
Original Article

FACTORS RELATED TO THE INCIDENCE OF MYOPIA IN STUDENTS AT THE JUNIOR HIGH SCHOOL 2 IN MOJOKERTO CITY

Rini Kusumawardhany ^{1*}, Rifqy Dharianta ²

¹ Faculty of Medicine, University of Muhammadiyah Surabaya

² Junior High School 2, Mojokerto City

Correspondence:

Rini Kusumawar Dhany

Faculty of Medicine, University of Muhammadiyah Surabaya

e-mail: rininugroho@gmail.com

DOI: <https://doi.org/10.60050/lkh.v8i2.27>

ABSTRACT

Background: Factors related to myopia are close-range activities, such as reading, writing, using computers and gadgets. Myopia is also related to the environment, namely spending time outdoors and genetic factors.

Objective: The aim of this research was to show whether there is an influence between behavioral and genetic factors on the incidence of myopia in students at SMPN 2 Mojokerto City.

Method: The research method used in this research is the Cross-Sectional Study analytical method, namely research to identify through observation using a questionnaire conducted online. The sampling technique used was simple random sampling. The number of samples in this study was 165 children. Data were analyzed univariately and bivariate using the Chi-Square statistical test via SPSS version 24.

Results: The results of the study showed that all variables, namely length of use of devices (screen time) with p -value = 0.000, genetic factors of parents with p -value = 0.000, length of outdoor activities with p -value = 0.006, and length of sleep time with p -value = 0.000, showed a significant relationship to the incidence of myopia while position using a device with p -value = 0.239 does not show a significant relationship.

Conclusion: It is hoped that the results of this research can provide education to children so that myopia does not increase by regulating the duration of use of devices/laptops (screen time) in a day for close activities, increasing the time for outdoor activities and the amount of sleep a day.

Keywords: Myopia, Devices, Behavior.

INTRODUCTION

In 2020, the World Health Organization (WHO) estimates that the number of blind people in the world will double, approximately 80 - 90 million people, so steps need to be taken so that the world's population can avoid the problems of blindness and visual impairment and obtain good vision. normal. One of the causes of blindness is refractive errors. The most

obvious factors are those related to close-range activities, such as reading, writing, using gadgets and computers (Ilyas, 2017).

Apart from behavioral factors, myopia is also related to genetics. Children with myopic parents have a myopia prevalence of 32.9% in children with both myopic parents, whereas it is 18.2% in children with one myopic parent and less than 6.3% in children with parents without myopia (Arianti, 2013).

Myopia has a high prevalence in the world. In Asia 70-90%, Europe 30-40%, and America 10-20%. Specifically in Indonesia, the prevalence reached 22.1%. Meanwhile, in South Sulawesi, according to Basic Health Research (RISKESDAS), it is 11.4%. Myopia is one of the causes of decreased visual acuity in children aged 8-12 years. Between the ages of 13-19 years, when the body experiences rapid growth, myopia gets worse (Nisaussholihah, et al., 2020).

Based on the results of a survey conducted by researchers with several junior high school students in Mojokerto City, quite a lot of people suffer from myopia/nearsightedness, especially at SMPN 2 Mojokerto City, which has increased since the 2020 pandemic. Based on the description above, the researchers compiled this research.

METHODS

Study Design

The research method used is an analytical method with a cross-sectional approach.

Settings

This research was carried out from February to May 2024 at Junior High School 2 Mojokerto City.

Research Subject

The population in this study were all 9th grade students at Junior High School 2 Mojokerto City, totaling 289 students consisting of 137 boys and 152 girls. The sample size was determined using the formula proposed by Riyanto, with a sample of 165 children. The sampling technique used in carrying out this research was simple random sampling.

Instrument

The research instrument used was an online questionnaire owned by Primadiani & Rahmi (2017).

Data Collection

Collection is carried out online by submitting a request for research to Junior High School 2 Mojokerto City. After obtaining permission from Junior High School 2 Mojokerto City and obtaining student data to distribute the questionnaire online, the researchers began distributing the questionnaire via social media owned by the students. The researchers waited for the results to come in until a predetermined number of samples were obtained.

Data Analysis

Univariate analysis aims to explain or describe the characteristics of each research variable which produces a frequency and percentage distribution for each variable. Bivariate analysis is used on two independent variables and a dependent variable that is thought to be related or correlated. The influence between the 2 research variables in the form of a nominal scale and an ordinal scale was tested using the chi-square statistical test, at a significant level (p value) there is a relationship (meaningful) if the p value < 0.05 and there is no relationship if p > 0.05.

Ethical Consideration

The implementation of this research has received permission from Junior High School 2 Mojokerto City and the University of Muhammadiyah Surabaya.

RESULTS

Analysis of the distribution of the variables studied can be seen in table 1 where based on gender, it shows that the majority are male, namely 87 people (52.1%), and the minority are female, namely 80 people (47.9%) of the 167 respondents aged 14-15 years. Table 2 shows the research variables that of the 167 respondents, 46 children suffered from myopia (27.5%) and 121 (72.5%) children did not suffer from myopia. Based on the length of time they used the device, the number of respondents with a duration of ≥ 6 hours was 124 (74.2%) children, while those with a duration of < 6 hours were 43 (25.8%). Respondents who were at low risk according to the duration of gadget use < 6 hours included 3 (7.0%) who suffered from myopia and 40 (93.0%) who did not suffer from myopia. The results of the analysis using C-Square analysis showed that there was an influence of prolonged use of gadgets on the occurrence of myopia (p -value = 0.000).

The next variable is the influence of position when using a device or laptop on the occurrence of myopia at Junior High School 2 Mojokerto City. Based on the table, it can be seen that of the 67 respondents who were at low risk in a sitting position, 40 (59.7%) suffered from myopia and 27 (40.3%) did not suffer from myopia. Respondents at high risk according to lying position included 35 (35%) who suffered from myopia and 65 (65%) who did not suffer from myopia. The results of the analysis using C-Square analysis showed that the influence of the position of using the device on the occurrence of myopia was not significant (p -value = 0.239).

Variable influence of hereditary/genetic history on the occurrence of myopia at Junior High School 2 Mojokerto City. Based on the table, it can be seen that of the 104 respondents who had a family/genetic history of myopia, 32 (30.8%) suffered from myopia and 72 (69.2%) did not suffer from myopia. There were 63 respondents who did not have a family/genetic history of myopia, of which 3 (4.9%) suffered from myopia and 60 (95.1%) students did not suffer from myopia. The results of the analysis using C-Square analysis showed that there was an influence of genetic history on the occurrence of myopia (p -value = 0.000).

The variable influence of the length of sleep time in one day on the occurrence of myopia can be seen in table 2 that of the 77 respondents who were at high risk with less than 7 hours of sleep, 37 (48%) suffered from myopia and 40 (52%) did not suffer from myopia. Respondents who were at low risk according to the length of laptop use of more than 7 hours included 8 (9%) who suffered from myopia and 82 (91%) who did not suffer from myopia. The results of the analysis using C-Square analysis showed that there was an influence of the length of laptop use on the occurrence of myopia (p -value = 0.006).

The last variable is the total outdoor activities of more than 15 hours in one week with the occurrence of myopia at Junior High School 2 Mojokerto City. Based on the table, it can be seen that of the 107 respondents who had a high risk of total outdoor activities of less than 15 hours, 28 (26.2%) suffered from myopia and 79 (73.8%) did not suffer from myopia. Respondents who had a low risk of outdoor activities for more than 15 hours included 7 (11.7%) who suffered from myopia and 53 (88.3%) who did not suffer from myopia. The

results of the analysis using C-Square analysis showed that there was an influence of the duration of outdoor activities on the occurrence of myopia (p -value = 0.036).

DISCUSSION

Based on the research results, the p -value was 0.000 ($p > 0.05$), indicating that there is an influence of genetic/hereditary factors on the occurrence of myopia at SM Junior High School 2 Mojokerto City. Genetic factors can pass on the trait of myopia to offspring, either in an autosomal dominant or autosomal recessive manner (genetic disorders inherited from parents to their children and diseases inherited from parents due to infection by their children). Sex-linked impairment is very rare, usually occurring in myopia associated with other eye diseases or systemic diseases. In the oriental race, the symptoms of myopia are more likely to be inherited in an autosomal recessive manner. The results of this research are in accordance with the results of several studies, including research on the relationship between length of use and viewing distance of gadgets and visual acuity in elementary school children, which states that there is an influence between gadget use and the incidence of myopia.

Using gadgets for a long period of time causes problems related to discomfort and various other eye complaints, namely asthenopia. When looking at a device screen for a long time it can increase the pressure on the eye muscles during the accommodation process for seeing at close range. For a long time, our eyes look at the device screen continuously resulting in a decrease in the frequency of blinking which can cause the eyes to experience excessive evaporation so that the eyes become dry. Tears have a very important function and serve to improve sharp vision, clean dirt that enters the eyes from the atmosphere, nutrients, namely glucose, electrolytes, enzymes, proteins and contain antibacterial and antibodies. If the eyes lack tears, it can cause the eyes to lack nutrients and oxygen. Over a long period of time, conditions like this can cause permanent visual impairment or myopia. Someone who does excessive near-distance activities may experience false myopia or pseudo myopia. Their blurred distance vision is more caused by using their eyes to focus excessively. After doing close-range activities for a long time, the eyes do not refocus to see clearly from a distance. These symptoms are usually temporary and the vision will become clear after a few minutes or rest. However, prolonged and constant use of the near vision eye can cause permanent reduction in distance vision or also known as Myopia.

The results of statistical tests using C-Square analysis showed that the value of the length of use of the device was p -value = 0.000, indicating that there was an influence of the time of use of the device on the incidence of Myopia. The results of this study are in accordance with research which states that myopia will begin to appear when operating a computer for at least 4 hours a day, and is mostly suffered by people who work with close vision for 8-10 hours a day. A study at Senior High School of Muhammadiyah 1 Pekajangan Pekalongan stated that the incidence of myopia was 43.8%, where students who used gadgets for > 6 hours had a risk of developing myopia of 9.733 times compared to students who used gadgets for ≤ 6 hours (p -value 0.001). These results are in line with many studies that have been conducted. Close activity for a long period of time can cause the eyes to accommodate continuously. Several studies have proven that continuously increasing accommodation power causes the eyes to become myopic.

Another research which is a quantitative descriptive study with a research population of students at Elementary School 10 Salatiga. The research variables studied were the duration of use of the device, body position when using the device, use when the light was dim, use when there was no light and eye health conditions. The results of the study stated that only the distance variable had a statistically significant influence on the incidence of myopia, while the variables of body position, duration of use, and room lighting did not have a significant influence.

CONCLUSION

Based on the results of research on factors related to the incidence of myopia in SMPN 2 Mojokerto City, it was concluded that there is an influence from the duration of use of gadgets/laptops (screen time) in a day, genetic factors from both parents who wear minus or cylindrical glasses, the length of sleep time per day and the total duration of 1 week of outdoor activities, on the incidence of myopia at SMPN 2 Mojokerto City. For the influence of the position of using the device on the occurrence of myopia, no significant relationship was found.

SUGGESTION

It is recommended to take precautions so that existing myopia does not get worse by changing habits that influence the progression of myopia, such as adjusting the duration of device/laptop use (screen time) in a day for short-distance activities, increasing the time for outdoor activities and the amount of sleep a day.

LIMITATION

There are no limitations in carrying out this research.

REFERENCES

- Arianti, M. P. (2013). Hubungan antara Riwayat Miopia di Keluarga dan Lama Aktivitas Jarak Dekat dengan Miopia pada Mahasiswa Pspd Untan Angkatan 2010-2012. *Jurnal Mahasiswa PSPD FK Universitas Tanjungpura*, 3(1).
- Bawelle, C. F., Lintong, F., & Rumampuk, J. (2016). Hubungan penggunaan smartphone dengan fungsi penglihatan pada mahasiswa Fakultas Kedokteran Universitas Sam Ratulangi Manado angkatan 2016. *eBiomedik*, 4(2).
- Chusna, P. A. (2017). Pengaruh media gadget pada perkembangan karakter anak. *Dinamika Penelitian: Media Komunikasi Penelitian Sosial Keagamaan*, 17(2), 315-330.
- Febriyani, S., Widhowati, S. S., & Purnomo, I. (2023). the relationship between gadget use and the incidence of myopia among high school students during online learning. *Indonesian Journal of Community Health Nursing*, 8(2), 84-92. DOI: <https://doi.org/10.20473/ijchn.v8i2.45608>
- Fitri, T. I., & Suprayitno, S. (2017). Hubungan lama penggunaan dan jarak pandang gadget dengan ketajaman penglihatan pada anak sekolah dasar kelas 2 dan 3 di SDN 027 Kota Samarinda.
- Ilyas, S. (2017). Ilmu Penyakit Mata, 5 ed. Jakarta: Badan penerbit FKUI.
- Navarona, A. I., & Mahawati, E. (2016). Hubungan antara Praktek Unsafe Action dalam penggunaan gadget dengan keluhan subyektif gangguan kesehatan mata pada murid Sekolah Dasar Islam Tunas Harapan tahun 2016. Retrieved October, 31, 2017.
- Nissausholihah, Nadia, Faradis, R & Roesbiantoro, Andi & Sajid Muhammad, David &

- Hotimah, Masdan & Salim, Hotimah, Biokimia & Islam, Jurnal. (2020). Pengaruh Penggunaan Gadget Terhadap Kejadian Miopia Pada Anak Usia Sekolah (4-17 Tahun) Di Poli Mata Rumah Sakit Islam Jemursari Surabaya. *Jurnal Kesehatan Islam : Islamic Health Journal*. 9. 55-59. DOI: <https://doi.org/10.33474/jki.v9i2.8872>.
- Pangemanan, J. M., Saerang, J. S. M., & Rares, L. M. (2014). HUBUNGAN LAMANYA WAKTU PENGGUNAAN TABLET COMPUTER DENGAN KELUHAN PENGLIHATAN PADA ANAK SEKOLAH DI SMP Kr. EBEN HEAZER 2 MANADO. *e-CliniC*, 2(2).
- Primadiani, I. S. & Rahmi, F. L. (2017). Faktor-faktor yang mempengaruhi progresivitas myopia pada mahasiswa kedokteran. *Jurnal Kedokteran Diponegoro*, 6 (4).
- Rudhiati, F., Apriany, D., & Hardianti, N. (2015). Hubungan durasi bermain video game dengan ketajaman penglihatan anak usia sekolah. *Jurnal Skolastik Keperawatan*, 1(2), 12-17.