. With the availability of prevalence data on asthenopia occurrences, various preventive as well as corrective actions can be done to improve the ocular health wellbeing of white collared police officers. Therefore, this study was very relevant and in line with the compliance of the National Law.

Apart from that, this study should be the first study to address prevalence of asthenopia among police officers working with its related risk factors. Till today, there has not been any ocular health related study done that focuses specifically to the police force in Malaysia. Besides, only data on prevalence of visual health among workers in governmental sectors in Malaysia were available which was might not represent Malaysian police officers. Moreover, this study could address asthenopia issue that occurred in the workplace, thus existing and prevailing asthenopia issue can be tackled accordingly, and increases work productivity among white collared police officers.

1.4 Conceptual Framework

The conceptual framework (**Figure 1.1**) for this study was constructed based on the area of study interest. Generally, it pictured the study concept especially on how individual, environmental, and psychosocial risk factors (the independent variables) were related to the occurrence of asthenopia (the dependent variable) among white collared police officers.

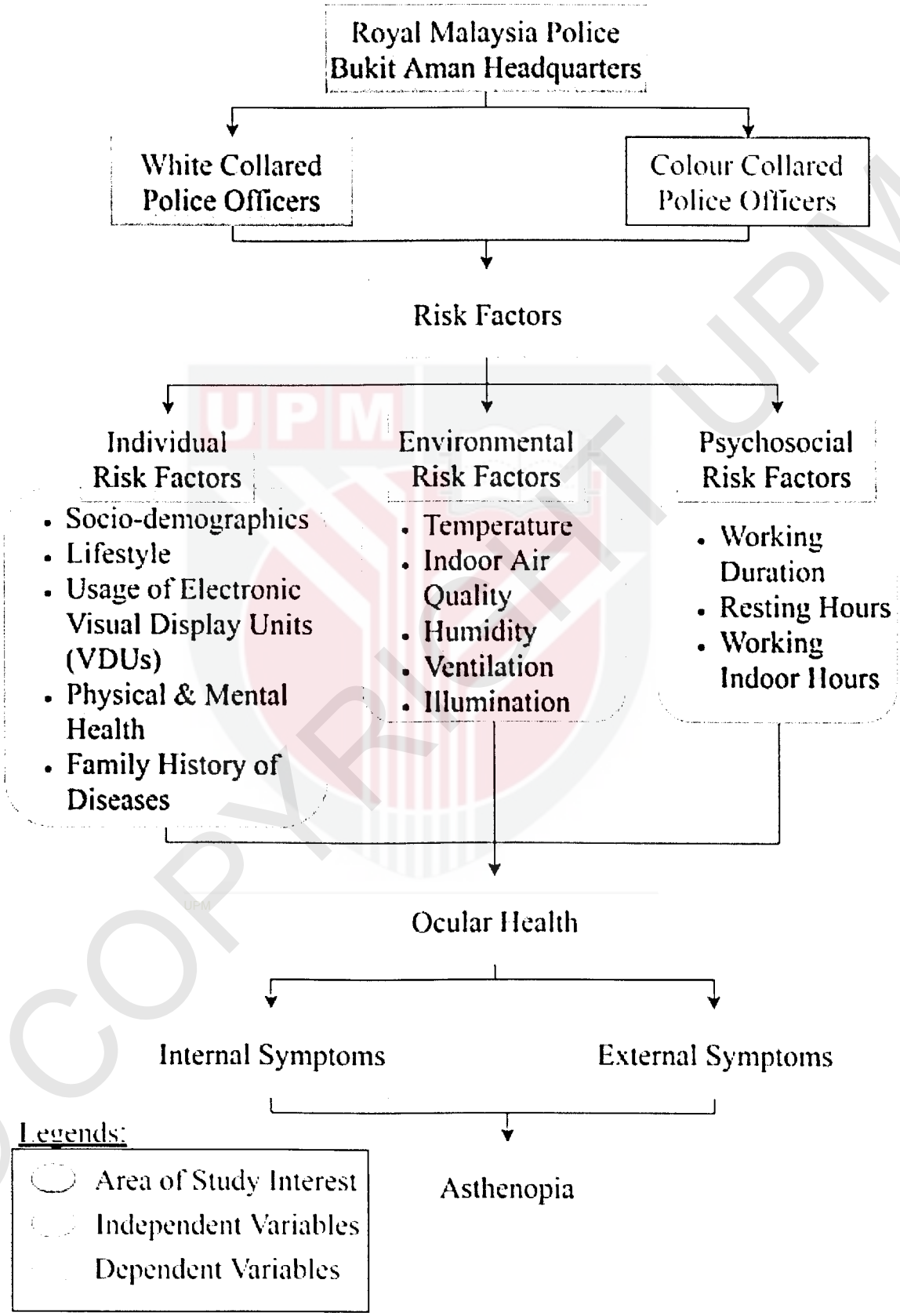

Figure 1.1: Conceptual framework and study variables

1.5 Definition of Terms

1.5.1 Conceptual Definition

White Collared Police Officers

Police officers of low and high ranks involved with job scopes in administrations, receptions, manual handling, inventory and stocktaking jobs, and other general office related services that were exposed to office hazards (DOSH, 2004).

Individual Risk Factors

Any attribute, characteristic or exposure of an individual that increases the likelihood of developing a disease or injury (WHO, 2016).

Environmental Risk Factors

Extrinsic from the individual environmental conditions, for which asthenopia symptoms that arises from the workplace office environment (Wolkoff et al., 2003).

Psychosocial Risk Factors

Job task and responsibility components such as working duration, given resting hours, and working indoor hours that influenced the likelihood of developing asthenopia symptoms (Iribarren et al., 2001).

Ocular Health

The hygiene use of eyes contributing to internal and external eye condition, symptoms, and overall wellbeing of the eyes (Han et al., 2013).

Asthenopia

An ocular health discomfort that were normally caused by refractive, accommodative or vergence anomalies, occurs as symptoms of both externally and internally, and the individually perceived discomfort symptoms was accessed through frequency and magnitude of the eye discomfort symptoms during work (Rosenfield, 2011; and Segui et al., 2015).

1.5.2 Operational Definition

White Collared Police Officers

Police officers from the Bukit Aman Police Headquarters, who were currently employed in any of the nine departments, having job scopes in administrations, receptions, manual handling, inventory and stocktaking jobs, or other general office related services that were exposed to possible risk factors of asthenopia.

Individual Risk Factors

Personal components like socio-demographic status, lifestyle, physical and mental health, and family history of diseases that influenced the likelihood of developing asthenopia symptoms among white collared police officers.

Environmental Risk Factors

The perceived workplace environmental conditions like temperature, indoor air quality (IAQ), relative humidity (RH), air ventilation and movement, and illumination adequacy that influenced the likelihood of developing asthenopia symptoms among white collared police officers.

Psychosocial Risk Factors

Job task and responsibility aspects such as working duration, given resting hours, and working indoor hours that influenced the likelihood of developing asthenopia symptoms among white collared police officers.

Ocular Health

The overall wellbeing use of the eyes that contributes to internal and external eye conditions and symptoms, whereby hygiene aspects were determined through individual factors, workplace environmental factors, and psychosocial factors among white collared police officers.

Asthenopia

Complaints of visual discomfort among white collared police officers that were from external symptoms includes burning, irritation, foreign body sensation, tearing, ocular dryness, and red eyes; or from internal symptoms includes eye strains, headache, eye ache, diplopia, photophobia, seeing halos, decrease in visual acuity, and blur in which symptoms of asthenopia were as suggested in a reliable and validated questionnaire (Segui et al., 2015).

1.6 Research Objectives

1.6.1 General Objective

To determine the relationship between the related risk factors and prevalence of asthenopia among white collared police officers in Bukit Aman.

1.6.2 Specific Objectives

i. To identify the socio-demographic information of respondents.

ii. To identify the prevalence of asthenopia symptoms among white collared police officers.

iii. To determine the relationship between individual risk factors an occurrence of asthenopia among white collared police officers.

iv. To determine the relationship between workplace environmental risk factors and occurrence of asthenopia among white collared police officers.

v. To determine the relationship between occupational risk factors and occurrence of asthenopia among white collared police officers.

1.7 Research Hypothesis

Table 1.1 listed the research objectives and its relevant hypothesis for the study.

Table 1.1: Research objectives and its relevant research hypothesis.

Research objectives	Research hypothesis
To identify the socio-demographic information of respondents.	-
To identify the prevalence of asthenopia symptoms among white collared police officers.	-
To determine the relationship between individual risk factors and occurrence of asthenopia among white collared police officers.	There was a significant relationship between individual risk factors and occurrence of asthenopia among white collared police officers.
To determine the relationship between workplace environmental risk factors and occurrence of asthenopia among white collared police officers.	There was a significant relationship between workplace environmental risk factors and occurrence of asthenopia among white collared police officers.

Research objectives	Research hypothesis
To determine the relationship between occupational risk factors and occurrence of asthenopia among white collared police officers.	There was a significant relationship between occupational risk factors and occurrence of asthenopia among white collared police officers.

LITERATURE REVIEW

2.1 Overview of the Eyes

2.1.1 Anatomy of the Eye

The eye consists of the cornea, a tough outer coat which was transparent anteriorly, and the sclera opaque posteriorly. Junction between both the cornea and the sclera was limbus. A rich vascular coat which was the uvea forms the choroid posteriorly and the ciliary body and iris anteriorly, while the choroid lines the retina in which it was firmly attached and nourished its outer two-thirds (James, Chew, & Bron, 2003).

Zonule fibers provide tension to the lens when objects were at distance, giving it an elongated shape. On the other hand, the ciliary body contraction allows the lens to take up a more curved shape which permits focusing for near objects (James et al., 2003).

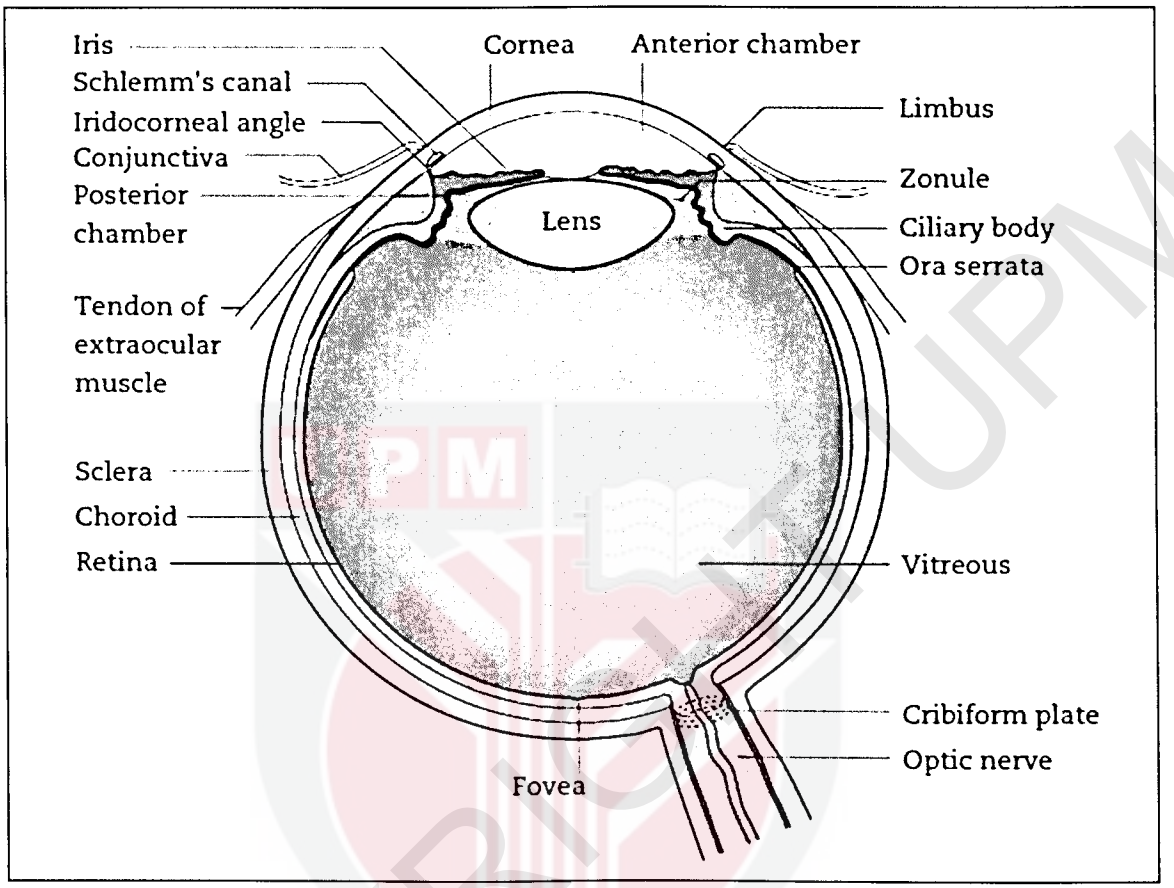

Figure 2.1: The basic anatomy of eye (James et al., 2003)

2.1.2 Process of Vision

About one-third of the light was refracted by the lens while the rest was by the cornea. When the light was refracted on the retina, projected image was inverted, minimized, and real. The lens takes the biconvex shape which intensifies the focusing power, flexible and can change curvature to accommodate according to light and object distance (Troncoso, Macknik, & Martinez-Conde, 2011).

When light hits the retina, the photoreceptor layer was excited. The photoreceptor layer consists of cones which were responsible for fine details and colour vision in bright light, and rods for vision under dim light will then takes up these photons and convert them into electrical impulses to be interpreted by the brain. These electrical impulses then received by the ganglion cells through amacrine and bipolar cells, and send their outputs to the brain for interpretations in the form of action potentials via optic nerve (Troncoso et al., 2011).

2.2 Asthenopia

2.2.1 Terms Used in Asthenopia

Being at a bigger scale, asthenopia was sometimes referred to other terms such as Computer Vision Syndrome (CVS) (Toomingas et al., 2013), and ocular morbidity (Wagel et al., 2015). These interchangeable terms has almost matching referral to set of symptoms. In layman terms, asthenopia have been interchangeable with terms including eye strains, visual discomfort, visual difficulty, tired eyes, ocular pain, visual complaints, and many more with similar eye health status to describe asthenopia (Toomingas et al., 2013).

2.2.2 Asthenopia as Symptoms of Ocular Health

Asthenopia symptoms can be divided into two major categories in general. The first category of asthenopia was from the external symptoms including burning eyes, itchy eyes, watery eyes, dry eyes, red eyes, foreign body sensation at the eyes, excessive blinking, and heavy eyelids. For the other category, the internal symptoms were symptoms including eye strains, eye ache and pain, headache, seeing halos, photophobia, diplopia, difficulty in sustaining visual operations, blurring of the vision, and decrease in visual acuity (Rosenfield, 2011).

2.2.3 External Symptoms of Asthenopia

Most eye symptoms were believed to be located anteriorly to the eye. They were most often related to external stimulus such as from the environmental aspects, as well as to mechanical stimulus like particulates (Wolkoff, 2008). Investigation in office buildings have shown that reported asthenopia symptoms were associated with defects of the precorneal tear film (PTF) (Wolkoff et al., 2005). Also, the surface of the eye was covered with a tissue which consists of man glands. These glands secrete the tears that cover the eye surface to keep the eye moist, which was necessary for normal eye function and nourishment of the eyes. The tears help to maintain the proper oxygen balance of the external eye structures and to keep the optical properties of the eye sharp. The normal tear layer was cleaned off and refreshed by the blinking action of the eyelids (Sweeney, Millar, & Raju, 2013). Among external symptoms includes burning, irritation, foreign body sensation, tearing, ocular dryness, and red eyes (Segui et al., 2015).

2.2.4 Internal Symptoms of Asthenopia

Internal symptoms of asthenopia can be the effect of overloading the ocular neuromuscular accommodative and vergence system. Long lasting near-work, defective optical system, or even poor distribution of lighting strains the eye to work harder. This situation puts heavy demand on ocular accommodative and vergence system. Additionally, the same study shows that symptoms can also be from mental or psychological origin (Toomingas et al., 2013). Lists of internal symptoms includes eye strains, headache, eye ache, diplopia, photophobia, seeing halos, decrease in visual acuity, and blur (Segui et al., 2015).

2.3 Risk Factors of Asthenopia

2.3.1 Individual Risk Factors of Asthenopia

Many published studies gives pieces of puzzle of known risk factors towards occurrences of asthenopia. Among known individual risk factors from various scientific papers include age, sex, lifestyle, usage of electronic Visual Display Units (VDUs), and overall physical and mental health (Han et al., 2013; Iribarren et al., 2001; and Toomingas et al., 2013).

The tear film stability deteriorates as age increases regardless of sex. Tighter lipid-lipid interactions in younger children were found to have more stable tear film as the lipid-lipid interactions acted like a barrier in reducing ocular dryness (Sweeney et al., 2013).

It was less clear that how lifestyle and dietary habits were related to the tear film stability, but studies have shown that the lipid and protein content of the eyes were affected with malnutrition, protein and vitamin-A deficiencies (Jalbert, 2013). Consumption of nutrients particularly from omega-6 and omega-3 fatty acids group suggested significant improvement towards dry eyes related to contact lens usage (Kokke, Morris, & Lawrenson, 2008). In another study, alcohol abuse was related to increased tear evaporation, subsequently to tear film instability (Sweeney et al., 2013).

Causal effects of asthenopia due to strenuous and stressful cognitive load were not clear, however, was related to blinking frequency reduction. Same study suggested a further reduction in blinking frequency was found when prolonged looking at VDUs as compared to hard copy counterparts means more focused effort required from cognition. These high visual and mental demands turns out affected negatively to the stability of Precorneal Tear Film (PFT) therefore, deleterious effects of external ocular wellbeing (Toomingas et al., 2013). Other study suggested that, stressful events may alter the autonomic nervous system and deteriorating the endocrine functions, leading to visual fatigue (Han et al., 2013).

Getting physically active allows normal ocular health by sustaining oxygen balance of the external eye properly. Uptake of fresh air during physical activity facilitated preserved moist and lubricated eye functions through the production good quality tears (Yan, Hu, Chen, & Lu, 2008). Additionally, micro pauses and complete blinks exercise were suggested to restore the PFT and overall performance of typical office work (Wolkoff, 2008).

2.3.2 Workplace Environmental Risk Factors of Asthenopia

Many studies have also pictured how perceived factors in workplace environment like temperature, relative humidity (RH), ventilation, Indoor Air Quality (IAQ), and illumination bring upon occurrence of asthenopia. Repeated studies in different office environment found similar findings that hygiene of workplace environment were very crucial in maintaining a healthy eye (Wolkoff et al., 2003, & 2005; and Wolkoff, 2008).

The delicate eye membranes were very sensitive to slightest fluctuation of external environment. Thermal climate like high room temperature, low RH, and high air velocity increases water loss, and postulated destabilizing Precorneal Tear Film (PTF) effects. Similarly, as little as 1 °C drop of temperature and above 30% but just about 40% of RH was associated with asthenopia reduction. On the other hand, increment of air velocity of more than 1 m/s may be beneficial to slight increase of blink frequency despite imposed drying effects (Wolkoff, 2008).

Symptoms related to ocular-surface were common symptoms when comes to IAQ studies. Previous study had suggested asthenopia symptoms like eye irritation and ocular dryness were most common office work disruption when IAQ was poor. In the course of sick building syndrome, tired and strained eyes have been reported in line to the development of visual and mental fatigues. However, the causal pathways of indoor environment to the ocular-surface related symptoms were unknown, but suspected that mucosal irritation was caused by presence of indoor air pollution (Wolkoff et al., 2003).

With regards to technology advancement, revision of ergopthamological studies especially illumination and visual performance in modern office buildings were indeed limited. The process to transmit and retrieve information had reported that it was dependent on illumination intensity and not of light source (Lee, Ko, Shen, & Chao, 2011). Practical artificial lightings which were independent to its location, combined with daylight can be effective in illuminating indoor buildings and affects occupant behaviour and lifestyle (Das & Paul, 2015). Ambient illumination adequacy had been suggested to play an important factor in aiding visual performance, as well as in reduction of visual fatigue in work (Lee et al., 2011).

2.3.3 Psychosocial Risk Factors of Asthenopia

Working organization has also known to be psychosocial contributing risk factors to asthenopia development. These risk factors includes working duration, allowable break period, and working indoor hours were among factors that were identified that increases asthenopia reporting among white collared workers especially when doing near-work tasks (Toomingas et al., 2013).

Increasing demand for work may require more visual strength to accommodate with the work demand. This had been reported to deteriorate ocular health through prolong, repeated, and excessive use of the eyes. Additionally, extended working hours for more than four hours in office settings with lack of break time was risk for asthenopia incidents. Possibilities for lacking of control over personal working conditions, for instant pausing momentarily during long lasting work, were contributing risk to ocular symptoms and upper extremities musculoskeletal disorder (Toomingas et al., 2013).

CHAPTER 3

METHODOLOGY

3.1 Background of Study

This study was done in order to provide prevalence of asthenopia data among white collared police officers working with accordance of related risk factors. Prospective of this study was to identify related risk factors towards development of asthenopia and make prevalence data available for corrective actions as well as for future references of the Royal Malaysia Police.

3.2 Location of Study

The study was conducted at the Royal Malaysia Police Headquarters Bukit Aman, Kuala Lumpur where the settings were of a typical office environment.

3.3 Study Design

This study was a cross-sectional observational study in determining the prevalence of asthenopia and its related risk factors among white collared police officers. It was designed as such that it enables the study to test the investigated hypothesis through intensive research conducted from November 2015 until June 2016.

3.4 Study Population

The study population was all government servants who were currently employed and working in Bukit Aman Police Headquarters, Kuala Lumpur. White collared police officers were chosen specifically as the sampling population since they were the population at risk to exposure of related risk factors of asthenopia.

3.5 Sampling

The first stage of sampling was stratified random sampling whereby population was stratified into nine available departments in the Royal Malaysia Police. The nine departments were:

i. Jabatan Pengurusan (JP)
ii. Jabatan Siasatan Jenayah (JSJ)
iii. Jabatan Siasatan Jenayah Narkotik (JSJN)
iv. Jabatan Siasatan Jenayah Komersil (JSJK)
v. Jabatan Integriti dan Pematuhan Standard (JIPS)
vi. Jabatan Pencegahan Jenayah dan Keselamatan Komuniti (JPJKK)
vii. Jabatan Keselamatan Dalam Negeri/ Ketenteraman Awam (JKDN/KA)
viii. Jabatan Sumber Strategik dan Teknologi (StaRT)
ix. Cawangan Khas (SB)

From the strata, JSJK department was excluded from the study since the department was not located in Bukit Aman. Following that, the samples were purposively sampled according to the inclusion criteria.

3.5.1 Sampling Frame

All white collared police officers from all the nine departments in the Bukit Aman Police Headquarters were the sampling frame for this study.

3.5.2 Sampling Unit

Those white collared police officers, who had fulfilled the inclusive criteria (refer **Section 3.5.5**) and exclusive criteria (refer **Section 3.5.6**), participated in this study. All respondents were recruited voluntarily to participate in this study and signed the respondent's information sheet and consent.

3.5.3 Sample Size Calculation

This cross sectional study recruited the respondents from the white collared police officers of Bukit Aman Police Headquarters, Kuala Lumpur. The sample size, n was calculated as follow (Lemeshow, Klar & Lawanga, 1990):

$$n = \frac{Z^2{}_{1-\frac{\alpha}{2}} P(1-P)}{d^2}$$

The estimated proportion value for asthenopia among white collared professions was P= 0.87 (DOSH, 2004). Allowable standard error associated with confidence intervals was set to *Z*= 95% (1.96), and desired precision was set to *d*= 0.05 into the formula. Therefore, the sample size that was sampled for the study to be significantly representative of the population is 174 human respondents.

Additional of 17 respondents (10% of total respondent) was added to the study making it a total of 191 human respondents as the minimal requirement in this study.

3.5.4 Subject Sampling

A minimum requirement of 191 human respondents was sampled solely for the purpose of this study. The sampling of the respondents was subjected to the availability of free time of the participating respondents.

This study was estimated to have 95% confidence interval with allowable of 5% errors for detecting the association between asthenopia and its related risk factors among white collared police officers.

3.5.5 Inclusion Criteria

In order for respondents to be included in the study, respondents must mandatory fulfil all of the following inclusion criteria which were:

i. A Malaysian nationality.

ii. Not under a probation period for police officers (a confirmed police officer).

iii. Must be posted at the Royal Malaysia Police Headquarters Bukit Aman, Kuala Lumpur for at least three years continuously.

The three inclusion criteria were chosen based on previous findings (Wagel et al., 2015). The literature emphasised the homogeneity of sampled population, therefore respondents must be of similar nationality. Besides, a confirmed police officer status reflects that the sampled population were representing the Royal Malaysia Police permanent force. Duration was an important factor since asthenopia symptoms were not resulted in an overnight situation, but rather a long period of time in which three years were enough for development of symptoms.

3.5.6 Exclusion Criteria

For respondents to be excluded from the study, they must have at least one of (but not limited) the following exclusion criteria:

i. Respondents with congenital eye problems.
ii. Respondents with history of eye trauma.
iii. Respondents with history of surgical procedure of the eyes.
iv. Respondents with hypertension.
v. Respondents with diabetes.
vi. Respondents who were currently pregnant.

The exclusion criteria were selected based on previous studies (Marzoli & Criscuoli, 2015; and Wagel et al., 2015). Presence of asthenopia symptoms among respondents with ocular related problems be it by birth or by traumatic accidents could possibly be from the imperfect ocular itself. Besides, corrective ocular surgery may suggest in altered natural functions of the eyes. On the other hand, hypertension and diabetic patients may have ocular related complications that may potentially damage the optic nerves leading to poor ocular health. Previous studies also suggest that pregnancy may cause similar ocular complications as of those with hypertension and diabetic, however temporary.

3.6 Data Collection Procedures

As illustrated in **Figure 3.1**, approval from both Universiti Putra Malaysia research ethic committee, and from Royal Malaysia Police were obtained before commencement of the pilot study. Stratified random sampling of departments was done, and later purposive sampling methods were used to recruit respondents for this study. Interested respondents were then screen for eligible criteria by using the pre-survey questionnaire. Eligible respondents were then recruited and were given respondent questionnaire to be filled. Following that, body composition monitoring was done in order to complete the respondent questionnaire distributed. Later, workbench illumination adequacy was checked and recorded with the aid of a digital lux meter. The whole process was done during the official 8 a.m. to 5 p.m. working hours.

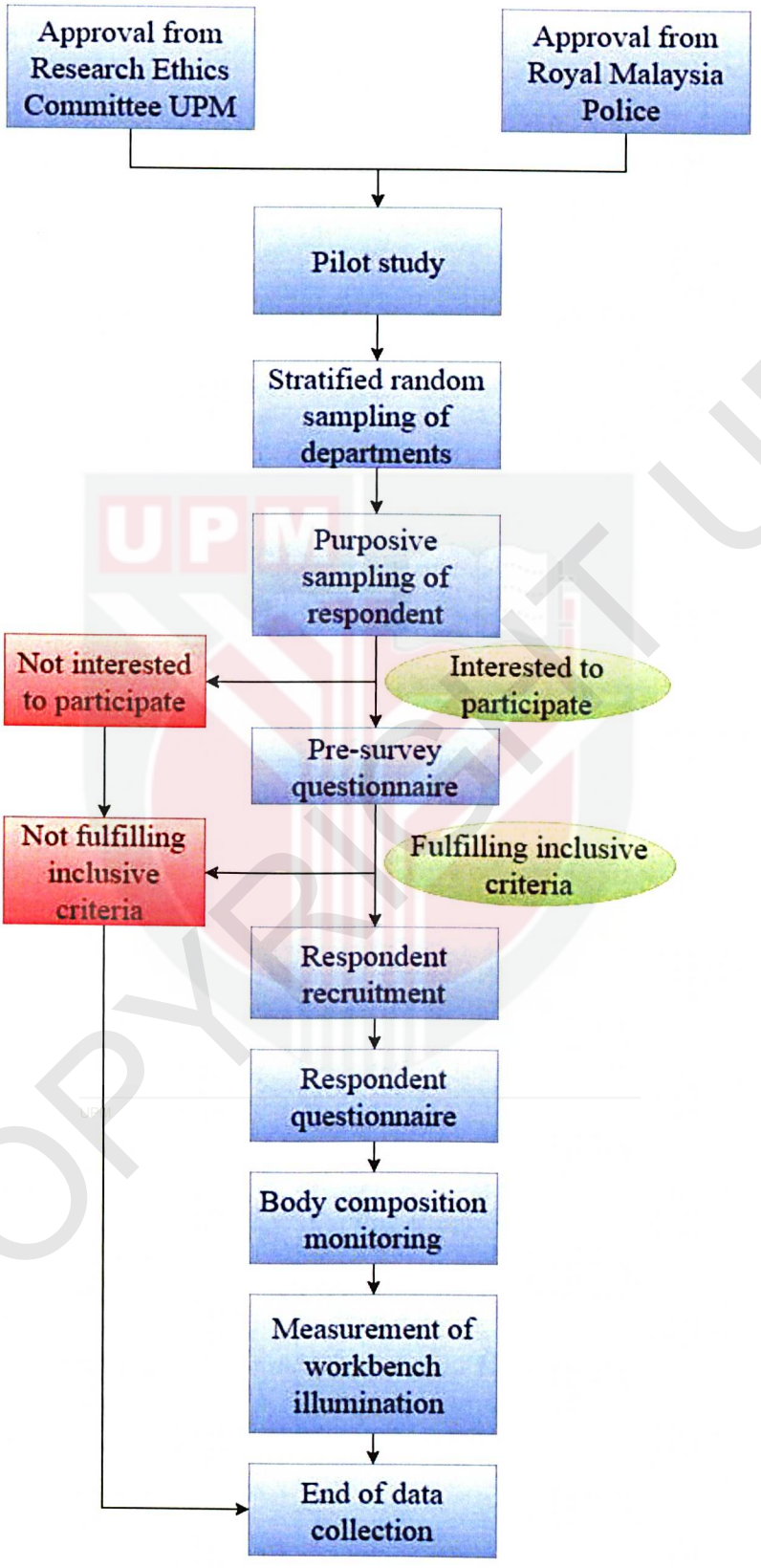

Figure 3.1: Data collection procedure

3.7 Study Instruments

3.7.1 Self-administered Questionnaire

Two sets of modified self-administered questionnaires namely the pre-survey questionnaire (refer **Appendix III**), and the respondent questionnaire (refer **Appendix IV**) was taken and modified from a reliable and validated questionnaire published by Segui et al., (2015). The questionnaires function to screen and select eligible respondents from the studied population, as well as to collect data on risk factors and asthenopia. These modified self-administered questionnaires were a translated version from English to Malay language. The self-administered questionnaires were piloted on 10% of sample size. These questionnaires have acceptable internal consistency with Cronbach's alpha coefficient, $\alpha = 0.733$ (68 number of item).

The first set (pre-survey questionnaire) was used to screen eligible respondents fulfilling the inclusion criteria (refer **Section 3.5.5**) and exclusion criteria (refer **Section 3.5.6**). Following that, the second set (respondent questionnaire) was used to collect data related to prevailing asthenopia symptoms and its risk factors among the screened respondents.

There were 8 parts in the respondent questionnaire namely, information on socio-demographical information, occupational description, usage of electronic Visual Display Units (VDUs), perceived workplace environment, lifestyle and dietary habits, physical and mental health status, family health status, and ocular health status. Data collected from all these 8 parts were then analysed and used to describe the prevalence of asthenopia and its risk factors among white collared police officers in Bukit Aman.

There were 16 items of asthenopia symptoms, in which respondents could report frequency and intensity of the experienced symptoms during work. Frequency of symptoms were coded to 0= never, 1= once or twice per week, and 2= three or more times per week. On the other hand, intensity of symptoms were coded to 1= moderate, and 2= intense. Application of the following expression resulted to the total score of asthenopia symptoms:

$$\text{Score}=\sum_{i=1}^{16}(\text{frequency of symptom occurrence})_i \times (\text{intensity of symptoms})_i *$$

*The result of frequency multiplied by intensity should be recoded as:

0 = 0; 1 or 2 = 1; and 4 = 2

The total score of ≥6 will be considered as respondents suffering from asthenopia symptoms and will be categorised as cases, while total score <6 will be considered as normal.

3.7.2 Body Composition Monitor

Data collection for information on socio-demographical features was assisted and completed with Omron Karada Scan HBF-362 (**Figure 3.2**) and Seca 206 Height Measuring Roller Tape (**Figure 3.3**). The instruments were used to complete respondent information on BMI and body fat percentage. Instruments were calibrated every time before taking subsequent measurements.

Figure 3.2: Omron Karada Scan HBF-362

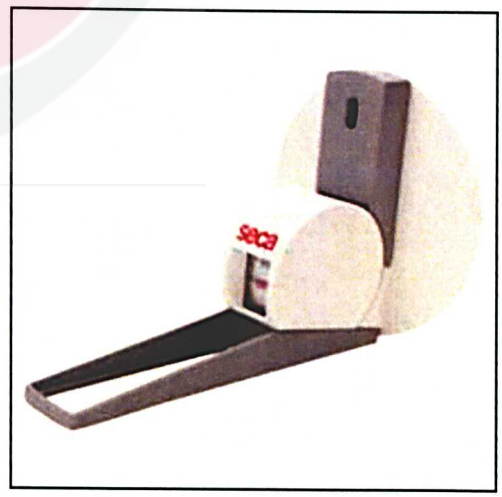

Figure 3.3: Seca 206 Height Measuring Roller Tape

3.7.3 Lux Meter

A standard calibrated Digital Light Meter HS1010 (**Figure 3.4**) was used to measure the illumination adequacy at workbench in unit lux. This instrument enables the researchers to numerically quantify the adequacy of illumination of the workbench. The raw quantification for illumination by a digital lux meter was expressed in continuous data. The adequacy or inadequacy of workbench illumination level will be categorised based on the Guidelines on Occupational Safety and Health for Working with Video Display Units (VDUs) (DOSH, 2003). **Table 3.1** shows the recommended illumination levels for various working conditions.

Figure 3.4: Digital Light Meter HS1010

Table 3.1: Recommended illumination for workstation for various tasks (DOSH, 2003).

Working Conditions	Illumination Levels (lux)
Task with well printed documents	300
Task with reduced readability of source documents	400 to 500
Data entry tasks	500 to 700

3.8 Statistical Analysis

Collected raw data from questionnaires were transferred into computerised data sheet after checking for accuracy by two investigators independently. Test for normality were run for all collected data. Data with normal distribution were analysed parametrically, while not normally distributed data were analysed with non-parametric test. Distribution in socio-demographic information data were explored and described for frequency and percentage value. Bivariate analysis for possible risk factors and its relevant variables were correlated with occurrence of asthenopia to quantify for strength of relationship. A 2-tailed p-value less than 0.05 were considered significant in this study. All data analysis was run using IBM SPSS statistical software version 22.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Socio-demographic Information of Respondents

Respondents who took part in this study were ranged within 21 years old as of the youngest, and 59 years old as of the oldest. The median score for the age of respondent was 34 years old (interquartile range, IQR= 17 years old). Majority of the respondents were from age group of 29 to 46 years old (f= 93, 48.7%), followed by age group less than 29 years old (f= 54, 28.3%), and age group more than 46 years old (f= 44, 23.0%).

Working experience in Bukit Aman among respondents was ranged within 3 years to 39 years of work experience. The median score for work experience was 8 years (IQR= 11 years). Mostly had 5 to 16 years of working experience (f= 83, 43.5%), followed by 3 to 5 years (f= 61, 31.9%), then more than 16 years (f= 47, 24.6%).

Male was suggested to dominate the profession (f= 128, 67.0%) comparatively to female (f= 63, 33.0%). Majority of them were of Malay ethnicity (f= 172, 90.1%), while non-Malay ethnicity were minority (f= 19, 9.9%) in this profession.

The data described that majority of the white collared police officers were from primary and secondary level of education (f= 121, 63.4%), while remaining had obtained tertiary education (f= 70, 36.6%). It reflects the work position for which the employment of less skilful lower ranked officers (f= 124, 64.9%) were more than of the employment of more skilful higher ranked officers (f= 67, 35.1%).

Only respondents from 8 out of 9 departments were selected to participate in the study since the Jabatan Siasatan Jenayah Komersil (JSJK) department was not situated in Bukit Aman area. As much as 15 (7.9%) to 30 (15.7%) respondents were selected from each of the 8 departments depending on the availability and accessibility to those departments.

Among all of the respondents (N= 191), none was underweight (BMI <18.5 kg/m^2). The minimum BMI was 18.6 kg/m^2, while maximum was 40.4 kg/m^2. The median score was 25.9 kg/m^2 (IQR= 5). Most of them were categorised in the normal category (BMI= 18.5 kg/m^2 to 24.9 kg/m^2) (f= 78, 40.8%) and overweight category (BMI= 25.0 kg/m^2 to 29.9 kg/m^2) (f= 79, 41.4%), while others were in obese category (BMI >30.0 kg/m^2) (f= 34, 17.8%).

On the other hand, the body fat percentage was categorised independently between male and female, and distinctively recoded into 3 groups of fit (male= 13.0% to 17.0%; female= 21.0% to 24.0%), average (male= 18.0% to 24.0%; female= 25.0% to 31.0%), and unhealthy (male >25.0%; female >32.0%). Body fat percentage ranges from 13.6% to 48.2% among respondents. The data was normally distributed (mean= 28.8% ±6.3). Majority of the respondents were in unhealthy range (f= 128, 67.0%), followed by average (f= 52, 27.2%) and then fit (f= 11, 5.8%).

Adequate workbench illumination was between 300 lux to 700 lux while working with Visual Display Units (VDUs). The workbench illumination level in Bukit Aman Headquarters was normally distributed (mean= 410.1 lux ±154.9) with range from 113.5 lux to 847.0 lux. Generally, the workplace were with adequate workbench illumination (f= 136, 71.2%), while less of improper workbench illumination (f= 55, 28.8%).

Table 4.1 summarises the socio-demographic information of white collared police officers from Bukit Aman for this study.

Table 4.1: Socio-demographic information of respondents (N=191)

Variables	Median (IQR)	Minimum - Maximum	*f* (%)
Age (years old)	34.0 (17.0)	21.0 – 59.0	
<29 years old			54 (28.3)
29 to 46 years old			93 (48.7)
>46 years old			44 (23.0)
Working experience (years)	8.0 (11.0)	3.0 – 39.0	
3 to5 years			61 (31.9)
5 to 16 years			83 (43.5)
>16 years			47 (24.6)
Gender	1.0 (1.0)	1.0 – 2.0	
Male			128 (67.0)
Female			63 (33.0)
Ethnicity	1.0 (0)	1.0 – 4.0	
Malay			172 (90.1)
Chinese			1 (0.5)
Indian			4 (2.1)
Others			14 (7.3)
Education level	1.0 (1.0)	1.0 – 2.0	
Primary/Secondary			121 (63.4)
Tertiary			70 (36.6)
Working position	1.0 (1.0)	1.0 – 2.0	
Lower ranked officer			124 (64.9)
Higher ranked officer			67 (35.1)
[b]Department	5.0 (5.0)	1.0 – 9.0	
JP			24 (12.6)
JSJ			29 (15.2)
JSJN			24 (12.6)
JSJK			0 (0)
JIPS			30 (15.7)
JPJKK			30 (15.7)
JKDN/KA			22 (11.5)
StaRT			17 (8.9)
SB			15 (7.9)

Variables	Median (IQR)	Minimum - Maximum	*f* (%)
BMI (kg/m^2)	25.9 (5.1)	18.6 – 40.4	
Underweight			0 (0)
Normal			78 (40.8)
Overweight			79 (41.4)
Obese			34 (17.8)
Body fat percentage (%)	[a] 28.8 ±6.3	13.6 – 48.2	
Fit			11 (5.8)
Average			52 (27.2)
Unhealthy			128 (67.0)
Workbench illumination (lux)	[a] 410.1 ±154.9	113.5 – 847.0	
Improper illumination			55 (28.8)
Adequate illumination			136 (71.2)

Descriptive analysis: IQR= Interquartile range; *f*= Frequency; BMI= Body Mass Index
[a]Normal distribution: Mean ±Standard Deviation (SD)
[b]Department: Jabatan Pengurusan (JP), Jabatan Siasatan Jenayah (JSJ), Jabatan Siasatan Jenayah Narkotik (JSJN), Jabatan Siasatan Jenayah Komersil (JSJK), Jabatan Integriti dan Pematuhan Standard (JIPS), Jabatan Pencegahan Jenayah dan Keselamatan Komuniti (JPJKK), Jabatan Keselamatan Dalam Negeri/ Ketenteraman Awam (JKDN/KA), Jabatan Sumber Strategik dan Teknologi (StaRT), Cawangan Khas (SB)

4.2 Prevalence of Asthenopia Symptoms among Respondents

For the prevalence of asthenopia among white collared police officers, 16 symptoms of asthenopia were selected and assessed for the frequency and magnitude of symptoms. Scoring for asthenopia cases were based on the 16 symptoms of asthenopia (Segui et al., 2015) as was explained in detail in **Section 3.7.1**.

The results showed that more than half of the respondents reported cases (f= 99, 51.8%) of asthenopia as compared to non-cases (f= 92, 48.2). Aligned with many studies, at least half of the studied population were at risk of having asthenopia (Blehm et al., 2005; Han et al., 2013; Toomingas et al., 2013; Wagel et al., 2015; and Yan et al., 2008).

Mean ±SD score reported frequency rank of asthenopia symptoms, rather than frequency number of asthenopia symptoms in frequency and percentage, f (%) score. Among the 16 symptoms of asthenopia, the top 5 frequently reported symptoms of asthenopia were headache (0.74 ±0.674), followed by blurred vision (0.64 ±0.704), then burning (0.61 ±0.587), next was photophobia (0.59 ±0.682), and lastly tearing (0.57 ±0.610). On the other hand, the 5 least reported symptoms of asthenopia with mean ±SD were eye pain (0.11 ±0.330), followed by coloured halos (0.16 ±0.459), next was dry eyes (0.24 ±0.461), then heavy eyelids (0.29 ±0.519), and lastly eye redness (0.30 ±0.535).

Table 4.2 summarised the reported frequency rank of asthenopia symptoms in mean ±SD score, and frequency number of asthenopia symptoms in *f* (%) score among white collared police officers as respondents.

Table 4.2: Frequency of asthenopia symptoms among white collared police officers (N= 191)

Occurrences of asthenopia	*f*	%
Normal	92	48.2
Cases	99	51.8

Symptoms of asthenopia	Mean ±SD	*f* (%)
Headache	0.74 ±0.67	117 (61.3)
Blurred vision	0.64 ±0.70	106 (55.5)
Burning	0.61 ±0.59	97 (50.8)
Photophobia	0.59 ±0.68	97 (50.8)
Tearing	0.57 ±0.61	91 (47.6)
Itching	0.53 ±0.61	91 (47.6)
Foreign body sensation	0.47 ±0.57	82 (43.0)
Difficulty in sustaining visual operation	0.42 ±0.71	61 (31.9)
Excessive blinking	0.42 ±0.67	56 (29.3)
Decreased in visual acuity	0.37 ±0.63	56 (29.3)
Diplopia	0.31 ±0.61	51 (26.7)
Eye redness	0.30 ±0.54	49 (25.6)
Heavy eyelids	0.29 ±0.52	44 (23.1)
Dry eyes	0.24 ±0.46	42 (22.0)
Coloured halos	0.16 ±0.46	24 (12.6)
Eye pain	0.11 ±0.33	20 (10.4)

Descriptive analysis: SD= Standard deviation; *f*= Frequency

For the magnitude of asthenopia symptoms, the top 5 most intense symptoms were reported to be headache with 17 respondents, followed by photophobia with 16 respondents, next was blurred vision with 12 respondents, and then were difficulty in sustaining visual operation and diplopia with 10 respondents for both respectively. On the other hand, the 5 least intense magnitude of asthenopia symptoms were eye pain, heavy eyelids, and eye redness all without respondents reporting intense symptoms, and dry eyes and foreign body sensation both having only one respondent reporting intense symptoms. **Table 4.3** ranks the magnitude of asthenopia symptoms by percentage reported among respondents.

Table 4.3: Magnitude of asthenopia symptoms among white collared police officers (N= 191)

Symptoms of asthenopia	*f* (%)		
	Intense	**Moderate**	**No symptoms**
Headache	17 (8.9)	100 (52.4)	74 (38.7)
Photophobia	16 (8.4)	75 (39.3)	100 (52.4)
Blurred vision	12 (6.3)	85 (44.5)	94 (49.2)
Difficult in sustaining visual operation	10 (5.2)	46 (24.1)	135 (70.7)
Diplopia	10 (5.2)	34 (17.8)	147 (77.0)
Decrease visual acuity	9 (4.7)	47 (24.6)	135 (70.7)
Coloured halos	3 (1.6)	21 (11.0)	167 (87.4)
Tearing	2 (1.0)	95 (49.7)	94 (49.2)
Itching	2 (1.0)	89 (46.6)	100 (52.4)
Excessive blinking	2 (1.0)	59 (30.9)	130 (68.1)
Burning	1 (0.5)	105 (55.0)	85 (44.5)
Foreign body sensation	1 (0.5)	81 (42.4)	109 (57.1)
Dry eyes	1 (0.5)	41 (21.5)	149 (78.0)
Eye redness	0 (0.0)	51 (26.7)	140 (73.3)
Heavy eyelids	0 (0.0)	49 (25.7)	142 (74.3)
Eye pain	0 (0.0)	20 (10.5)	171 (89.5)

Descriptive analysis: *f*= Frequency

4.3 Individual Risk Factors and the Occurrence of Asthenopia

Relationship between individual risk factors and the occurrence of asthenopia among white collared police officers were analysed according to categories of lifestyle, usage of electronic visual display units (VDUs), physical and mental health, and family history of diseases of respondents as shown in **Table 4.4**. The data was analysed using spearman-rho correlation test (body fat percentage was analysed using pearson correlation test), and significant value was set at $p < 0.05$.

Lifestyle category includes variables of smoking, water consumption, doing physical exercise, green leafy vegetables consumption, fruits consumption, and alcohol consumption. There was a significant, and very weak correlation between doing physical exercise ($p = 0.025$, $r_s = -0.162$) with the reduction of asthenopia complaints, suggesting that doing physical exercise may relieve asthenopia. On the other hand, there were not enough evidences to show significant correlation ($p > 0.05$) of all other variables that were listed in lifestyle category with the occurrence of asthenopia, except for the doing physical exercise variable.

Usage of electronic Visual Display Units (VDUs) category includes variables of using desktop, laptop, smartphone, tablet, watching television, and playing video game console during leisure time. There were not enough evidences to show significant correlation ($p > 0.05$) of all variables listed in the usage of electronic VDUs category with the occurrences of asthenopia.

Table 4.4: Correlation between individual risk factors and asthenopia among white collared police officers (N= 191)

Category	Variables	Asthenopia (N= 191)	
		r_s	p
Lifestyle	Smoking	0.023	0.750
	Water consumption	-0.069	0.408
	Doing physical exercise	-0.162	*0.025
	Green leafy vegetables consumption	-0.009	0.907
	Fruits consumption	-0.006	0.930
	Alcohol consumption	-0.090	0.218
Usage of Electronic Visual Display Units (VDUs)	Usage of desktop	0.038	0.600
	Usage of laptop	0.071	0.326
	Usage of smartphone	0.002	0.982
	Usage of tablet	0.092	0.205
	Usage of television	0.013	0.854
	Usage of video game console	0.072	0.320
Physical and Mental Health	Age	0.082	0.259
	BMI	0.109	0.134
	[a]Body fat percentage	0.052	0.479
	Wearing spectacles	0.122	0.093
	Wearing contact lens	0.146	*0.044
	Quality of sleep	-0.132	0.070
Family History of Diseases	Family history of hypertension	0.150	*0.038
	Family history of diabetes	0.046	0.524
	Family history of heart attack	0.191	*0.008
	Family history of stroke	0.039	0.592
	Family history of obesity	0.047	0.519
	Family history of ocular disease	0.095	0.191

Spearman-rho correlation test: r_s= Correlation coefficient; p= p-value; BMI= Body Mass Index
[a]Normal distribution: Pearson correlation test
*Significant correlation at $p < 0.05$

Variables included in physical and mental health category were age, Body Mass Index (BMI), body fat percentage, wearing spectacles, wearing contact lens, and quality of sleep. There was a significant, and very weak correlation between wearing of contact lens ($p= 0.044$, $r_s= 0.146$) with asthenopia complaints, suggesting that wearing contact lens may be risk to developing asthenopia. On the other hand, there were not enough evidences to show significant correlation ($p >0.05$) of all other variables that were listed in physical and mental health category with the occurrence of asthenopia, except for the wearing contact lens variable.

In family history of diseases category, data on variables of family history of hypertension, diabetes, heart attack, stroke, obesity, and ocular disease were collected. It was found that there were a significant, and very weak correlation in both family history of hypertension ($p= 0.038$, $r_s= 0.150$), and family history of heart attack ($p= 0.008$, $r_s= 0.191$) with reporting of asthenopia, suggesting that family history of hypertension and heart attack may be risks to developing asthenopia. On the other hand, there were not enough evidence to show significant correlation ($p >0.05$) of all other variables that were listed in family history of diseases category with occurrences of asthenopia apart from family history of both hypertension and heart attack.

Getting physically active had been suggested to be correlated with reduction of asthenopia symptoms. In a study among college students, doing exercise at least of 3.5 hours per week was associated with prevalence of asthenopia reduction (Han et al., 2013). Another study among electronic VDU users, taking break from work with simple exercise such as stretching can improve 15% productivity as symptoms of asthenopia were relieved (Rosenfield, 2011).

None of the variables for usage of electronic Visual Display Units (VDUs) in individual risk factors were significantly related to occurrences of asthenopia among white collared police officers. Study by Iribarren et al., (2001) added, symptoms of blurred vision and burning eyes (ranked top 2 and 3 respectively in this study) were associated more with reading hard copy, while red eyes (ranked bottom 5) was associated more with computer use. During data collection process, these observations were clearly seen in the workplace setting whereby white collared police officers in Bukit Aman still deal with paper reports and documents most of the time rather than in soft copy forms. This may suggest that the complaints of asthenopia in the workplace were not due to the use of VDUs.

This study had found that wearing contact lens was significantly correlated to the development of asthenopia symptoms suggesting it as a risk factor. Parallel with previous findings, dry eyes was one of common asthenopia symptoms from wearing contact lens (Kokke et al., 2008). Studies had suggested that contact lens user adds additional resistance to the eye and eyelid surface resulting friction effects and drying of ocular surface (Blehm et al., 2005; and Wolkoff, 2008). The ocular surface friction due to contact lens was associated to ocular discomfort since the tear film will be exhausted (Sweeney et al., 2013).

Family history of hypertension and heart attack had been identified as among several risk factors of asthenopia in this study. In a study by Han et al., (2013), genetic factors were clearly a risk factor after running multivariate logistic regression analysis suggesting that heredity of chronic diseases may linked to asthenopia prevalence. On the other hand, past epidemiological data had linked family history of eye disease and eye injury to risk of limited vision functionality (Belmonte, 2007). Although the respondents in this study were not directly having these non-communicable health problems, after considering that they were excluded at the beginning of the study, our results still showed a weak correlation of genetic factors with complaints of asthenopia. However, it was also important to promote ocular health, also prevention of these non-communicable diseases in order to reduce the risk of asthenopia among white collared police officers.

4.4 Workplace Environmental Risk Factors and the Occurrence of Asthenopia

Relationship between office environment as risk factors and the occurrence of asthenopia among white collared police officers were analysed according to categories of perceived temperature, perceived indoor air quality (IAQ), perceived humidity, perceived ventilation, perceived illumination, and measured workbench illumination level by the respondents as shown in **Table 4.5**. The data was analysed using spearman-rho correlation test (measured workbench illumination level was analysed using pearson correlation test), and significant value was set at $p < 0.05$.

Table 4.5: Correlation between workplace environmental risk factors and asthenopia among white collared police officers (N=191)

Variables	Asthenopia (N= 191)	
	r_s	p
Perceived temperature	-0.041	0.573
Perceived indoor air quality (IAQ)	-0.091	0.211
Perceived humidity	0.026	0.716
Perceived ventilation	-0.161	*0.026
Perceived illumination	-0.115	0.113
Measured workbench illumination level	-0.108	0.138

Spearman-rho correlation test: r_s= Correlation coefficient; p= p-value
[a]Normal distribution: Pearson correlation test
*Significant correlation at $p < 0.05$

Among all variables in workplace environmental risk factors, perceived ventilation in the workplace variable was significantly, and very weakly correlated ($p= 0.026$, $r_s= -0.161$) with the reduction of asthenopia complaints, suggesting that good perceived workplace ventilation may relieve asthenopia complaints. On the other hand, there were not enough evidences to show significant correlation ($p >0.05$) of all other workplace environmental risk factors variables with the occurrence of asthenopia.

Environmental factor such as ventilation was most often related to external ocular symptoms of asthenopia. The cornea was known to be very sensitive to moisture and chemical imbalance influenced from environmental factors (Blehm et al., 2005). Good indoor air ventilation was important to disperse and dilute these indoor air contaminants. A study reported that occurrences of burning, itching, and tearing among office workers were significantly higher in modern buildings that were equipped with air conditioning units comparatively to the naturally ventilated buildings (Wolkoff et al., 2003). However, another study suggested that introducing ventilation with fans indirectly increases air velocity, hence posting even a greater threat to ocular drying (Rosenfield, 2011). These contrasting findings probably suggest that there should be an optimal level of ventilation to be achieved in order for indoor occupants reduces the complaints of asthenopia symptoms.

4.5 Psychosocial Risk Factors and the Occurrence of Asthenopia

Relationship between psychosocial risk factors and the occurrence of asthenopia among white collared police officers were analysed according to categories of working duration, allowable break period, and duration of working indoor as shown in **Table 4.6**. The data was analysed using spearman-rho correlation test, and significant value was set at $p < 0.05$.

Of all the variables grouped in psychosocial risk factors, working duration was significantly, and very weakly correlated ($p = 0.022$, $r_s = 0.166$) with the occurrence of asthenopia, suggesting prolong working duration was a risk factor to asthenopia complaints. On the other hand, there were not enough evidence to show significant correlation ($p > 0.05$) of all other psychosocial risk factors variables with the occurrence of asthenopia.

Table 4.6: Correlation between psychosocial risk factors and asthenopia among white collared police officers (N=191)

Variables	Asthenopia (N= 191)	
	r_s	p
Working duration	0.166	*0.022
Allowable break period	-0.062	0.395
Duration of working indoor	0.056	0.445

Spearman-rho correlation test: r_s= Correlation coefficient; p= p-value
*Significant correlation at $p < 0.05$

Findings from this study suggested that prolong duration of working may increase the complaints of asthenopia. In a study by Iribarren et al., (2001), cumulative nearwork which includes reading, and usage of computers over additional weekly working hours demonstrated significant relationships with number of asthenopia symptoms. Another study by Gobba et al., (1988) reported that a mean of 6 working hours was enough to report 71% of eye discomfort symptoms and 66% of ocular asthenopia symptoms.

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion of the Study

In conclusion, the prevalence of asthenopia among white collared police officers was as much as 51.8%. Top 5 most reported symptoms of asthenopia were headache, blurred vision, burning, photophobia, and tearing among white collared police officers in workplace.

Findings from the study also suggested that there were 6 significantly correlated risk factors namely sedentary lifestyle, wearing contact lens, family history of hypertension, family history of heart attack, perceived poor ventilation, and prolong working durations to higher reporting numbers of asthenopia among white collared police officers in Bukit Aman. Findings from the study also suggested that doing physical exercise and having perceived good ventilation in workplace environment were protective factors that were significantly correlated to lower complaints of asthenopia among white collared police officers. On the other hand, none of the variables for usage of less electronic Visual Display Units (VDUs) in individual risk factors were significantly correlated to occurrences of asthenopia among white collared police officers.

5.2 Limitation of the Study

This study highlighted the limitation whereby convenient sampling method was used to collect the respondents which was not a randomised sampling method. Therefore, the results only described the sampling population rather than the overall population as a whole. Besides that, the cross-sectional research design was used due to time limitation for conducting the research, hence does not allow inferences of casualty of risk factors to asthenopia. Additionally, researchers went through tight security checks and surveillance throughout data collection period when collecting data in the Royal Malaysia Police Bukit Aman Headquarters. This may result to inaccessibility to certain sensitive departments whereby possibility of population at risk was situated, therefore underreporting of asthenopia prevalence among white collared police officers.

5.3 Recommendation for Control Measure Actions

This study recommended that the study results should be utilised for controlling and tackling risk factors relating to prevailing asthenopia issues among white collared police officers. This health science based research also recommended actions to be taken among white collared police officers in Bukit Aman in controlling the identified risk factors. Among recommended actions to be taken targeted towards the population at risk were:

- Encouraging physical activity such as exercise to tackle sedentary lifestyle;
- Encourage switching to spectacles for those who are wearing contact lens;
- Promote healthy lifestyle and prevention of non-communicable diseases like hypertension and cardiovascular diseases;
- Ensure optimal ventilation in workplace environment to reduce asthenopia related symptoms complaints; and
- Encouraging effective and efficient work management to avoid working for long hours.

5.4 Recommendation for Future Research

For future studies, other researchers may broaden the population scope by including all other police officers in the Federal Territory. Besides, future researchers can involve random sampling methods to sample related population in order to generalize the study population effectively. Also, more solid conclusion can be drawn when cross-sectional comparative or longitudinal studies involving similar characteristic populations were done in the future looking on related factors for interventions.

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APPENDICES

APPENDIX I

RESPONDENT'S INFORMATION SHEET AND CONSENT

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

FORM B1: RESPONDENT'S INFORMATION SHEET AND CONSENT

Please read the following information carefully and do not hesitate to discuss any questions you may have with the researcher.

1. STUDY TITLE

PREVALENCE OF ASTHENOPIA AND ITS RISK FACTORS AMONG WHITE COLLARED POLICE OFFICERS IN BUKIT AMAN

2. INTRODUCTION

With ever changing lifestyle, workplace environment, and job demand, asthenopia or eye discomfort symptoms had become problem among the white collared professions. Individual risk factors, poor office environment, and increasing job demand offers risk of asthenopia occurrences. Service sectors such as the white collared police officers are prone to these risk factors (DOSH, 2004). Therefore, this study will be conducted with the purpose of finding statistical prevalence of asthenopia and its risk factors in workplace in order to empower the Royal Malaysia Police in complying with the National Law: Occupational Safety and Health (OSHA) Act 1994 (Act 514).

3. WHAT WILL YOU HAVE TO DO?

You as a respondent will be required to give full cooperation to the researchers by providing detailed personal particulars which are relevant to this study accurately and clearly while answering the questionnaires. Corresponding with this study, you will be required to do a body composition monitoring with body composition monitoring equipments, as well as to assist the researcher in measuring workbench illumination adequacy using a lux meter during the study.

4. WHO SHOULD NOT PARTICIPATE IN THE STUDY?

Those who are not Malaysian, not police officers, who are not currently attached to Bukit Aman Police Headquarters, Kuala Lumpur for at least 3 years, have congenital eye problems, have history of eye trauma, have history of surgical procedure of the eyes, is hypertension, diabetic, or a pregnant mother should not participate in the study.

5. WHAT WILL BE THE BENEFITS OF THE STUDY?

(a) TO YOU AS THE SUBJECT?

You will benefit from obtaining free body composition checking when you participated in this study.

(b) TO THE INVESTIGATOR?

Researcher will be able to know the relationship of risk factors in the workplace with occurrences of asthenopia among white collared police officers.

6. WHAT ARE THE POSSIBLE RISKS?

The study does not pose any risk to the respondent.

7. WILL THE INFORMATION THAT YOU PROVIDE AND YOUR IDENTITY REMAIN CONFIDENTIAL?

All information given by the respondent is confidential and will only be used for the purpose of this study.

8. WHO SHOULD YOU CONTACT IF YOU HAVE ADDITIONAL QUESTIONS DURING THE COURSE OF THE RESEARCH?

For any inquiries, you may contact:

Researcher,

MELVIN LEE HAN JEAN

Final Year Student
Bachelor of Science (Environmental and Occupational Health)
Faculty of Medicine and Health Sciences
Universiti Putra Malaysia (Serdang Campus)

Supervisor,

IRNIZA BINTI RASDI

Senior Lecturer
Department of Environmental and Occupational Health
Faculty of Medicine and Health Sciences
Universiti Putra Malaysia (Serdang Campus)

*Please initial here if you have read and understood the contents of this page*_____

9. CONSENT

I ..... Identity Card No. .....
address.....
... .hereby voluntarily agree to take part in the research stated above *(clinical /drug trial/video recording/ focus group/interview-based/ questionnaire-based).

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

I* wish / do not wish to know the results related to my participation in the research

I agree/do not agree that the images/photos/video recordings/voice recordings related to me be used in any form of publication or presentation (if applicable)

* delete where necessary

Signature .....
(Respondent)

Date :.....

Signature .....
(Witness)

Name :.....

I/C No. :.....

I confirm that I have explained to the respondent the nature and purpose of the above-mentioned research.

Date .....

Signature .....
(Researcher)

APPENDIX II

BORANG PENERANGAN DAN PERSETUJUAN RESPONDEN

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

BORANG B1: PENERANGAN DAN PERSETUJUAN RESPONDEN

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

1.TAJUK KAJIAN

PREVALEN ASTENOPIA DAN FAKTOR-FAKTOR RISIKO DALAM KALANGAN PEGAWAI POLIS BERKOLAR PUTIH DI BUKIT AMAN

2. PENGENALAN

Dengan gaya hidup, persekitaran tempat kerja, serta permintaan pekerjaan yang sentiasa berubah, astenopia atau simptom ketidakselesaan mata telah menjadi masalah dalam kalangan profesion berkolar putih. Risiko individu, persekitaran pejabat yang kurang baik, and permintaan pekerjaan yang semakin tinggi memberi risiko berlakunya astenopia. Sektor perkhidmatan seperti pegawai polis berkolar putih sering terdedah dengan faktor-faktor risiko ini (DOSH, 2004). Oleh itu, kajian ini akan dilaksanakan dengan tujuan mencari prevalen statistik bagi masalah astenopia dan faktor-faktor risikonya di tempat kerja, sekaligus membolehkan Polis Diraja Malaysia mematuhi Undang-undang Negara: Akta Kesihatan dan Keselamatan Pekerjaan 1994 (Akta 514).

3. APAKAH YANG PERLU ANDA LAKUKAN?

Anda sebagai responden perlu memberi kerjasama penuh kepada penyelidik dengan memberi segala butiran peribadi yang berkaitan dengan kajian ini dengan tepat dan jelas ketika menjawab borang-borang kaji selidik. Sehubungan itu, anda dikehendaki untuk membuat pemeriksaan komposisi badan anda dengan menggunakan alat-alat pemantau komposisi badan, dan juga perlu membantu pengkaji dalam mengukur tahap pencahayaan di meja kerja dengan menggunakan lux meter semasa kajian.

4. SIAPA YANG TIDAK BOLEH MENYERTAI KAJIAN INI?

Sesiapa yang bukan warganegara Malaysia, bukan pegawai atau anggota polis, tidak berkerja di Ibu Pejabat Bukit Aman, Kuala Lumpur sekurang-kurangnya 3 tahun, mempunyai masalah mata kongenital, pernah mengalami trauma pada mata, pernah menjalani pembedahan mata, mempunyai hipertensi, diabetik, ataupun ibu hamil tidak boleh menyertai kajian ini.

5. APAKAH FAEDAH MENYERTAI KAJIAN INI?

a) KEPADA ANDA SEBAGAI PESERTA?

Anda dapat membuat pemeriksaan komposisi badan secara percuma apabila anda menyertai kajian ini.

b) KEPADA PENYELIDIK?

Penyelidik dapat tahu bagaimana risiko-risiko yang ada di tempat kerja anda berhubung kait dengan berlakunya astenopia dalam kalangan polis berkolar putih.

6. ADAKAH IA BERISIKO?

Kajian ini tidak memberi risiko kepada responden.

7. ADAKAH MAKLUMAT DAN IDENTITI SAYA KEKAL RAHSIA?

Segala maklumat yang diberikan oleh responden adalah sulit dan digunakan untuk tujuan kajian ini sahaja.

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

Untuk sebarangan pertanyaan, anda boleh menghubungi:

Penyelidik,

MELVIN LEE HAN JEAN

Pelajar Tahun Akhir
Bacelor Sains (Kesihatan Persekitaran dan Pekerjaan)
Fakulti Perubatan dan Sains Kesihatan
Universiti Putra Malaysia (Kampus Serdang)

Penyelia,

IRNIZA BINTI RASDI

Pensyarah Kanan
Jabatan Kesihatan Persekitaran dan Pekerjaan
Fakulti Perubatan dan Sains Kesihatan
Universiti Putra Malaysia (Kampus Serdang)

Sila tandatangan di sini sekiranya anda telah membaca dan memahami kandungan halaman ini

_____

9. PERSETUJUAN

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

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

Saya* berminat / tidak berminat untuk mengetahui keputusan kajian yang melibatkan saya.

Saya* setuju/tidak bersetuju untuk imei/gambar/rakaman video/ rakaman suara digunakan dalam apa jua bentuk penerbitan atau pembentangan. (sekiranya berkaitan).

*potong yang tidak berkenaan

Tandatangan .....
(*Responden*)

Tandatangan .....
(*Saksi*)

Tarikh :.....

Nama :.....

No. K/P: .....

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

Tarikh .....

Tandatangan .....
(*Penyelidik*)

APPENDIX III

BORANG SOAL SELIDIK PRA-TINJAUAN

BORANG SOAL SELIDIK PRA-TINJAUAN

No. Polis: _____

Sila tandakan (✓) pada petak yang tersedia bagi jawapan anda.

Adakah anda:	YA	TIDAK
1) seorang warganegara Malaysia?		
2) seorang anggota ataupun pegawai polis?		
3) telah disahkan sebagai anggota atau pegawai polis tetap?		
4) telah berkhidmat di Ibu Pejabat Polis Bukit Aman lebih dari 3 tahun?		
5) mempunyai masalah penglihatan sejak lahir?		
6) pernah mengalami trauma (kecederaan) di bahagian mata?		
7) pernah menjalani pembedahan mata?		
8) mempunyai penyakit tekanan darah tinggi (hipertensi)?		
9) mempunyai penyakit kencing manis (diabetes)?		
10) seorang ibu hamil ketika ini?		

APPENDIX IV

BORANG SOAL SELIDIK

*ID Responden: ☐☐☐☐☐☐☐

BAHAGIAN A: MAKLUMAT LATAR BELAKANG

Bahagian ini WAJIB dilengkapkan. Sila tandakan (✓) pada jawapan anda.

1) Umur: _____ tahun (pada 1 Januari 2016)

2) Tempoh perkhidmatan: _____ tahun/bulan (potong yang tidak berkenaan)

3) Jantina: ☐ Lelaki ☐ Perempuan

4) Bangsa: ☐ Melayu ☐ Cina ☐ India ☐ Lain-lain

5) Pendidikan: ☐ Sekolah Rendah/Menengah ☐ Pra-universiti/Universiti

6) Penjawat: ☐ Awam ☐ Anggota ☐ Pegawai

7) Jabatan:

☐ Jabatan Pengurusan (JP)

☐ Jabatan Siasatan Jenayah (JSJ)

☐ Jabatan Siasatan Jenayah Narkotik (JSJN)

☐ Jabatan Siasatan Jenayah Komersil (JSJK)

☐ Jabatan Integriti dan Pematuhan Standard (JIPS)

☐ Jabatan Pencegahan Jenayah dan Keselamatan Komuniti (JPJKK)

☐ Jabatan Keselamatan Dalam Negeri/ Ketenteraman Awam (JKDN/KA)

☐ Jabatan Sumber Strategik dan Teknologi (StaRT)

☐ Cawangan Khas (SB)

*Ruangan ID Responden akan dilengkapkan oleh penyelidik

BAHAGIAN B: ULASAN PEKERJAAN

Sila bulatkan jawapan anda.

1) Purata masa anda bekerja termasuk kerja lebih masa.

A. Kurang dari 4 jam sehari
B. Antara 4 hingga 8 jam sehari
C. Antara 8 hingga 10 jam sehari
D. Lebih dari 10 jam sehari

2) Jumlah masa yang diberikan untuk anda berehat dalam tempoh bekerja.

A. Kurang dari 30 minit sehari
B. Antara 30 hingga 60 minit sehari
C. Antara 60 minit hingga 120 minit sehari
D. Lebih dari 120 minit sehari

3) Purata masa anda bekerja **dalam** pejabat.

A. Kurang dari 1 jam sehari
B. Antara 1 hingga 5 jam sehari
C. Antara 5 hingga 8 jam sehari
D. Lebih dari 8 jam sehari

BAHAGIAN C: PENGGUNAAN ALATAN ELEKTRONIK PAPARAN VISUAL

Soalan adalah berdasarkan **(a)KEKERAPAN** dan **(b)TEMPOH** penggunaan peralatan elektronik paparan visual anda. Sila tandakan (✓) pada jawapan anda.

Penggunaan peralatan elektronik paparan visual	**(a) KEKERAPAN [berapa kali seminggu]**								**(b) TEMPOH [berapa jam sehari]**	
	0	1	2	3	4	5	6	7	Kurang 4 jam	Lebih 4 jam
1) Komputer (*desktop*)										
2) Komputer Riba (*laptop*)										
3) Telefon Pintar (*smartphone*)										
4) Tablet										
5) Televisyen										
6) Konsol Permainan Video										

BAHAGIAN D: KEADAAN TEMPAT KERJA

Soalan adalah berdasarkan keselesaan persekitaraan di tempat kerja anda. Sila tandakan (✓) pada jawapan anda.

Anda selesa dengan:	**Tidak**	**Ya**
1) Suhu persekitaran (*temperature*) *tempat* kerja anda.		
2) Kualiti udara (*air quality*) tempat kerja anda.		
3) Tahap kelembapan (*humidity*) tempat kerja anda.		
4) Sistem pengudaraan (*ventilation*) tempat kerja anda.		
5) Tahap pencahayaan (*illumination*) tempat kerja anda.		

BAHAGIAN E: AMALAN GAYA HIDUP

Soalan adalah berdasarkan amalan gaya hidup anda. Sila tandakan (✓) pada jawapan anda.

1) Adakah anda seorang perokok?

☐ Tidak ☐ Ya

2) Adakah anda minum sekurang-kurangnya 2 Liter air kosong setiap hari?

☐ Tidak ☐ Ya

Soalan adalah berdasarkan **KEKERAPAN** anda amalkan gaya hidup ini dalam seminggu. Sila tandakan (✓) pada jawapan anda.

Kekerapan dalam seminggu anda:	**0 kali**	**1 kali**	**2 kali**	**3 kali**	**4 kali**	**5 kali**	**6 kali**	**7 kali**
1) Bersenam								
2) Makan sayur-sayuran berdaun hijau								
3) Makan buah-buahan								
4) Mengambil alkohol								

BAHAGIAN F: STATUS KESIHATAN FIZIKAL & MENTAL

Soalan adalah berdasarkan status kesihatan fizikal dan mental anda. Sila tandakan (✓) pada jawapan anda.

1) Adakah anda memakai **cermin mata** untuk bantu penglihatan anda?
☐ Tidak ☐ Ya

2) Adakah anda memakai **kanta sentuh (*contact lens*)** untuk bantu penglihatan anda?
☐ Tidak ☐ Ya

3) Adakah anda mempunyai tidur yang berkualiti?
☐ Tidak ☐ Ya

BAHAGIAN G: STATUS KESIHATAN KELUARGA TERDEKAT

Soalan adalah berdasarkan status kesihatan keluarga terdekat anda. Sila tandakan (✓) pada jawapan anda.

Keluarga terdekat anda mempunyai:	**Tidak**	**Ya**
1) Darah tinggi/ hipertensi		
2) Kencing manis/ diabetes		
3) Sakit jantung		
4) Strok		
5) Obesiti		
6) Penyakit mata kronik		

BAHAGIAN H: STATUS KESIHATAN MATA

Soalan adalah berdasarkan **(a)KEKERAPAN** dan **(b)KESUNGGUHAN** status kesihatan mata anda. Sila tandakan (✓) pada jawapan anda.

PERHATIAN: Sila kosongkan ruangan **(b)KESUNGGUHAN** jika anda memilih **0 kali** untuk **(a)KEKERAPAN**

Simptom-simptom mata berlaku SEMASA kerja	(a) KEKRAPAN [berapa kali seminggu]			(b) KESUNGGUHAN [kesungguhan simptom]	
	0 kali	1 ke 2 kali	3 kali dan lebih	Sederhana	Amat
1) Mata pedih					
2) Gatal-gatal					
3) Rasa berhabuk					
4) Mata berair					
5) Kelip mata berlebihan					
6) Mata merah					
7) Sakit mata					
8) Kelopak mata rasa berat					
9) Mata kering					
10) Penglihatan kabur					
11) Penglihatan berganda					
12) Kesukaran fokus untuk penglihatan dekat					
13) Peningkatan sensitiviti kepada cahaya					
14) Gelang (*halo*) berwarna di sekeliling objek					
15) Merasa penglihatan semakin teruk					
16) Sakit kepala					

-TERIMA KASIH ATAS KERJASAMA ANDA DALAM MENJAWAB SOAL SELIDIK INI-

***UNTUK KEGUNAAN PENYELIDIK

Body Composition Monitoring

Age: _____ years old (as of 1st January 2016)

Height: _____cm

Weight: _____kg

Fat: _____% ☐ (-) ☐ (0) ☐ (+) ☐ (++)

BMI: _____ ☐ <18.5 ☐ 18.5-24.9 ☐ 25-29.9 ☐ >30

Workbench Illumination

Workbench Illumination: _____lux

APPENDIX V

ETHICS COMMITTEE FOR RESEARCH INVOLVING HUMAN SUBJECTS OF UNIVERSITI PUTRA MALAYSIA (JKEUPM) APPROVAL LETTER

APPENDIX VI

SURAT KEBENARAN MENJALANKAN PENYELIDIKAN TAHUN AKHIR

KURSUS EOH4999A&B DI IBU PEJABAT POLIS BUKIT AMAN

s.k : 1) Dr Imiza bt Rasdi
Pensyarah Kanan
Jabatan Kesihatan Persekitaran dan Pekerjaan
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