



The Relationship Between Visual Acuity and Histology Practical Exam Results in Medical Students

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Abstract

Background: Visual acuity is the eye's ability to see and distinguish objects clearly at a certain distance, which can decrease if an object is too close to another object and can affect students' academic performance. Histology practicum is one of the main things medical students study, and involves the use of a microscope. The image on the microscope by the lens makes the eye work hard to focus so that it correlates with the sharpness of the student's vision. The aim of this study is to analyze the correlation between visual acuity and the outcomes of the histology practical examination. **Methods:** This study used a quantitative method with a cross-sectional design. The sample consisted of medical faculty students from Gorontalo State University in 2022. The data was collected from the histology department archive using purposive sampling. The data analysis included bivariate tests with correlation tests using the Spearman test. After conducting the normality test, it was found that the data was not normally distributed. This can lead to eye strain and make it hard to see properly. **Results:** Of the 40 students, 20 used glasses to improve visual acuity, while the other 20 did not use any aids. The correlation test on visual acuity and the practical examination scores in students found no significant difference, indicated by a $p\text{-value} = 0.701$ ($p > 0.05$). The correlation coefficient (r) on

practical examination scores and the Snellen decimal was 1.00 and -0.063, respectively. Conclusion: There is no relationship between visual acuity and the results of the histology practical exam of medical faculty students in 2022.

Keywords: Visual acuity, practical exam, histology.

1. Introduction

Medical students tend to read at close distances for extended periods due to the curriculum demands that require an in-depth understanding of complex and detailed material. The habit of close and prolonged reading is a risk factor that can lead to visual acuity problems and stimulate prolonged accommodation use. Accommodation is a mechanism in the eye that focuses images precisely on the retina by altering the lens structure, thereby changing the refractive power. Generally, the accommodation process begins when the eye observes an object about 5-6 meters away. The longer the accommodation lasts, the more tired the eye becomes, resulting in retinal blurring and unfocused vision [1] [2].

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Visual acuity or visus is the ability of the eye to see and distinguish objects clearly at a certain distance [3]. Visual acuity problems can occur when someone has difficulty seeing the most miniature objects without accommodation. Visual acuity decreases when an object is too close to another object [4]. If left unaddressed, mild visual acuity deterioration can lead to more severe visual issues over time, affecting students' academic performance. Unresolved visual acuity problems can impact academic achievement and social behavior [5,6]. A study conducted on medical students found the prevalence of myopia in Nepal, India, and Pakistan to be 64.81%, 52.78%, and 47%, respectively [7]. Research conducted on medical students at Universitas Negeri Gorontalo showed a myopia prevalence of 74.3% [8].

One of the fundamental learning subjects for medical students is Histology. Histology is the study of the microscopic and normal structure of body tissues. When using a microscope, the image produced by the objective lens falls precisely on the eyepiece lens's focus, causing the eyes to accommodate maximally. The demand for increased accommodation when viewing close visual targets can lead to accommodation system fatigue and visual acuity problems [9].

2. METHODS

This study used a method called quantitative research with a cross-sectional approach. It was carried out at the Faculty of Medicine, Gorontalo State University, between April and May 2024. The study focused on students at the Faculty of Medicine, Gorontalo State University, who was part of the biomedical block in 2022. The research included students who completed the practical learning process and the first biomedical histology exam. It also involved students who received the visual acuity test results through a provided link. The study did not include students who repeated Biomedical Block 1 or needed to be on time for the Biomedical Histology One practicum exam.

The study selected 42 participants using purposive sampling, which means they chose specific people who met certain criteria. The researchers used data from the archives of the histology department, including visual acuity measurements and 25-question biomedical histology practicum exam results. After organizing and coding the data, they used the Statistical Package for Social Sciences (SPSS) 25.0 for Windows program to analyze it with bivariate analysis. They used the Pearson correlation test to examine the relationship between two variables: the visual acuity measurement results and the biomedical histology practicum exam results among students at Gorontalo State University's medical faculty in 2022. The statistical test provides a p-value, and if it's 0.05 or less, it suggests a relationship between the two variables. If the p-value is above 0.05, it indicates no relationship between the variables.

3. RESULT AND DISCUSSION

The correlation test is the analytical test used to assess the relationship between the two variables. A normality test is first carried out to evaluate whether the data is normally distributed to determine the correlation test to be used. From the results of the normality test using the Shapiro-Wilk test on the research variables, a p-value = 0.00 ($p < 0.05$) was obtained so that the data was not normally distributed, so the Spearman correlation test was used to determine the correlation of variables in the study.

Table 1. Sample characteristics

Variable	N	%	VOD	VOS	practical exam score	Use of visual aids	
						Yes	No
Gender							
Male	11	27.5%				3	9
Median			0.83	1.00	28.00		
Min			0.08	0.08	16.00		
			1.00	1.00	64.00		

Max	29	72.5%				17	11
Female			0.33	0.33	36.00		
			0.08	0.08	12.00		
Median			1.00	1.66	68.00		
Min							
Max							
Total	40	100%				20	20

***Descriptive Test**

The table below shows information about the characteristics of the 40 respondents in the research. The respondents were chosen from the population based on specific criteria. Of the 40 respondents, 11 (27.5%) were male, and 29 (72.5%) were female. The characteristics assessed included visual acuity, Visus Oculi Dextra (VOD), and Visus Oculi Sinistra (VOS). The male respondents had median values of 0.83 for VOD and 1.00 for VOS, with minimum and maximum values of 0.08 and 1.00. The median and minimum values for the female respondents for VOD and VOS were 0.33 and 0.08, respectively. The maximum value for VOS was 1.66, higher than the maximum value for VOD, which was 1.00.

In addition, the percentage of the use of visual acuity aids in respondents using glasses and not using any aids was 20 people each (50%), with details of respondents using glasses more women (17 people), and most respondents not using aids were also women (11 people). Another characteristic assessed was the student's practical exam score taken at the first Biomedical Histology Practicum 1 exam at the Faculty of Medicine, Gorontalo State University, in 2022. The results showed that out of 40 respondents, the maximum and minimum exam scores were 68 and 12, respectively, obtained by female respondents.

Tabel 2. correlation test results

Variable	N	Correlation Coefficient (r)	p-value
Practical exam score	40	1.00	0.701*
Snellen decimal	40	-0.063	

***Spearman Rho test**

Table 2 shows that the histology practical exam scores with sharp eyesight results do not show a significant difference, as evidenced by the p-value = 0.701 ($p > 0.05$). This means that the value of visual acuity in students does not correlate with the results of histology practical examination scores. In addition, the correlation coefficient (r) obtained on the practical exam score variable is 1.00, and on the Snellen decimal, it is a negative correlation coefficient of -0.63.

Tabel 3. Non-parametric Test

	Use of vision aids	N	%	p-value
Practical exam	Yes	20	50%	

score	No	20	50%	0.765*
	Total	40	100%	

*Mann-Whitney test

Table 3 shows the results of the non-parametric test, namely the Mann-Whitney test conducted on variables with data on the use of aids to improve visual acuity ability on the results of practical test scores in students. A total of 20 people used aids in the form of glasses to help improve visual acuity, while the other 20 chose not to use any aids. From the test results that have been carried out, the p -value = 0.765 is obtained, which means that there is no significant difference in the use of aids with the results of practical exam scores, so there is no correlation in the test results ($p > 0.05$).

This study evaluated the sharp eyesight of 2022 medical students at the Faculty of Medicine, Gorontalo State University. In addition, the study also aims to determine the effect of visual acuity quality on histology practicum exam results as an indicator of student academic achievement. After conducting the Spearman Rho correlation test ($n = 40$), it was found that the quality of visual acuity of medical students of the medical faculty of Gorontalo State University differed from the results of the histology practical examination (p -value = 0.701). The results of this study are similar to studies conducted by Yahya (2018) related to the prevalence of visual acuity disorders and their impact on the academic performance of male medical students in Saudi Arabia; the results of this study state that visual acuity disorders do not affect the academic performance of male medical students in Saudi Arabia [10]. Until now, no further study has explicitly discussed the effect of visual acuity quality on histology practicum exam results in general medical students.

Different from the results of research conducted by Alvarez PC et al. (2020) regarding visual acuity on the academic performance of schoolchildren, which states that children with poor academic performance have worse visual health than children with good academic performance [11]. Similar research findings were conducted by Hopkins (2021) regarding the decline in visual acuity affecting academic performance [12]. Further research by Alamri (2022) states that visual impairment affects students' daily activities and academic performance, especially with myopia refractive error [13]. The mechanism of visual impairment affecting the practical examination results is still undefined. Still, it is suspected that students with poor vision reduce the interpretation of preparations under the microscope during the exam, thus affecting the final results of the student's practical examination [14].

However, the results of histology practicum exam scores in students are influenced by visual acuity and various factors including motivation, intellectual ability, learning methods, teaching resources, and facilities owned by the student [15]. Student learning outcomes are also influenced by the role of teachers and institutions in facilitating students. Teachers play a role in adjusting teaching methods to accommodate students, especially students with vision problems. In addition,

educational institutions are also obliged to provide facilities that support students, especially those with special needs or visual acuity.

The results of this study only partially represent the theory of the relationship between visual acuity and histology practical exam results in students. Limitations of this study include the small sample size and potential human error during the visual acuity examination, which may introduce bias. Therefore, further research with a larger sample size and more accurate visual acuity examinations by specialists is needed to obtain more precise study results.

4. CONCLUSION

The results of the research show that there is no significant difference, which, in this case, means that there is no relationship between visual acuity and the results of the histology practical examination of medical faculty students in 2022. Nevertheless, the results of the study, which showed that there was no significant difference in the results of the practicum exam with sharp eyesight of students, showed that the assessment of academic performance is not only measured by sharp eyesight but can also be assessed from several factors, including the quality of teachers, learning methods, motivation, and support facilities received by the student.

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