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Factors of Decreased Visual Acuity in Primary and Junior High School Students Aged 6-15 Years in the Working Area of Cimareme Community Health Center, West Bandung Regency

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Abstract

The issue of decreased visual acuity in children, especially in primary and junior high school ages, has not been well socialized. Many children and parents still lack understanding regarding the risk factors associated with daily activities that contribute to decreased visual acuity. This study is an analytical observational research using a cross-sectional approach. The research was conducted on all students from grade I to grade VI of SD Unggulan Al-Amin, totaling 266 individuals, and all students from grade VII to grade IX of SMP Unggulan Al-Amin, totaling 120 individuals. Data were collected through visual acuity examinations using the Snellen chart at 6 meters and interviews guided by a questionnaire. Data were analyzed using the chi-square test. Among the students of SD Unggulan Al-Amin, six factors were found to have a significant relationship with decreased visual acuity based on the chi-square test. These six factors are reading position (p=0.001), frequency of cellphone use (p=0.000), duration of gadget use (p=0.001), gadget usage position (p=0.040), distance while watching TV (p=0.046), and distance from eyes to cellphone screen (p=0.019). Among the students of SMP Unggulan Al-Amin, eight factors were found to have a significant relationship, including reading position (p=0.00), frequency of cellphone use (p=0.000), duration of gadget use (p=0.000), gadget usage position (p=0.000), frequency of TV watching (p=0.001), duration of TV watching (p=0.000), distance while watching TV (p=0.000), and distance from eyes to cellphone screen (p=0.000). Decreased visual acuity was experienced by 56.8% of students from SD Unggulan Al-Amin and 18.3% of students from SMP Unggulan Al-Amin. There is a significant relationship between risk factors and decreased visual acuity, including reading position, frequency of cellphone use, duration of gadget use, gadget usage position, frequency of TV watching, duration of TV watching, distance while watching TV, and distance from eyes to cellphone screen.

Introduction

School-age children are those who have started schooling, typically aged between 6 and 12 years old. During this period, there are numerous health issues that significantly impact a child's future quality of life. Common health problems among school-age children include poor implementation of Healthy and Clean Living Behaviors (HCLB), such as incorrect teeth brushing, improper handwashing, dental caries, worm infections, nutritional issues, and refractive errors or visual acuity disorders.

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Globally, approximately 2.2 billion people have either near-sightedness or far-sightedness issues. Among these cases, about 1 billion could be prevented or remain untreated. Moreover, 90% of those with untreated visual impairments or blindness reside in low- and middle-income countries (LMICs). Based on the World Health Organization (WHO), an estimated 285 million people worldwide suffer from visual impairments. Refractive errors (myopia, hyperopia, or astigmatism) account for 43%, cataracts without access to surgery for 33%, and glaucoma for 2% of these visual impairments.

Myopia has a high prevalence globally, with rates of 70-90% in Asia, 30-40% in Europe, and 10-20% in America. Specifically in Indonesia, its prevalence reaches 22.1%. Myopia is a leading cause of decreased visual acuity in children aged 8-12 years old. Between the ages of 13 and 19, when the body undergoes rapid growth, myopia tends to worsen. Myopia, also known as nearsightedness, occurs when parallel light rays from a distance are focused in front of the retina, causing clear vision for near objects but blurred vision for distant ones.

The risk factors for decreased visual acuity often go unnoticed and can arise from our daily activities. According to the Beijing Pediatric Eye study, the occurrence of decreased visual acuity results from the interaction between internal and external factors. Internal factors include familial history, while external factors encompass reading habits, gadget usage, and television viewing practices. Decreased visual acuity is commonly found in students who have habits of close reading, prolonged television watching with a short distance between the eyes and the TV screen, and extended periods of gadget use, particularly while lying down.

A study in Nigeria titled 'Prevalence of Visual Impairment among Primary and Secondary School Children in Delta State, Nigeria' showed a considerable prevalence of visual impairments among primary and secondary school children in Delta State. Uncorrected refractive errors were the most prevalent visual impairments among school children. Various socio-demographic and economic factors such as gender, age groups, parental education, parental occupation, and monthly income did not significantly correlate with visual impairments in this research. However, the study highlighted that students from lower socio-economic status spent longer hours studying in poorly lit and crowded rooms, which could affect eye development and refractive status over time. Increased visual impairments following improvements in socio-economic status, as indicated in this research, might be linked to increased indoor gaming and computer-related gadget use among children whose parents have higher monthly incomes. The study indicated that prolonged use of computers (laptops) and similar gadgets (smartphones) has been associated with significant visual impairments over the long term.

This study aims to determine the prevalence of decreased visual acuity among students at SD and SMP Unggulan Al-Amin in the village of Tanimulya, West Bandung Regency. The specific objectives include understanding the relationships between age, gender, family history of myopia, reading positions, frequency and duration of cellphone use, cellphone usage positions, frequency and duration of TV watching, distance from TV while watching, and the distance between the eyes and the cellphone screen in relation to decreased visual acuity.

Methods

This study is an analytical observational research with a cross-sectional approach conducted from August to November 2023. The research was carried out at SD Unggulan Al-Amin and SMP Unggulan Al-Amin, Tanimulya, West Bandung Regency. Total sampling was employed, where all members of the population were taken as samples. The population includes all students from grade I to grade VI in SD Unggulan Al-Amin and all students from grade VII to grade IX in SMP Unggulan Al-Amin. The samples that met the inclusion and exclusion criteria were as follows:

Inclusion Criteria; (1) Students of SD and SMP Unggulan Al-Amin attending school; (2) Students willing to participate as respondents; (3) Students aged 6 to 15 years old.

Exclusion Criteria; (1) Students who are absent from school due to illness or permission.

Instrumentation Of Research

Visual acuity is measured using observation methods employing the Snellen Chart. Students are seated upright parallel to the Snellen Chart at a distance of 6 meters, then asked to read the letters displayed on the chart alternately using their right and left eyes.

Other data such as age, gender, familial history, reading habits, gadget usage, and television viewing behaviors are measured through interview methods utilizing questionnaires filled out with the assistance of the students' parents. Research data are analyzed through univariate and bivariate analyses to determine the trend of decreased visual acuity occurrences among elementary and middle school students based on age, gender, familial history of myopia, reading positions, frequency and duration of cellphone usage, cellphone usage positions, frequency and duration of television watching, distance from the TV while watching, and the distance between the eyes and the cellphone screen concerning decreased visual acuity.

Results and Discussion

Univariate Analysis of Elementary School Unggulan Al-Amin Students

Table 1. Characteristics of respondents

Characteristics of respondents	Frequency	Percentage (%)
Age		
6 years old	17	6.4
7 years old	36	13.5
8 years old	54	20.3
9 years old	40	15.0
10 years old	48	18.0
11 years old	49	18.4
12 years old	22	8.3
Total	266	100.0
Gender		
Male	145	54.5
Female	121	45.5
Total	266	100.0
Visual acquity		
Normal	115	43.2
Decreased visual acuity	151	56.8
Total	266	100.0

Source: Primary Data 2023

In the table above, the total number of students from SD Unggulan Al-Amin who meet the inclusion criteria is 266 students. Among them, there are 145 male students (54.5%) and 121 female students (45.5%). Based on age distribution, the breakdown is as follows: 17 students (6.4%) aged 6 years old, 36 students (13.5%) aged 7, 54 students (20.3%) aged 8, 40 students (15.0%) aged 9, 48 students (18.0%) aged 10, 49 students (18.4%) aged 11, and 22 students (8.3%) aged 12. Results from the Snellen chart examination show that 115 students (43.2%) have normal visual acuity, while 151 students (56.8%) have decreased visual acuity. The total number of students who participated as respondents from SD is 266 students (100%).

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Table 2. Distribution of Factors Related to Visual Acuity

	Frequency	Percentage (%)
Gender		
Male	145	54.5
Female	121	45.5
Total	266	100.0
Age		
6 years old	17	6.4
7 years old	36	13.5
8 years old	54	20.3
9 years old	40	15.0
10 years old	48	18.0
11 years old	49	18.4
12 years old	22	8.3
Total	266	100.0
Genetic history		
Yes	146	54.9
No	120	45.1
Total	266	100.0
Reading Position		
Sitting	246	92.5
Lying down	10	3.8
Prone position	10	3.8
Total	266	100.0
Frequency of cellphone usage		
Everyday	153	47.5
Not everyday	113	42.5
Total	266	100.0
Duration of cellphone usage		
1-2 hour	183	68.8
3-6 hour	70	26.3
More than 6 hour	13	4.9
Total	266	100.0
Position while using cellphone		
Sitting	179	67.3
Lying down	12	4.5
Prone position	75	28.2
Total	266	100.0
Frequency of Watching TV		
Everyday	144	54.1
Not everyday	122	45.9
Total	266	100.0
Duration of Watching TV		
1-2 hour	211	79.3
3-6 hour	53	19.9
More than 6 hour	2	8
Total	266	100.0
Distance while watching TV		
1-2 meter	132	49.6

3-8 meter	134	50.4
Total	266	100.0
Distance between eyes and cellphone screen		
Less than 30 cm	140	52.6
More than equal 30 cm	126	47.4
Total	266	100.0

Source: Primary Data 2023

From the table above, it's observed that 146 students (54.9%) have a familial history where their parents experienced decreased visual acuity and used minus lenses. There are 246 students (92.5%) who maintain a seated position while reading.

Regarding cellphone usage, 153 students (47.5%) interact with their phones regularly every day. Among them, 183 students (68.8%) use cellphones for 1-2 hours per day, 70 students (26.3%) use them for 3-6 hours, and 13 students (4.9%) use them for more than 6 hours. The majority, 179 students (67.3%), prefer sitting while using their phones, although 75 students (28.2%) use them in a prone position, and 12 students (4.5%) use them while lying down.

In terms of TV watching habits among the SD Al-Amin students, 144 students (54.1%) watch TV daily. Among them, 211 students (79.3%) watch for 1-2 hours, 53 students (53.3%) watch for 3-6 hours, and only 2 students (8%) watch for more than 6 hours. The distance while watching TV is predominantly 3-8 meters for 134 students (50.4%) and 1-2 meters for 132 students (49.6%). As for the distance between the eyes and the cellphone screen, 140 students (52.6%) maintain a distance of less than 30 cm, while 126 students (47.4%) maintain a distance equal to or greater than 30 cm.

From the Table 3, six factors have a p-value <0.05. The chi-square test resulted in a p-value of 0.001 for the relationship between reading position and visual acuity, indicating a statistically significant association between reading position and visual acuity.

The frequency of cellphone usage yielded a p-value of 0.000, gadget usage duration had a p-value of 0.001, gadget usage position had a p-value of 0.040, distance while watching TV had a p-value of 0.046, and the distance between the eyes and the cellphone screen had a p-value of 0.019. These factors all possess a p-value <0.05, signifying a statistically significant relationship.

Bivariat Analysis

Table 3. Relationship of Factors with Visual Acuity

		Visual Acquity						
		Decrease Visual Acquity		**Normal**		**Total**		***p*-value**
		N	%	N	%	N	%	
Gender	Male	80	30.1	65	24.4	145	54.5	0.566
	Female	71	26.7	50	18.8	121	45.5	
Total		151	56.8	115	43.2	266	100.0	
Age	6 years old	10	3.8	7	2.6	17	6.4	0.426
	7 years old	14	5.3	22	8.3	36	13.5	
	8 years old	33	12.4	21	7.9	54	20.3	
	9 years old	25	9.4	15	5.6	40	15.0	

	10 years old	29	10.9	19	7.1	48	18.0	
	11 years old	28	10.5	21	7.9	49	18.4	
	12 years old	12	4.5	10	3.8	22	8.3	
Total		151	56.8	115	43.2	266	100.0	
Genetic history	Present	65	24.4	55	20.7	120	45.1	0.438
	Absent	86	32.3	60	22.6	146	54.9	
Total		151	56.8	115	43.2	266	100.0	
Reading Position	Sitting	132	49.6	114	42.9	246	92.5	0.001
	Lying down	9	3.4	1	0.4	10	3.8	
	Prone position	10	3.8	0	0.0	10	3.8	
Total		151	56.8	115	43.2	266	100.0	
Frequency of cellphone usage	Everyday	138	51.9	15	5.6	153	57.5	0.000
	Not everyday	13	4.9	100	37.6	113	42.5	
Total		151	56.8	115	43.2	266	100.0	
Duration of gadget usage	1-2 hour	93	35	90	33.8	183	68.8	0.001
	3-6 hour	45	16.9	25	35	70	26.3	
	More than 6 hour	13	4.9	0	68.8	13	4.9	
Total		151	56.8	115	43.2	266	100.0	
Position while using cellphone	Sitting	92	34.6	87	32.7	179	67.3	0.040
	Lying down	8	3.0	4	1.5	12	4.5	
	Prone position	51	19.2	24	9.0	75	28.2	
Total		151	56.8	115	115	43.2	100.0	
Frequency of Watching TV	Everyday	78	29.3	66	24.8	144	54.1	0.352
	Not everyday	73	27.4	49	18.4	122	45.9	
Total		151	56.8	115	43.2	266	100.0	
Duration of Watching TV	1-2 hour	123	46.2	88	33.1	211	79.3	0.206
	3-6 hour	28	10.5	25	9.4	53	19.9	
	More than 6 hour	0	0.0	2	0.8	2	0.8	
Total		151	56.8	115	43.2	266	100.0	
Distance while watching TV	1-2 meter	68	25.6	64	24.1	132	49.6	0.046
	3-8 meter	83	31.2	51	19.2	134	50.4	
Total		151	56.8	115	43.2	266	100.0	
Distance between eyes and	< 30 cm	70	26.3	70	26.3	140	52.6	0.019
	≥ 30 cm	81	30.5	45	16.9	126	47.4	

cellphone screen								
Total		151	56.8	115	43.2	266	100.0	

Source: Primary Data 2023

Univariate Analysis of Junior High School Unggulan Al-Amin Students

Table 4. Characteristics of respondents

Characteristics of respondents	Frequency	Percentage (%)
Age		
12 years old	33	27.5
13 years old	38	31.7
14 years old	37	30.8
15 years old	12	10.0
Total	120	100.0
Gender		
Male	63	52.5
Female	57	47.5
Total	120	100.0
Visual acquity		
Normal	98	81.7
Decreased visual acuity	22	18.3
Total	120	100.0

Source: Primary Data 2023

In the table above, the total number of respondents from SMP Unggulan Al-Amin is 120 students. Among them, there are 63 male students (52.5%) and 57 female students (47.5%). Based on age distribution, there are 33 students (27.5%) aged 12, 38 students (31.7%) aged 13, 37 students (30.8%) aged 14, and 12 students (10.0%) aged 15.

The results from the Snellen chart examination show that 98 students (81.7%) have normal visual acuity, while 22 students (18.3%) have decreased visual acuity.

Univariat Analysis

From table 5, it was found that 146 students (54.9%) have a familial history where their parents experienced decreased visual acuity and used minus lenses. The number of students who sit while reading is 246 (92.5%). Students who regularly interact with a cellphone every day amount to 153 students (47.5%). Among them, 183 students (68.8%) use cellphones for 1-2 hours per day, 70 students (26.3%) use them for 3-6 hours, and 13 students (4.9%) use them for more than 6 hours. The most chosen position when using a cellphone by students is sitting, accounting for 179 students (67.3%), although there are 75 students (28.2%) who use cellphones in a prone position and 12 students (4.5%) in a lying-down position. Among the student respondents from SD Al-Amin, 144 students (54.1%) watch TV daily, with 211 students (79.3%) watching for 1-2 hours, 53 students (53.3%) watching for 3-6 hours, and only 2 students (8%) watching for more than 6 hours. The most common distance while watching TV among students is 3-8 meters, accounting for 134 students (50.4%), and 1-2 meters for 132 students (49.6%). As for the distance between the eyes and the cellphone screen, 140 students (52.6%) maintain a distance of less than 30 cm, while 126 students (47.4%) maintain a distance equal to or greater than 30 cm.

Table 5. Distribution of Factors Associated with Visual Acuity

	Frequency	Percentage (%)
Gender		
Male	63	52.5
Female	57	47.5
Total	120	100.0
Age		
12 years old	33	27.5
13 years old	38	31.7
14 years old	37	30.8
15 years old	12	10.0
Total	120	100.0
Genetic history		
Yes	54	45.0
No	66	55.0
Total	120	100.0
Reading Position		
Sitting	83	69.2
Lying down	28	23.3
Prone position	9	7.5
Total	120	100.0
Frequency of cellphone usage		
Everyday	44	36.7
Not everyday	76	63.3
Total	120	100.0
Duration of cellphone usage		
1-2 hour	90	75.0
3-6 hour	29	24.2
More than 6 hour	1	0.8
Total	120	100.0
Position while using cellphone		
Sitting	60	50.0
Lying down	59	49.2
Prone position	1	0.8
Total	120	100.0
Frequency of Watching TV		
Everyday	41	34.2
Not everyday	79	65.8
Total	120	100.0
Duration of Watching TV		
1-2 hour	90	75.0
3-6 hour	29	24.2
More than 6 hour	1	0.8
Total	120	100.0
Distance while watching TV		
1-2 meter	68	56.7
3-8 meter	52	43.3
Total	120	100.0

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Distance between eyes and cellphone screen		
Less than 30 cm	77	64.2
More than equal 30 cm	43	35.8
Total	120	100.0

Bivariat Analysis

The bivariate analysis from Table 6 reveals 8 variables or risk factors with a p-value < 0.05: reading position, frequency of cellphone usage, duration of gadget usage, gadget usage position, frequency of TV watching, duration of TV watching, distance while watching TV, and distance between the eyes and the cellphone screen.

The reading position factor has a p-value of 0.000, where $p < 0.05$, indicating a statistically significant relationship between reading position and decreased visual acuity. Similarly, the frequency of cellphone usage shows a p-value of 0.000, indicating a significant association with decreased visual acuity. The duration of cellphone usage also exhibits a p-value of 0.000, suggesting a significant relationship with decreased visual acuity. The position of cellphone usage displays a p-value of 0.000, while the frequency of TV watching shows a p-value of 0.001, the duration of TV watching has a p-value of 0.000, distance while watching TV shows a p-value of 0.009, and the distance between the eyes and the cellphone screen exhibits a p-value of 0.000. These p-values being less than 0.05 indicate a statistically significant relationship between these factors and decreased visual acuity.Uncorrected refractive errors are the most common vision impairments among school children. From the above research results, six risk factors are associated with students' interaction with cellphone, laptop, or TV screens, while two other risk factors are related to the reading position and the position in front of screens like cellphones, laptops, or TVs.

Computer Vision Syndrome (CVS) can represent a cluster of visual and extraocular symptoms associated with continuous use of visual display terminals (VDT) or screens of computers, laptops, TVs, or cellphones. It has been proven to cause asthenopia, decreased visual acuity, dry eye syndrome, and red eyes as the most frequent manifestations of vision and eye disorders.

In study of 5074 children from the Generation R, Enthoven et al[5] observed a moderate association between computer use in young children and myopia. However, reading time showed a stronger correlation, indicating that extended reading hours may pose a higher risk of myopia compared to using desktop computer screens. Interestingly, outdoor exposure seemed to mitigate the combined impact of near work activities. The relationship between myopia prevalence and axial elongation outcomes largely aligned, yet differences emerged in the strength of the relationship between axial length and refractive error for high myopes, possibly due to compensatory factors like crystalline lens thickness.

The debate regarding computer use as a myopia risk factor has persisted. While extensively studied, most research has been inconclusive due to cross-sectional designs. Our longitudinal study revealed an association between early-age computer use and myopia development during school age, which differs from limited prior longitudinal studies conducted on this topic. Despite the lack of randomized controlled trials, observational studies recognize total near work as a myopia risk factor. Enthoven et al study emphasizes the impact of near work activities in childhood, especially regarding reading habits. The effect of computer use appeared relatively weaker, likely due to the closer reading distance involved in book reading compared to desktop computer use.

Research has firmly established a causal link between childhood outdoor exposure and myopia, with results indicating that the required hours of outdoor exposure to prevent myopia vary depending on near work intensity. Outdoor exposure seemed to modify the effect of near work activities, suggesting an additional protective effect. While a minimal of 12 hours per week

outdoor exposure was previously suggested to prevent myopia, our findings suggest a need for over 7 hours per week to counteract low-intensity near work and over 14 hours per week for protection against medium or high-intensity near work.

The research also indicates that the body position while reading is a risk factor for the occurrence of myopia. The chi-square test results show a relationship between the reading position and the occurrence of myopia with a p-value of 0.001 ($p > 0.05$). This happens because when reading in a lying/down position, the distance between the eyes and the reading material is unstable, causing constant eye accommodation. Additionally, there's a reduction in light intensity as the reading material blocks the light source, leading to increased eye accommodation and quicker fatigue. This situation worsens if the reading environment has poor lighting (dim), causing the eyes to tire more quickly, consequently increasing the risk of myopia.

Study by Nunes et al included 90% of the 5-year-old Tejo community for assessing visual acuity and correcting refractive errors. The sample had a balanced gender ratio and a slightly larger representation from rural schools (54.4%). About 6.7% of analyzed children already wore glasses during evaluation. Reduced visual acuity (VA) was observed in 13.7% of the sample, with 18.5% of them already using glasses. Urban and rural children didn't significantly differ in reduced VA rates, but boys showed a higher rate (15%) compared to girls (12%). Data on childhood VA presentation are varied due to age differences, chart types, and methodologies among studies. The study reported disparate VA reduction frequencies ranging from 5.6% to 33.3%. Comparing with Lança's study in Portugal, this one reported a lower frequency of reduced VA.

Higher reduced VA frequencies in older children from different studies align with completed emmetropization and better collaboration during tests. This study also found disparities in VA frequencies among studies due to factors like age, geography, and clinical procedures.[7]

Although not directly analyzed, rural children possibly come from lower-income families, which could lead to higher reduced VA frequencies. However, this study showed a slightly higher reduced VA rate in urban areas.

Gender differences in reduced VA frequencies were not common in literature, but studies suggested girls tend to perform better. This might explain the higher proportion of boys with reduced VA in this sample.VA reduction in children often links to amblyopia and uncorrected refractive errors. This study found significant refractive errors in 28.9% of screened children, with 79.1% not corrected. Most children with reduced VA had significant refractive errors, showing myopia as a major cause of visual loss in childhood.

Preschool children often show more astigmatism and hyperopia than myopia. Strabismus prevalence was relatively low (around 2%), mostly linked to significant refractive errors. Stereopsis assessment is scant but showed a reduced frequency similar to other studies in preschoolers. Uncorrected visual problems can impact learning and self-esteem. Early detection and correction of visual deficits before school entry are crucial for literacy development and overall learning abilities.

Various risk factors linked to myopia have been noted, but their independent association or mediation by other factors remains unclear. Education and outdoor time are strongly linked to myopia, prompting a need to explore whether other associations with myopia are influenced by these factors.

Commonly, all significantly associated risk factors are included in multivariable regression, labeling the remaining as independent, yet this approach has limitations due to collinearity, the need for all relevant variables, and variable measurement inaccuracies. Statistical adjustments

often perform poorly due to complex confounding patterns and assumptions of simple relationships between variables.

Factors like sex, ethnicity, parental myopia, birth order, and season of birth have been studied in relation to myopia. Gender disparities vary across studies, potentially influenced by social factors like education access or outdoor engagement. Ethnicity differences in myopia prevalence may be influenced by environmental exposures rather than solely genetics.

Parental myopia consistently associates with increased myopia risk in children, suggesting both genetic and environmental influences. Birth order and season of birth also show associations, possibly linked to educational access or school starting age. Height and intelligence exhibit inconsistent links with myopia, potentially influenced by social factors like education. Physical activity and sleep associations with myopia are confounded, often correlated with time spent outdoors and education rather than direct biological connections. Many of these associations lack consistency across studies, indicating potential confounding effects by social or environmental factors. Some popular beliefs about myopia causes, like reading in dim light, lack solid scientific evidence and require further investigation before being accepted as valid causal factors.

Table 6. Relationship of Factors with Visual Acuity

		Visual Acuity						
		Decrease in Visual Acuity		**Normal**		**Total**		***p*-value**
		N	%	N	%	N	%	
Gender	Male	9	7.5	54	45.0	63	52.5	0.228
	Female	13	10.8	44	36.7	57	47.5	
Total			18.3	98	81.7	120	100.0	
Age	12 Tahun	9	7.5	24	20.0	33	27.5	0.145
	13 Tahun	5	4.1	33	27.5	38	31.7	
	14 Tahun	8	6.7	29	24.1	37	30.8	
	15 Tahun	0	0	12	10.0	12	10.0	
Total		22	18.3	98	81.7	120	100.0	
Genetic history	Present	10	8.3	44	36.7	54	45.0	0.962
	Absent	12	10.0	54	45.0	66	55.0	
Total			18.3	98	81.7	120	100.0	
Reading Position	Sitting	1	0.8	82	68.3	83	69.2	0.000
	Lying down	15	12.5	13	10.8	28	23.3	
	Prone position	6	5	3	2.5	9	7.5	
Total			18.3	98	81.7	120	100.0	
Frequency of cellphone usage	Everyday	20	16.6	24	20.0	44	36.7	0.000
	Not everyday	2	1.6	74	61.6	76	63.3	
Total			18.3	98	81.7	120	100.0	
Duration of gadget usage	1-2 hour	6	5.0	84	70.0	90	75.0	0.000
	3-6 hour	16	13.3	13	10.8	29	24.2	
	More than 6 hour	0	0.0	1	0.8	1	0.8	
Total			18.3	98	81.7	120	100.0	
	Sitting	2	1.7	58	32.7	60	50.0	0.000

Position while using cellphone	Lying down	19	15.8	40	1.5	59	49.2	
	Prone position	1	0.8	0	9.0	1	0.8	
Total			18.3	98	81.7	120	100.0	
Frequency of Watching TV	Everyday	14	15.0	27	22.5	41	34.2	0.001
	Not everyday	8	6.7	71	59.2	79	65.8	
Total			18.3	98	81.7	120	100.0	
Duration of Watching TV	1-2 hour	6	5.0	84	70.0	90	75.0	0.000
	3-6 hour	16	13.3	13	10.8	29	24.1	
	More than 6 hour	0	0.0	1	0.8	1	0.8	
Total		22	18.3	98	81.7	120	100.0	
Distance while watching TV	1-2 meter	7	5.8	61	50.8	68	56.7	0.009
	3-8 meter	15	12.5	37	30.8	52	43.3	
Total			18.3	98	81.7	120	100.0	
Distance between eyes and cellphone screen	< 30 cm	7	5.8	70	58.3	77	64.2	0.000
	≥ 30 cm	15	12.5	28	23.3	43	35.8	
Total		22	18.3	98	81.7	120	100.0	

Source: Primary Data 2023

Conclusion

A decrease in visual acuity was experienced by 56.8% of students at Al-Amin Primary School and 18.3% of students at Al-Amin Junior High School. There is a significant correlation regarding risk factors associated with decreased visual acuity, namely reading position, frequency of mobile phone use, duration of gadget use, gadget usage position, TV watching frequency, TV watching duration, TV viewing distance, and distance from the eyes to the phone screen. Lifestyle modifications are recommended, particularly in reading habits, gadget use, and television viewing habits.

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