

Relationship of the Incidence of Myopia in Adolescents with Family History

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RELATIONSHIP OF THE INCIDENCE OF MYOPIA IN ADOLESCENTS WITH FAMILY HISTORY

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Abstract

The shadow of the far away object will be focused in front of the retina known as myopia. Genetic and environment are the risk factors of myopia. The aim of this study is to analyze the relationship of the myopia incidence in adolescents with parents myopia history.

This study was a case-control study design. Samples were selected using a random sampling technique. The study was carried out at Junior High School 1 Padang Panjang from March to July 2018. Seventy students were included in this study, consisting of 35 students with myopia and 35 students with emmetropia. The samples were grouped into two groups; myopia group which used glasses, and control group with normal vision. The parent histories were taken by using the questionnaire. Chi square test was carried out to analyze the data.

In this study, 20% of myopia groups having parents history of myopia, and 14% of control group having parents history of myopia, with p value = 0.314.

In this study myopia cases have not association with genetic family histories, other factors can be the influence of development of myopia in adolescents. Further studies are needed to explore other factors that influence for myopia incidence in adolescents that can be modified to reduce the incidence.

Keywords : Genetic, reading position, myopia

INTRODUCTION

Myopia is a refractive error in which the eyes are not able to refract light at one focus to see objects clearly, while the near objects that are clearly visible but objects that are far away are blurred. It occurs when the eyeball is too long, so if the light comes from an infinite distance, the image will fall in front of the retina. Myopia can also occur due to overly curved corneas or because of the length of eyeballs (Schiefer et al., 2016). In 2010, WHO estimated that 27% of the world's population had myopia and 2.8% of the world's population had high myopia. The incidence is expected to continue to increase to 33% in 2020 and 52% in 2050 (WHO, 2015).

Myopia has several causes, such as eyeball lengthening, environmental influences, and genetics. Environmental influences such as near work activities can also increase the axial length of the eyeball due to excessive extraocular muscle work and ciliary muscle contraction. Lack of outdoor activity is also a main environmental influence. World Health Organization (WHO) in 2015 reported, in East Asia due to the very intensive learning time of school, this condition accelerates the development and progression of myopia in children who have genetic factors. The Consortium for Refractive Errors and Myopia (CREAM) which is an international researchers team discovered twenty-four new genes that affect genetic myopia. Some of these genes are involved in nerve cell function, metabolism, and eye development (Verhoeven et al., 2013). A large number of chromosome localizations have been reported in high myopia, the *MYP1-MYP17* genes. These genes are related to the risk of a hereditary history of risk factors for myopia (Zhang et al., 2015).

Indonesia, a research shows that myopia more often begins to occur at the age of 13 (Fauziah et al., 2014). The age of the onset of myopia is included at the school age (5-15 years old) who are enrolled school or not (WHO, 2011). Parental history is an important factor associated with myopia that occurs in early adolescence (juvenile myopia). Research has been conducted on 366 students on 8th grade who participated in the Orinda Longitudinal Study of Myopia in Helsinki showed the risk factors for parental history are more influential than work activities. From 18.3% of students who had myopia, 32.9% of them with both parents who had myopia, 18.2% of them with one parent with myopia, and 6.3% of them who had parents without myopia histories (Mutti et al., 2002). A research reported the prevalence of myopia in school children aged 6-15 years in East Jakarta was 32,3% and risk factors for parental history have a greater influence on the incidence of myopia than environmental factors (Nora et al., 2010).

A public junior high school I, in Padang Panjang city is a high rank accreditation of national standard school. The students of this school have high innovation in learning and have long duration learning activity that force them to read a lot. The reading habit are one of the environmental risk factors that influence the incidence of myopia in this students. The aim of this study is to analyze relationship of the myopia incidence in adolescents with parents myopia history.

SUBJECT AND METHOD

This study is case control study design. The study was conducted on March to July 2019 at junior high school I in Padang Panjang, West Sumatra, Indonesia.

Population and Samples

The sample of this study was 70 students. Data obtained from questionnaire included general information and other data which required for this study. Visual acuity was measured by using Snellen chart. Samples were divided into 2 groups; 35 myopia students (myopia group) and 35 non-myopia students (control group). Myopia group was students who were using negative lenses. Students who had a 6/6 visual acuity and did not wear glasses were included in control group. Exclusion criteria were students who had different refractive abnormalities between the two eyes, had eye diseases such as cataracts, red eyes and had chronic diseases. Student glasses were examined whether negative or positive lenses. Visual acuity examination was performed using Snellen chart. Parents history obtained from a questionnaire. Dichotomous data coded 0 for parents without myopia and 1 for parents with myopia. This study approved by Ethics Committee of Research Faculty of Medicine Universitas Andalas, No: 251/KEP/FK/2019.

Data Analysis

Data were presented as frequency distribution of the studied variables. Chi square test was used to analyze a relationship between variables, with $p < 0.05$ was considered significantly.

RESULTS

In this study, most of samples age was between 14-15 years old. Samples characteristic as shown in Table 1.

Table 1. Samples characteristic.

Characteristics		Myopia		Control	
		f	%	f	%
Age (years old)	13-≤14	12	34,3	12	34,3

	>14-≤15	21	60	21	60
	>15-≤16	2	5,7	2	5,7
Total		35	100	35	100
Sex	Male	11	31,4	11	31,4
	Female	24	68,6	24	68,6
Total		35	100	35	100

The highest incidence of myopia is mild myopia which reached 80%, followed by moderate myopia, as shown in Table 2.

Table 2. Distribution of myopia degree of samples

Degrees of myopia	f	%
Mild	28	80
Moderate	7	20
Severe	0	0
Total	35	100

Only fourteen cases(40%)of myopia group had a parents history of myopia and from control group 28.5% as shown in in Table 3.

Table 3. Family history of myopia

Family History	Myopia		Control	
	f	%	f	%
Yes	14	40	10	28.5
No	21	60	25	71.5
Total	35	100	35	100

It was found that, relationship between the incidence of myopia of the samples with the parents myopia history is not significant with $p = 0.314$.

DISCUSSION

Students with myopia are mainly aged between 14 to 15 years old. This was obtained because most of the respondents came from 8th grade. The results of this study were in line with research by Fan et al in Hong Kong in 2004 which showed that there was a relationship between myopia and age, more than half of children aged over 11 years (54,52%) become myopia (Fan et al., 2004). Based on the classification of myopia based on the age of onset according to the American Optometric Association (AOA), myopia in the samples is youth-onset myopia, that is myopia that occurs at age <20 years (Goss et al., 1997).

In this study, it was found that there were more female students from each group than male students. This is consistent with research conducted in China that girls are significantly more likely to suffer from myopia than boys, and the prevalence of myopia in girls is 6.23% higher than boys (Li et al., 2017). The difference in the development of myopia in boys and girls is due to girls spending more time reading and doing near work activities, and relatively less outdoor activities (Yip et al., 2012). Mild myopia is the highest cases, and no severe myopia was found. This study is in line with research by Fan et al in Hong Kong stating that the incidence of mild myopia in school-aged children is higher than that of moderate myopia and severe myopia (Fan et al., 2004). Mild myopia is myopia with lenses size up to minus 3 diopters, moderate myopia which is between minus 3 diopters to minus 6 diopters, and severe myopia, myopia with lenses size of more than 6 diopters. This is consistent with the literature which states that a person exposed to continuous risk factors may eventually have mild myopia (Frederick, 2002).

Usually, it was found that myopia patients had family history. In this study, 60% of myopia samples do not have family history. It seems the samples have other dominant risk factors than genetic. It can be assumed such as lack of outdoor activities. In the other hand, A study reported that, there is a relationship between myopia in the parents with myopia in children. In a study conducted by the Singapore Cohort Study of Risk Factors for Myopia (SCORM) it was found that myopia in parents increases the axial length of the eyeball and the degree of myopia, where children with myopia in both parents have a longer axial eyeball length and higher degree of myopia compared to children who have myopia in one parent (Pan et al., 2012). In addition, research in Helsinki in grade 8 junior high school students showed that from 18.3% of students who had myopia, 32.9% had a history of both parents suffering from myopia, 18.2% had a history of one parent suffering from myopia, and 6.3% had no myopia in parents (Mutti et al., 2002). This study is in line with research conducted by Mutti which states that more myopia students have myopia parents compared to students who are not myopia, but the research by Mutti found that the value of $p = 0.001$ ($p < 0.05$) which shows that there is a significant relationship between myopia in parents with the incidence of myopia. Whereas in this study found there is no significant relationship between the myopia and family history. The result in this study consistent with Wulansari study (Wulansari et al., 2018).

Family history is one of the genetic risk factors that can increase the risk of myopia in children. Genes for the development of high myopia and myopia have been identified in studies of families and twins (Li and Zhang, 2017). There are studies that show that many mutations are reported to be related to the structure and metabolic constituents of the sclera extracellular matrix (Morgan et al., 2012). Sclera had structural changes including thinning, reduction in fibril diameter collagen, and fiber dysregulation which is the result of altered metabolism and ultimately leads to an increase in excessive axial length of the eyeball resulting in vision problems (McBrien, 2013).

Furthermore, there may be other factors that can be related to the incidence of myopia in these samples. Another risk factors obtain from questionnaire was an outdoor activities. Myopia samples who carry out outdoor activities less than 200 minutes per day in 14 samples compared to samples who were not myopia (12 samples). This is accordance with research conducted by Mutti in 2002 which stated that children with myopia spend less time outdoors activities, for example exercising (Mutti et al., 2002). Children who spend less than 200 minutes per day doing outdoor activities had risk of myopia (Wu et al., 2018). The increasing of intensity of light exposure outdoors will mediate dopamine release from the retina due to stimulation by sunlight which can reduce the axial lengthening of the eyeball. This is called the light-dopamine hypothesis (French et al., 2013).

Conclusion

In this study myopia case have not association with genetic family histories, other factors can be came influences development of myopia in adolescents. Further studies are need to explore other factor that influence for myopia incidence in adolescent that can be modified to reduced the incidence.

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CONFLICT OF INTEREST

There are no conflicts of interest to declare.(2017) that the search for health information used by the people is television, online media or credible website portal sites, and social media is sharing information from the group Whatsapp, LINE Group, and BBM Group.

The print media such as books, leaflets, posters, and print media were present continues to grow through creative ideas such as the calendar method is one source of information available to the public at Lubuk Buaya Primary Health Center Padang City. According to research Yulida (2018) that mothers get the information from the media about the health promot. In MR vaccine has an interest to participate than mothers who do not get the information. This is in line with research by Smith et al (2017) that need improvement in obtaining information about the vaccine by the public.

Providers also a source of information for the community, midwives, medical personnel in hospitals and health centers. Skills needed by health personnel when giving continuous medical information and provide advice to families includes communicating clearly and regularly, listening to every question and concern for family members, as well as providing advice to the family members of any public health needs (Friedman, 2014). For that health workers have an important role in providing information about immunization MR. According to research conducted by Nolna et al (2018) that one of the problems that led to parents not to immunize is bad manners and lack of health personnel immunization of health workers.

Socio-cultural relationship with childhood immunization at 9 months to 5 years.

Results of statistical test by using Chi-Square test showed the value of $p = 0.000$ ($p < 0.1$). Based on these results it can be concluded that there is a significant relationship between socio-cultural MR immunization in children aged 9 months to 5 years in Lubuk Buaya Primary Health Center Padang City. The results are consistent with international studies conducted Man (2017) in India that there is a high correlation between the culture in influencing child immunization. Based on international research Alshammari, majority of respondents (89.9%) know the recommended immunizations, encourage other parents to do the immunization, as well as the confidence and acceptance of the vaccine, vaccine-related perceptions of health benefits and ease of access to immunization, where it is a socio-cultural substance and impacts both parents in Saudi Arabia is working to immunize her child (Alshammari, 2018).

Cultural barriers related to the way of life and belief systems, differences in perception or point of view, the attitude of traditionalism prejudiced against new things, is problematic culture that affects the mother in immunization MR (Setiadi, 2013). In the study Mechanic explained that the underlying barriers to immunization MR is social influence certain culture of how people acquire and address information from sources they trust and do not trust, their own perspective as well as the type of information that they consider credible and relevant to their situation (Mechanic, 2002).

The times promote a change in culture. Culture that trust by a group will inevitably shift In this case the rejection of immunization will be through the process of diffusion (spread of culture) that give rise to conflict between groups who want change with groups that do not want change. What is needed here is social control in the community, which became a "whip" for the group with the same culture so that they can sort out, where appropriate culture which is not appropriate. It can be concluded that the granting or refusal of immunization in children because culture is a common thing in the social environment (Setiadi, 2013).

Residents live in a social reality that they create collectively, the emergence of thought would be a renewal in society enabling socio-cultural changes. Positive social change to encourage people to think ahead so as to the formation of a good social and cultural life and vice versa. One example of an impact on the status of immunization MR in children aged 9 months to 15 years. The existence of a good social culture where people tertuntut to think forward, also will push to familiar immunization in the community.

V. CONCLUSION

Based on the results of research on "Social relations and cultural resources to immunization Measles Rubella (MR) in Puskesmas Padang Lubuk Buaya in 2019", it can be concluded as follows:

1. MR Immunization frequency distribution in Lubuk Buaya Primary Health Center Padang City including public health problem because not yet reached the minimum target of national immunization is 95%
2. The frequency distribution obtained resources immunizing mothers with MR in Lubuk Buaya Primary Health Center Padang City in 2019 mostly include both categories. Better resources obtained by the mother the higher the mother's level of participation in the Measles Rubella immunization in children. Various sources of information obtained by the mother is out of print media, electronic media, and healthcare.
3. The frequency distribution of socio-cultural MR immunization in Puskesmas Padang Kota Lubuk Buaya mostly categorized as good and most of the other less well. Socio-cultural influence on participation MR mother in immunization depends on two different sides of the socio-cultural exposure that is positive or negative depending on the relevance of the social perception of the mother in the culture itself.

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