THE OPHTHALMOLOGY MANAGEMENT OF PRIMARY SCHOOL CHILDREN AMONG CHINESE ETHNIC GROUP IN PENANG, MALAYSIA

By

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DECLARATION

I hereby declare that the project is based on my original work except for quotations and citation which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at USM or any other institutions.

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ABSTRAK

Selama ini, kesilapan pembiasan mata ialah satu isu sosial di semua negara terutama dalam masyarakat Cina. Dalam lingkungan Asia, kelaziman kesilapan pembiasan direkodkan tertinggi dalam populasi Cina bandar seperti Hong Kong, Taiwan, Singapura, China Selatan dan Malaysia. Kerosakan visual disebabkan oleh ralat biasan yang tidak dibetulkan semakin dikenali di seluruh dunia sebagai satu penyebab penting kecacatan visual yang boleh dielaki. Kesilapan pembiasan mata dikenali sebagai kerosakan visual paling senang dirawat dan paling kos eficien dalam penjagaan mata. Bagaimanapun , ini adalah lebih baik mengelakkan kesilapan pembiasan mata kerana orang yang ralat biasan perlu menanggung dengan bebanan fizikal dan beban kewangan cermin mata sepanjang hayat mereka. Kepercayaan kecekapan diri mencadangkan kanak-kanak sepatutnya mempunyai kesedaran untuk membetulkan kesilapan kepercayaan diri mereka, tabiat, meningkatkan amalan-amalan kawal selia sendiri mereka dan mengubah struktur sekeliling supaya mempunyai pemahaman yang lebih baik dalam kesilapan pembiasan mata. Walau bagaimanapun, kajian yang lalu untuk menentukan faktor-faktor yang berkaitan dengan kesilapan pembiasan mata di Malaysia untuk kanak-kanak Cina masih sangat kurang. Maka, kajian ini dijalankan untuk menentukan faktor-faktor yang mempunyai pengaruh terhadap kesilapan pembiasan mata antara kanak-kanak sekolah rendah Cina dengan menggunakan sampel 168 orang pelajar dari dua buah sekolah jenis kebangsaan rendah Cina di Pulau Pinang, Malaysia. Kajian ini mendapati tabiat makan dan ciri-ciri genetik tidak mempunyai pengaruh penting terhadap kesilapan pembiasan mata. Bagaimanapun, gaya hidup yang tidak sihat, pencapaian peribadi yang baik dan

pergantungan mesin telah didapati secara positif mengaruh kelaziman kesilapan pembiasan mata antara kanak kanak sekolah rendah Cina di Penang, Malaysia.

ABSTRACT

All the while, refractive error is a social issue in all countries especially in Chinese community. Within Asia, the prevalence of refractive error is recorded the highest in urban Chinese populations such as Hong Kong, Taiwan, Singapore, Southern China and Malaysia. Visual impairment because of uncorrected refractive error is increasingly being recognized worldwide as an avoidable visual disability. Refractive error is known as the easiest visual impairment to treat and the most cost efficient eye care interventions. However, it is better to prevent refractive error because refractive error people will have to endure with the physical encumbrance and the financial burden of spectacles throughout their lives. Self efficacy belief suggested that children should have awareness to correct their faulty self beliefs, habit, improve their self-regulatory practices and alter the surrounding structure in order to have better understanding in refractive error. Nevertheless, previous studies to found the risk factors which related to refractive error in Malaysia Chinese children population is still very less. Thus, this study is conducted to determine the risk factors which have influence to refractive error among Chinese primary children by using a sample of 168 students from two government Chinese primary school in Penang, Malaysia. This study found that eating habit and genetic traits do not have significant relationship to refractive error. However, unhealthy lifestyle, good personal achievement and machine dependence are found to positively associate with the prevalence of refractive error among Chinese primary school children in Penang, Malaysia.

Chapter 1 INTRODUCTION

1.1 Introduction

This chapter introduces the research outline of the study. It begins with expressing the background of the study, the problem statement with research objectives and followed by research questions. The significance of this study will highlight in end of this chapter and will give an overview of the next chapters in the thesis.

1.2 Background

World Health Organization has globally estimated that there are approximately 314 million people are living with vision impairment. Division from this number of visual impairment, there are 269 million people having low vision and 45 million are blind because of refractive error. The geographic distribution of visual impairment is not uniform and more than 90% of visual impairment people in the world are found in developing countries. (Susan Lewallen et al. 2009)

The Global Initiative for the Elimination of Avoidable Blindness (Vision 2020: The Right to Sight) has set a major challenge which requires a significant increase in the provision and uptake of eye care services around the world. The eye care service needs to be more widely available if the trend in visual impairment is increasing. One of the most significant barriers for the refractive error people to access eye care services is affordability. The shrinking economies of many countries in the world especially some poor countries are placing increasing pressure on health care budgets that are already severely over stretched. The budget for eye health services has been pushed further down

in the list of public health priorities after compete with the demands from life threatening diseases such as AIDS, malaria and tuberculosis. Obviously, this is due to refractive error was not a life threatening disease which can cause death. At the same time, the increasing cost of health care has forced many governments to restructure of their health delivery systems in their countries. (Martin Kyndt, 2001)

According to R. D. Thulasiral et al. (2003), the majority of refractive error people should have their sight restored by spectacles, but only a few of them have access to eye examinations and affordable for corrections. The balance of people with uncorrected refractive error in developing country will likely has deteriorated eye sight and become permanent visual impaired. It may cause blindness to the person if his refractive error continues unattended.

In order to correct refractive error, myopes (refractive error people) need to endure with the physical encumbrance and the financial burden of spectacles throughout their lives in order to restore visual acuity. The need for optical correction in school myopes has significantly affected the social activities of millions of children during their productive age.

Undeniable that refractive error is known as the largest percentage of overall vision problems in the world but it also classified as the easiest visual impairments to be corrected and the most cost-efficient eye care interventions. The cost of the elimination of blindness and permanent visual impaired due to uncorrected refractive error are estimated

at US$5 per person in need of spectacles. The cost of providing eye care to people who are visually impaired because of uncorrected refractive error by year 2020 would be estimated at $1.5 billion dollars. Hence, the challenges of correcting refractive error of millions of people around the world are to find innovative ways to provide access to eye exams, consistent supply and financing of spectacles. (Kammerle Schneider, 2004)

Dr. Vivek Trivedi et al. (2006) established that there were about 70% of refractive error people in India who have refractive error are benefit greatly from wearing spectacles to correct refractive error. Hence, it is important to develop effective strategies to eliminate this easily treated visual impairment. Children are significantly warranted urgent action to correct their visual error by providing adequate spectacles because this would enhance his/her school and social participation and psycho social development. As the defective vision is an obstacle to learning process and are prone to accident. Children may lose confidence and become inactive in their learning activities due to they have uncorrected refractive error. In addition, wearing of spectacles helps to prevent further deterioration of visual impairment and irreversible damage to retina. Information, education and communication regarding refractive error is important to the people in health service centre, teachers, parents and even children themselves because all of these parties play important roles in prevention and early detection of refractive errors. These groups of people shall be educated to have knowledge and awareness of early detection of refractive errors.

Apparently, uncorrected refractive error may turn school-going children become visual disability in the world today. Nanthan Congdon et al. (2008) showed that about 43% to 78% of 15-year-old children suffer from refractive error among secondary-school students in China. More surprisingly is that about 60% to 70% of refractive error children in Chile and China were uncorrected by spectacles while about 25% of Australia children who need spectacles also do not have them. This shows that there is many refractive error people are not getting correction for their visual impairment. Hence, it is better to prevent refractive error rather than seek for correction.

In fact, three major races in Malaysia such as Malays, Chinese and Indians have almost similar genetic make-up compared with Malays, Chinese and Indians in Singapore. However, Seang-Mei Saw et al. (2006) found out that the ethnicity-specific prevalence of myopia in Singapore Malays, Chinese and Indians are higher than that in Malaysian Malays, Chinese and Indians. Based on history, Chinese in Singapore and Malaysia were migrated from the same localities in South China and Indians in Singapore and Malaysia were migrated primarily from South India and Sri Lanka. Majority of the Chinese and the Indian families have lived for decade after migration and the Malays are native to Singapore and Malaysia. This shows that the environment may be a contributing factor that leads to higher myopia rates in Singapore. Ethnic composition in Malaysia population is estimated at 71.1% Malay, 16.3% Chinese, 8.7% Indian and 4.0% of other ethnicity. However, the prevalence of myopia in Malaysian Malays is 9.2%, Malaysian Chinese 30.9% and Malaysian Indians 12.5%. Hence, Malaysia Chinese is identified as the race that has the highest prevalence of refractive error.

In conclusion, the above phenomenon highlighted a troubling health issue about the prevalence of refractive error and urgent action warrants to correct this visual impairment. Nanthan Congdon et al. (2008) argued that positive attitudes and practices are required among the refractive error people or the prospective candidates of refractive error across all gender and educational levels so that during their consultation with eye care professional, they will have positive attitudes as well as allaying fear of wearing spectacle for visual correction is required. They should be educated on usefulness of wearing spectacles to correct refractive error, emphasizing positive attitudes and practices to prevent prevalence of refractive error and eliminating unfounded fear of spectacles during consultations from professional if having refractive error problem to avoid deterioration of refractive error.

1.3 Problem Statement

Malaysia Chinese is defined to have the highest prevalence of refractive error among all races in Malaysia. The ophthalmology management of Chinese primary school children in Malaysia has become a social issue due to the refractive error rate in this race is growing in Malaysia population especially in childhood. A study on the prevalence of refractive error and visual impairment in school-age children in Gombak District, a suburban area near Kuala Lumpur city, was carried out in 2005 and found that more than half of those with refractive error who needed corrective spectacles were without them. Refractive error in school-age children in urban Gombak District was mostly caused by myopia, with a particularly high prevalence among children of Chinese ethnicity. (Pik-Pin Goh et al., 2005)

Myopia is the most common type of refractive error among children. The costs of correction for myopia with spectacles, contact lens or laser medical treatment in optometry and ophthalmology centers have amounted to billions of dollars. Therefore, understanding the negative impacts of refractive error and underlying factors contribute to refractive error are important to reduce the prevalence of refractive errors in Malaysia. The prevalence of myopia in Malaysia is consisting of 9.2% Malaysian Malays, 30.9% Malaysian Chinese and 12.5% Malaysian Indians. Within Asia, the prevalence of myopia is recorded the highest in urban Chinese populations such as in Hong Kong, Taiwan, Singapore and Southern China while the lowest in non-Chinese rural populations such as Nepal and India. The possible risk factors inducing refractive error among Chinese children in urban area are significant for society awareness. The refractive error issue will become a future social illness if the prevalence of refractive error keeps increasing and not under control. Hence, it is crucial to identify the possible underlying factors which contribute to refractive error. By knowing the possible underlying factors, prevention or avoidance of these factors may reduce the prevalence of refractive error especially young age children. Hence, the community shall be given the information and education in prevention and early detection of refractory errors especially myopes themselves should even know more in details about how to take care of their eyes in prevent deterioration of their eye sight.

Thus this study is conducted to identify the positive risk factors which significantly related to refractive error among Chinese children in Penang, Malaysia.

1.4 Research Objectives

Therefore, this study attempts to accomplish six main objectives as follow:

1. To determine whether there is relationship between eating habit and refractive error
2. To determine whether there is relationship between genetic traits and refractive error
3. To determine whether there is relationship between lifestyle and refractive error
4. To determine whether there is relationship between personal achievement and refractive error
5. To determine whether there is relationship between machine dependence and refractive error
6. To investigate whether gender and age moderate the relationship between possible risk factors and refractive error.

1.5 Research Questions

This study tries to answer the following research questions to achieve the above objectives:

1. What is the relationship between eating habit and refractive error?
2. What is the relationship between genetic traits and refractive error?
3. What is the relationship between lifestyle and refractive error?
4. What is the relationship between personal achievement and refractive error?
5. What is the relationship between machine dependence and refractive error?
6. Are gender and age moderating the relationships between the possible risk factors and refractive error?

1.6 Significance of the Study

This study is developed for community to understand possible risk factors which related to refractive error so that the increase of prevalence of refractive error may be controlled. This study's objective is to promote prevention of refractive error and avoidance of refractive error deterioration among children through self-awareness of negative impact in refractive error and adopting self-regulatory strategies. We discuss this study's theoretical framework based on the social cognitive theory- self-efficacy in health behaviors. Health behaviors dependent on one's level of perceived self-efficacy because self-efficacy is cognitions that determine whether health behavior change will be initiated. The children improved self-perceptions of refractive error, perceived benefits in the performance of self-efficacy and move forward to the action change. This study helps children benefit from educational interventions that promote self-awareness and self-efficacy of eye health care.

This study will make contributions to children, parents and community by providing useful information to reduce prevalence of refractive error. This study will determine the possible risk factors which related to refractive error in terms of environment aspect and non environment aspects. The study will help them to determine and avoid these possible risk factors which may induce refractive error. The community must understand that this information is important to alert and to make awareness among them because uncorrected refractive error has become the leading cause of visual disability among school-age children of European, South Asian and East Asian. Although refractive error can be corrected with suitable spectacles to improve the children's school

and social participation and psycho social development, it is better to prevent refractive error because myopes will need to endure with the physical encumbrance and the financial burden of spectacles throughout their lives.

1.7 Organization of the Remaining Chapters

This study is structured in five chapters. The first chapter provides an introduction as well as an overview of this study. The second chapter presents the review of literature that highlights the findings in previous research studies undertaken in relation to refractive error, theoretical framework and the hypotheses development. Chapter three will illustrate the data and variables in term of research design, unit of analysis, sample collection, measurement of variables, the method of data analysis and expected outcome. Chapter four analyzes the results of finding, focusing on statistical analysis, descriptive statistic, binary logistic analysis and discriminant analysis and comparison between both analyses. Lastly, chapter five will present the discussion on overall findings, implications of the study, limitation of the study, as well as suggestion for future research and conclusions.

Chapter 2 LITERATURE REVIEW

2.1 Introduction

This chapter will present the previous literature that has been undertaken. As such, this chapter will give an overview of literature on the prevalence of refractive error; the influence of eating habits, genetic trait, lifestyle, personal achievement and machine dependence to refractive error. The theoretical framework and the hypothesis development will be presented in the end of this chapter.

2.2 Social cognitive theory- self-efficacy in health behavior

Self-efficacy belief provides the foundation for human motivation, well-being and personal accomplishment. This is because people need to believe that their actions can produce healthy eyes as outcomes which they desire so that they have incentive to act or to persevere in facing any difficulties. From this theoretical perspective, human functioning is viewed as the product of a dynamic interplay of personal, behavioral and environmental influences.

Health behaviors such as diet habit, non-smoking, physical exercise, dieting, condom use, dental hygiene, seat belt use, or breast self-examination are, among others, dependent on one's level of perceived self-efficacy. Self-efficacy beliefs are cognitions that determine whether health behavior change will be initiated.(Beth T. Stalvey et al., 2003) People's awareness to correct their faulty self-beliefs and habit (personal factors), improve their self-regulatory practices (behavior)and alter the surrounding structures (environmental factors) in order to have a better understanding in refractive error and its

negative impacts. It is because human are viewed as self-organizing, proactive, self-reflecting and self-regulating rather than reactive organisms which shaped and shepherded by environmental forces. Firstly, myopes need to realize his personal eye care condition and understand the underlying factors which involved in causing refractive error. Then, myopes must decide upon actions taken to prevent or correct his refractive error as soon. (Frank Pajares, 1996)

2.3 Types of refractive error

There are basically three types of refractive errors that affecting children's eyes such as (1) Myopia (near-sighted) - this is a condition where the distance vision is blurred but the person still usually can see well for reading or other near sighted tasks. This occurs most often in school-age children, although occasionally younger children can be affected, (2) Hyperopia (far-sighted) – most children are normally far-sighted early in life and need no treatment for this because they can use their own focusing muscles to provide clear vision for both distant and near vision and (3) Astigmatism – caused by a difference in the surface curve of eye. Instead of being shaped like a perfect sphere, the eye is shaped with a greater curve in one axis. If a person has a significant astigmatism, fine details which seen may look blurred or distorted. (American Association for Pediatric Ophthalmology and Strabismus, 2010)

2.4 Treatment of refractive error

Eye is one of the most sensitive and complex organs in human body. It includes a transparent lens that helps to focus light on retina and send signal to human brain for

visual ability. Refractive error is an inaccuracy of focusing the light by eyes and a frequent reason for reduced visual acuity. Refractive error is disorder that results blurred image of the person but it is not an eye disease. A refractive error person needs external accessory to help rectify the error of light bend in his eye to restore visual acuity. The external accessory is to manipulate the light bend in eye to focus accurately on retina for obtaining clear and sharp image.

Wearing spectacles is an easy method to correct refractive errors by focusing the error of light on the retina and obtain clear image. It can also help to protect eyes from harmful light rays such as ultraviolet (UV) light rays. A special lens coating that screens out UV light is available in ophthalmology centers. Spectacles or goggles made of protective lens material (polycarbonate) should be used for sports or in all hazardous activities. All children and adults who have poor eye sights should wear protective polycarbonate lenses at all times to protect their eyes. (Kammerle Schneider, 2004)

In conclusion, significant visual impairment due to refractive error was found among school-age children living in a rural district of western India. Most of the refractive error can be easily corrected with spectacles and should be taken action when early detection because refractive error has detrimental impact on education and development in a child's life. Cost-effective strategies to eliminate this easily treatable cause of visual impairment are warranted. (Dr. Vivek Trivedi & Dr. Sandip Zalawadiya et al, 2006)

2.5 Prevalence of refractive error

Visual impairment because of uncorrected refractive error is being recognized globally as an avoidable visual disability. This recognition is evidenced by its inclusion in the priority areas of Vision 2020: The Right to Sight— a global initiative launched by an alliance of non-governmental organizations and World Health Organization (WHO). In addressing the widespread need for population-based data on childhood refractive error, the Refractive Error Study in Children (RESC) protocol was developed to assess the prevalence of visual impairment and refractive error in children among different ethnic origins and cultural settings. Eight RESC surveys were conducted in Nepal, China, Chile, India, South Africa and Malaysia between year 1998 and 2003. (Solange et al., 2008)

The aim of "Vision 2020 - the Right to Sight" is to eliminate needless blindness by the year 2020. Refractive error can be simply diagnosed, measured and corrected with spectacle and provision of spectacles is extremely cost-effective in reducing visual impairment. The lack of spectacle provision in eye care services in underserved communities has significant negative consequences in terms of lost educational and employment opportunities which impact quality of life and lost economy for individual, family and society.

Within Asia, the prevalence of myopia is the highest in urban Chinese populations such as Hong Kong, Taiwan, Singapore and Southern China and the lowest in non-Chinese rural populations such as Nepal and India. The differences in myopia rates may be attributed to variations in genetic susceptibility or environmental lifestyles. It has been