



Characteristics of Junior High School Students with Refractive Errors: Descriptive Data on Nutritional Knowledge and Gadget Usage

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Abstract. Visual impairment, predominantly due to refractive errors like myopia, is a pressing global health concern with notable prevalence in Indonesia. Such errors are frequently linked to excessive gadget usage among students. This study sought to examine the presence of refractive errors in junior high school students and evaluate their understanding of nutrition and patterns of gadget use. Using a quantitative descriptive method, the research was conducted in a Junior High School in Kendari city, involving 101 students across grades 7 to 9. Data collection entailed eye refractive tests and questionnaires on nutritional knowledge and gadget usage patterns. Results indicated that 52.4% of participants had refractive errors. A significant portion of respondents used gadgets from a distance of less than 30 cm, and 84.5% engaged in excessive gadget use, defined as more than one continuous hour. In terms of nutrition, 51.5% were aware of the importance of a varied diet, emphasizing fruits and vegetables laden with eye-supporting vitamins and minerals. Approximately 65% believed in the necessity of a diverse daily diet. These insights highlight the urgent need to enhance awareness of the detriments of excessive gadget use and the role of nutrition in eye health. The findings form a foundational basis for future preventative strategies and behavioral interventions. Emphasizing regular eye examinations, responsible gadget use, and a balanced diet is imperative for safeguarding the ocular health of schoolchildren.

Keywords: Srefractive errors, gadget usage, nutritional knowledge, student, eye health

1. Introduction

Refractive errors are a major global health concern with escalating prevalence in countries such as China, India, Pakistan, Indonesia, and the United States. Uncorrected refractive errors are the primary cause of visual impairment globally, followed by cataracts and Age-related Macular Degeneration (AMD). Conversely, in terms of blindness, cataracts lead then uncorrected refractive errors and glaucoma. Many of these conditions are preventable, especially if identified early, ideally during childhood and adolescence. Thus, detecting refractive errors early is pivotal for averting severe vision issues in adulthood [1], [2].

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Refractive errors manifest as reduced visual acuity, occurring when the eyes cannot precisely focus an image, resulting in blurred vision. A sharp image fails to form on the retina due to an imbalance in the eye's visual system, causing the composed image to appear blurry. The refracted light doesn't correctly align on the retina, but either lies in front of or behind it, failing to converge on a singular point. These errors represent one of the primary treatable causes of blindness and visual impairment across various age groups and genders [3].

School-aged children are notably impacted by refractive errors, which, fortunately, are often correctable. It's advised to evaluate visual acuity before school entry, as simple corrections like eyeglasses can address these issues. Timely treatment can prevent conditions such as amblyopia (lazy eye) and strabismus (crossed eyes). Myopia, or nearsightedness, is particularly prevalent among children and young adults, with its diagnosis and classification based on specific refraction degrees [4].

Factors like genetics, near-work activities, and excessive gadget use influence the onset and progression of refractive errors. The allure of digital games and internet access makes gadgets irresistible to many, especially children and adolescents. However, unmonitored and excessive use can amplify the risk of conditions like myopia. The COVID-19 pandemic further exacerbated gadget screen time due to remote learning, potentially accelerating myopia progression [5], [6].

Approximately 13 million children (ages 5-15) in Southeast Asia experience refractive errors, which can impede their daily activities and developmental milestones. If unchecked, these errors can lead to complications with lasting impacts [7]. Some studies suggest gender-based discrepancies in refractive error rates, indicating a higher incidence in males. Factors like genetics, visual habits, outdoor activities, and dietary habits—especially whole grain consumption—play roles in myopia onset and progression in children and adolescents [8].

This study is situated in SMP Negeri 1 Kota Kendari, Southeast Sulawesi, a prominent school in a gadget-prevalent, densely populated urban setting. The objective is twofold: to discern the relationship between refractive errors and nutritional habits and to evaluate the association between refractive errors and gadget use frequency. Through this exploration, the study aims to illuminate potential intervention and prevention avenues.

2. Methods

This study employs a quantitative descriptive research approach. The research will be conducted at SMP Negeri 1 Kota Kendari from May to August 2023. Participants will be selected using a stratified proportional random sampling technique. The study will encompass students from grades 7-9 at SMP Negeri 1 Kota Kendari who have provided informed consent. Students who withhold consent or those with health conditions precluding accurate eye refractive measurements will be excluded. The study aims to involve 101 students. This sample size was ascertained using the Slovin formula, incorporating a 0.1 margin of error. Researchers have developed questionnaires to gauge nutritional knowledge and gadget usage frequency for this study. Collected data will be

processed and analyzed using SPSS (Statistical Package for the Social Sciences). Descriptive statistics will elucidate refractive errors, nutritional knowledge, and gadget usage patterns.

3. Results

Table 1. Refractive error, gadget usage, and nutritional knowledge in junior high school at 1 Junior High School, Kendari City

Variable	n	Percentage (%)
Refractive error		
Yes	54	52,4
No	49	47,6
Gadget Usage		
Gadget use <30 cm	66	64,1
Gadget use >=30 cm	37	35,9
Excessive frequency	87	84,5
Medium frequency	116	15,5
Nutritional Knowledge		
Good	66	64,1
Poor	37	35,9
Diverse Consumption		
Ya	53	51,5
No	50	48,5
Vegetable Consumption Everyday		
Yes	53	51,5
No	50	48,5
Food Consumption Everyday		
Yes	55	53,4
No	48	46,6
Attitudes Towards Diverse Food Consumption		
Agreed	67	65
Strongly Agreed	13	12,6
Disagreed	22	21,4
Strongly Disagreed	1	1

3.1 Refractive Errors

Out of a total of 103 respondents, 54 individuals (52.4%) had refractive errors, while 49 individuals (47.6%) did not have any refractive errors. This indicates that more than

half of the students experience refractive errors. Refractive errors can encompass various vision problems such as myopia, hypermetropia, or astigmatism. This underscores the importance of early detection and preventive measures for vision problems in the adolescent population.

3.2 Gadget Usage Patterns

Regarding gadget usage patterns, 66 individuals (64.1%) reported using gadgets at a distance of less than 30 cm, while 37 individuals (35.9%) did not report this behavior. In terms of the frequency of gadget usage, 87 individuals (84.5%) reported excessive gadget usage, while 16 individuals (15.5%) reported moderate gadget usage. Furthermore, in terms of the duration of gadget usage in a single session, 87 individuals (84.5%) reported using gadgets for more than 1 hour continuously. In comparison, 16 individuals (15.5%) reported using devices for less than 1 hour continuously. These results highlight severe concerns about gadget usage behavior that may harm students' eye health.

3.3 Nutritional Knowledge

In terms of nutritional knowledge, 66 individuals (64.1%) were categorized as having good dietary knowledge, while 37 individuals (35.9%) had less healthy knowledge. This indicates that the majority of students have a good understanding of crucial nutritional aspects for their health, such as diverse food consumption, daily vegetable intake, and daily fruit consumption. The majority of respondents, precisely 67 individuals (65.0%), agreed with the statement that one should consume diverse foods every day. Meanwhile, 13 individuals (12.6%) strongly agreed, 22 individuals (21.4%) somewhat compromised, and only one individual (1%) disagreed. These results illustrate a positive attitude toward diverse food consumption among students, which is an essential step towards a balanced diet and a healthy lifestyle.

The research findings offer a deeper understanding of the factors contributing to refractive errors in junior high school students, as well as their gadget usage patterns and nutritional knowledge. Recognizing the potential impact of excessive gadget usage on students' eyes and enhancing their nutritional knowledge are crucial steps in promoting eye health and overall well-being among students. This data can also serve as a foundation for developing improved health education programs in schools to support healthier lifestyles among adolescents.

4 Discussion

The findings of this research provide a comprehensive view of refractive errors, gadget usage, and nutritional knowledge among students of 1 Junior High School in Kendari City. This discussion delves into the implications and significance of these findings.

4.1 Refractive Errors

The prevalence of refractive errors among junior high school students in this study is noteworthy, with 52.4% of the respondents experiencing some form of refractive error. Refractive errors such as myopia, hypermetropia, and astigmatism are common causes of visual impairment and can significantly impact academic performance and quality of life. These results emphasize the importance of regular eye check-ups among students, as well as the need for educational programs to raise awareness about the significance of early detection and corrective measures. Moreover, the high prevalence of refractive errors highlights the potential role of genetic factors, environmental factors, and lifestyle choices in their development. Understanding the interplay of these factors can aid in designing effective prevention strategies and intervention programs for students at risk.

Refractive errors can affect a student's academic performance and quality of life, so it is essential to have regular eye exams and take corrective action if necessary. Refractive disorders such as myopia, hypermetropia, and astigmatism can affect the quality of a student's vision, which in turn can affect their academic performance. For example, if a student has difficulty seeing the blackboard or reading a textbook, this could impact their ability to learn and participate in class activities. In addition, undiagnosed or untreated refractive errors can cause headaches, eye fatigue, and other disorders that can interfere with students' concentration and learning. Apart from its impact on academic performance, refractive errors can also affect a student's quality of life. For example, students who have difficulty seeing may feel frustrated or anxious, which can impact their emotional well-being. They may also experience difficulty in participating in daily activities or sports, which can affect their physical and social well-being [9], [10].

4.2 Gadget Usage Patterns

The data reveals concerning patterns of gadget usage among students. Over 64% of the respondents reported using gadgets at a close range of less than 30 cm. This behavior, if sustained, could contribute to eye strain and other vision-related problems. Additionally, approximately 84.5% of students reported excessive gadget usage, with more than 87% using gadgets for over one hour continuously. These findings are alarming, as prolonged and close-up gadget usage has been associated with an increased risk of myopia in children and adolescents. The COVID-19 pandemic, which led to increased screen time due to online learning, may have exacerbated this issue. These results underscore the urgent need for educational initiatives that promote healthy gadget usage habits. School health programs should aim to educate students on maintaining an appropriate viewing distance, taking regular breaks, and using screens with proper lighting. Parents and guardians also play a pivotal role in monitoring and limiting gadget use, especially during the critical stages of development.

4.3 Nutritional Knowledge

The majority of students displayed a good understanding of nutritional concepts, including diverse food consumption, daily vegetable intake, and daily fruit consumption.

This indicates a positive aspect of students' health awareness and knowledge. A balanced and nutritious diet is essential for overall well-being, including eye health. Proper nutrition can reduce the risk of eye-related issues and support optimal visual function. However, it's essential to consider the practical translation of nutritional knowledge into actual behavior. While students may possess knowledge about healthy eating, the application of this knowledge in their daily lives is equally important. Future research could explore the correlation between nutritional knowledge and dietary practices among students to provide a more comprehensive understanding of their dietary behaviors.

The majority of students demonstrated a positive attitude toward diverse food consumption. This positive attitude aligns with the promotion of a balanced diet, which is not only essential for overall health but also crucial for maintaining good eye health. This positive attitude can be harnessed to encourage students to translate their knowledge of good nutrition into practical dietary habits. Excessive use of gadgets and at close range can worsen the risk of refractive and other disorders. Therefore, it is essential to educate students about healthy gadget usage patterns. Using gadgets such as smartphones, tablets and computers at close range can burden the eyes, which in turn can increase the risk of vision problems, including refractive errors such as myopia [5].

When looking at a gadget screen at close range, the eyes have to work harder to focus, which can cause eye fatigue. In addition, looking at a gadget screen at close range for long periods can reduce the frequency of blinking, which can dry out the eyes and cause discomfort. If this occurs chronically, it can affect eye health in the long term [11], [12]. There is also research that shows a link between using gadgets at close range and an increased risk of myopia or nearsightedness. Myopia occurs when the eye grows too long from front to back, causing light to be focused in front of the retina rather than directly on it. This can cause far vision to become blurry while near vision remains clear [6], [13].

A good understanding of nutrition is an essential key to choosing healthy foods. This is especially true for students, where healthy eating habits can support their overall health, including eye health [14], [15]. Foods rich in nutrients such as vitamins A, C, E, and minerals such as copper and zinc are very important for eye health. Omega-3 fatty acids, lutein, zeaxanthin, and other antioxidants can also help protect the eyes. Foods such as carrots, green leafy vegetables, fish, eggs, nuts, seeds and oranges are examples of foods that are good for eye health [16]. In addition, a healthy and balanced diet can also help prevent various other health problems, such as obesity, diabetes, and heart disease, all of which can have a negative impact on eye health [17], [18].

5. Conclusion

This study has shed light on critical aspects of eye health, gadget usage patterns, and nutritional knowledge among junior high school students in SMP Negeri 1 Kota Kendari. The prevalence of refractive errors, particularly myopia, is a significant concern, emphasizing the need for regular eye check-ups and early intervention. The high incidence of refractive errors among students could be attributed to a combination of genetic factors, lifestyle choices, and excessive gadget usage, which calls for multi-faceted approaches to address these issues. Excessive gadget usage at close range was an

other noteworthy finding, with a majority of students reporting detrimental gadget habits. This behavior poses a potential risk to eye health, mainly due to the COVID-19 pandemic, which increased screen time for students. Thus, immediate measures, including educational programs, are crucial to promote healthy gadget usage and limit adverse effects on vision. Conversely, the majority of students demonstrated good nutritional knowledge and a positive attitude toward diverse food consumption. This knowledge presents an opportunity for students to adopt healthier dietary habits and improve their overall well-being, including eye health.

Early Eye Health Screening: Schools should prioritize and facilitate regular eye health screening for students to detect refractive errors in their early stages. Timely correction of these errors through eyeglasses or other interventions can prevent long-term vision problems. Implement comprehensive health education programs that focus on the importance of eye health and the risks associated with excessive gadget usage. These programs should emphasize maintaining a proper viewing distance and taking regular breaks from screens.

Parents and guardians play a crucial role in monitoring and controlling gadget usage at home. They should be informed about the potential risks of excessive screen time and encouraged to establish gadget usage rules. Schools can consider screening students' nutritional habits to assess whether their knowledge translates into practical behavior. This would help identify students who might benefit from additional guidance on making healthier dietary choices. Schools should develop health promotion initiatives that encourage students to maintain a balanced and nutritious diet. These initiatives can include school lunches that provide a variety of healthy food options. Collaboration between schools, parents, eye health professionals, and nutritionists is essential to develop a holistic approach to student well-being. This interdisciplinary approach ensures that students receive comprehensive guidance and support in areas affecting their health.

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