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RESEARCH ARTICLE

Prevalence of Myopia and Associated Risk Factors Among Patients at a Tertiary Hospital in Mogadishu, Somalia

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Abstract:

***Introduction*:** Myopia, often known as shortsightedness, is a refractive error caused by the cornea's steep curvature or prolonged axial length, resulting in light rays converging in front of the retina instead of on it. It is the most common type of vision problem, affecting many school-age children and teenagers, with its seriousness generally linked to higher levels of schooling. The study identifies several risk factors for myopia, including educational level, family history, outdoor activity, smartphone usage, and near-work activity

***Method*:** A cross-sectional study including 400 patients was conducted at the Mogadishu Somali Turkey Training and Research Hospital in Somalia between July 2023 and November 2023. A structured questionnaire was developed from several research sources to assess the prevalence and risk factors of myopia through interviews.

***Result*:** Out of the total patient population (5000), it is observed that 8% (400 patients) have been diagnosed with myopia. On the other hand, a majority of 92% (4600 patients) do not exhibit myopia. According to the gender, male patients had a 0.1 times lower likelihood of being myopic compared to female patients (adjusted odds ratio = 0.142, 95% confidence interval: 0.730-1.206), and this difference was statistically significant (p-value < 0.005). Patients with educational levels of preschool, schooling, and university level 1.7, 1.8, and 1.2 were more likely to be myopic than those who were not educated (AOR = 1.729, 95% CI: 0.745-6.122) and (AOR = 1.809, 95% CI: 0.157-1.821) and (AOR = 1.221, 95% CI: 0.912-2.291), and patients with educational levels of preschool and schooling were statistically significant to be myopic (P-values 0.000). Individuals under the age of 15 were 1.2 times more prone to myopia compared to those aged 35 and older (AOR = 1.283, 95% CI: 0.382-2.894), and they were statistically significant to be myopic (P-value 0.007).

***Conclusion*:** The study provides valuable insights on myopia and its related risk factors. Continued study and cooperation are essential to deepen our comprehension, strengthen preventive strategies, and ultimately lessen the worldwide influence of myopia on ocular health. It is crucial to identify the risk factors associated with myopia and accurately assess the prevalence of this condition.

Keywords: Myopia, outdoor activity, near work activity, cross-sectional study.

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1. INTRODUCTION

Myopia, often known as shortsightedness, is a refractive error when the cornea's pronounced curvature or extended axial length leads to light rays from a distance focusing in front of the retina [1]. Myopia is the most prevalent refractive error among school-age children and teenagers, and its occurrence is closely linked to higher levels of education [2]. By 2050, around 4.758 billion individuals will have myopia, accounting for nearly 50% of the global population. Additionally, around 938 million people will have extreme myopia, representing approximately 9.8% of the population [3]. In Africa, a frequency of 5.6% was found in Tanzania and 7.5% in the Ethiopian towns of Debark and Kola Diba, which comprised 1134 preschool and schoolchildren between the ages of 5 and 15 [4,5].

In Hargeisa, Somalia, a study conducted in 2020 found that myopia was present in 9.1% of the examined population [6]. The increasing prevalence of myopia in some countries suggests that environmental factors have a significant impact on the condition, which is a combination of genetic and environmental factors. Factors such as age, gender, level of education, family history of myopia, outdoor time, school type, distance to work, and local activities have all been associated with it. [7]. School-age children are regarded as a high-risk population due to the significant impact that untreated refractive error can have on their cognitive, physical, and mental development [8]. Due to the risk of blinding visual disorders such as maculopathy, retinal detachment, and optic neuropathy, the global increase in the prevalence of myopia has a significant influence on public health [9].

In order to propose preventative measures or carry out educational initiatives that aim to raise awareness of the significance of outdoor activities and sun exposure, it is essential to identify the risk factors linked with myopia as well as to accurately evaluate the prevalence of the condition. Therefore, the goal of our research was to determine the myopia prevalence in our patients visiting the ophthalmology outpatient clinic in Mogadishu Somali- Turkey Training and Research Hospital, Mogadishu, Somalia. Furthermore, our goal was to look at the linked risk variables and offer guidance on how to prevent myopia in our community.

2. METHODOLOGY

The participants for this cross-sectional study were patients aged 5 years or older who had visited the clinic and had been diagnosed with myopia; Patients with ocular conditions aside from myopia were not included. The study was carried out at the outpatient ophthalmology clinic at the Mogadishu Somali Turkey Training and Research Hospital, Mogadishu, Somalia, between July 2023 and October 2023. Within this time frame, a total of 5000 individuals sought medical attention at our ophthalmology clinics. Out of these, a specific subset of 400 patients who were diagnosed with myopia ultimately participated in the study. Patients with other ophthalmologic diseases were excluded following through eye examinations.

Specialists in ophthalmology have directly assessed refraction in the clinic. A licenced ophthalmologist also performed a thorough ocular examination on each patient, which included ophthalmoscope and slit lamp tests. Children between the ages of 5 and 10 underwent a cycloplegic refraction technique that involved retinoscopy. This procedure was conducted after administering two drops of 1% cyclopentolate in each eye individually, with a five-minute interval between administrations.

Patients over the age of ten underwent subjective refraction testing on each eye separately and visual acuity testing on a Snellen eye chart following a set technique.

In order to assess the prevalence and risk factors of myopia, interviewers created a structured questionnaire that they will administer. The dependent variable was an ophthalmologist's assessment of myopia. The following were independent variables: age, gender, a positive family history of myopia, the average amount of time spent each day on a mobile device, the amount of time spent each day on near-work activities, and the amount of time spent outdoors. In our study, a spherical equivalent refraction (objective) of less than -0.5 diopters (D) was considered myopia. Individuals were classified as mild (≤-0.50D to -3.00D), moderate (<-3.00D to -6.00D), high myopia (<-6.00D to -9.00D), and severe myopia (<-9.00D) based on their baseline degree of myopia. [10].

2.1. Ethical Consideration

Every patient visiting our ophthalmology clinic provides informed consent for their data to be used for research reasons, and this study did not reveal any personal information. The study received approval from the research ethics committee of Mogadishu Somali Turkey Training and Research Hospital under Ethics Protocol No. MSTH/14848. The study was conducted in accordance with the principles outlined in the Declaration of Helsinki.

2.2. Statistical Analysis

The data were analyzed using the Statistical Package for the Social Sciences (SPSS) programme. The study provided descriptive statistics, including percentages and frequencies. A chi-square test was conducted to evaluate the connection between categorical variables, specifically myopia (yes, no) and gender (male, female). Logistic regression analysis was utilised to identify the risk factors linked to myopia, with a 95% confidence interval (CI). The statistical significance threshold was established at $p < 0.05$.

3. RESULT

Between July 2023 and November 2023, a total of 400 patients diagnosed with myopia who had attended the ophthalmology department at Mogadishu Somali Turkey Training and Research Hospital and met the specified criteria were included in the study. Out of the total patient population, it is observed that 8% (400 patients) have been diagnosed with myopia. On the other hand, a majority of 92% (4600 patients) do not exhibit myopia. Considering the gender distribution of the patients, 173 (43.2%) respondents were male, while 227 (56.7%) respondents were female.

Regarding the age of the patients, 95 (23.7%) respondents were less than 15 years old. The age group of 15-24 years old accounted for 130 (32.5%) respondents. Those between 25 and 34 years old represented 101 (25.2%) respondents. In relation to the prevalence of myopic eyes, 4.0% of the participants exhibited myopia exclusively in their right eye, whereas 1.5% had myopia exclusively in their left eye. Myopia affected both eyes in 94.5% of the patients. When evaluating the extent of myopia, 70.8% of the subjects displayed mild myopia, 26.3% had moderate myopia, and 3.0% indicated severe myopia. Regarding education, 9.5% of the participants lacked basic literacy skills, while 5.0%, 45.8%, and 39.8% had achieved completion of preschool, primary and secondary education, and university education, respectively.

In terms of family history, 192 (48.0%) respondents had a positive family history of myopia, while 208 (52.0%) participants had a negative family history. Regarding outdoor activity per hour, 205 (51.3%) respondents engaged in outdoor activities for less than 1 hour. The category of 1-2 hours of outdoor activity was reported by 96 (24.0%) respondents. More than 3 hours of outdoor activity were reported by 99 (24.8%) respondents. Concerning mobile phone usage per hour, 28 (7.0%) respondents used their mobile phones for 0-2 hours. Those who used mobile phones for 2-4 hours accounted for 250 (62.5%) respondents. More than 4 hours of mobile phone usage were reported by 122 (30.5%) respondents. Finally, According to the patient's near work activities the majority of the respondents 179(44.8%) were replied that their work activities is within more than 4 hours, 139(34.7%) were said within 0-2 hours, while the minority of the respondents only 82(20.5%) were response within 2-4 hours (Table **1**).

Table **2** indicates regression analyses: patients aged <15 years old were 1.2 times more likely to be myopic than those aged 35 and above (AOR = 1.283, 95% CI: 0.382-2.894), and they were statistically significant to be myopic (P-value 0.007). Additionally, those aged 15-24 were 1.6 times more likely to be myopic than those aged 35 and above (AOR = 1.629, 95% CI: 0.943-1.802), and they were also not statistically significant to be myopic (P-value 0.273). Also, those aged 25-34 years old were 2.6 times more likely to be myopic than those aged 35 and above (AOR = 2.639, 95% CI: 0.792-9.124). According to the gender, male patients were 0.1 times less likely to be myopic than female patients (AOR = 0.142, 95% CI: 0.730-1.206), and they were statistically significant to be myopic (P-value 0.005).

Patients with left myopic eyes were 0.2 less likely to be myopic than those with right myopic eyes (AOR = 0.283, 95% CI: 0.912-2.817), and they were not statistically significant (P-value 0.829). Additionally, those who had both myopic eyes were 1.2 times more likely to be myopic than those who had the

right myopic eye (AOR = 1.293, 95% CI: 0.273-4.821), and they were statistically significant to be myopic (P-value 0.002).

Table 1. Descriptive analysis of variables associated with occurrence of myopia among the patients in Mogadishu Somalia.

Variable	Frequency	Percent
Age of the patient		
<15 years old	95	23.7
15-24 years old	130	32.5
25-34 years old	101	25.2
35 and above	74	18.5
Sex of the patient		
Male	173	43.2
Female	227	56.8
Myopic Eye		
Right	16	4.0
Left	6	1.5
Both	378	94.5
Myopic Grade		
Mild	283	70.8
Moderate	105	26.3
High	12	3.0
Education of patient		
Illiterate	38	9.5
Preschool	20	5.0
Schooling	183	45.8
University level	159	39.8
Family history		
Positive	192	48.0
Negative	208	52.0
Outdoor Activity per hour		
Less than 1 hour	205	51.3
1-2 hours	96	24.0
More than 3 hours	99	24.8
Mobile using per hour		
0-2 hours	28	7.0
2-4 hours	250	62.5
More than 4 hours	122	30.5

Near work activity per hour		
0-2 hours	139	34.7
2-4 hours	82	20.5
More than 4 hours	179	44.8

Table 2. Regression analysis of variables associated with occurrence of myopia among the patients in Mogadishu Somalia.

Variable	Frequency	Percent	P-value	AOR 95% CI
Age of the patient				
<15 years old	95	23.7	**0.007***	1.283(0.382-2.894)
15-24 years old	130	32.5	0.273	1.629(0.943-1.802)
25-34 years old	101	25.2	0.836	2.639(0.792-9.124)
35 and above	74	18.5		1
Sex of the patient				
Male	173	43.2	**0.005***	0.142(0.730-1.206)
Female	227	56.8		1
Myopic Eye				
Right	16	4.0		1
Left	6	1.5	0.829	0.283(0.912-2.817)
Both	378	94.5	**0.002***	1.293(0.273-4.821)
Myopic Grade				
Mild	283	70.8	**0.001***	0.209(0.532-12.829)
Moderate	105	26.3	0.710	0.287(0.920-2.927)
High	12	3.0		1
Education of patient				
Illiterate	38	9.5		1
Preschool	20	5.0	**0.000***	1.729(0.745-6.122)
Schooling	183	45.8	**0.000***	1.809(0.157-1.821)
University level	159	39.8	0.162	1.221(0.912-2.291)
Family history				
Positive	192	48.0	**0.000***	1.086(0.266-2.784)
Negative	208	52.0		1
Outdoor Activity per hour				
Less than 1 hour	205	51.3	**0.002***	0.281(0.726-2.983)
1-2 hours	96	24.0	0.218	0.719(3.722-2.911)
More than 3 hours	99	24.8		1

Mobile using per hour				
0-2 hours	28	7.0		1
2-4 hours	250	62.5	**0.001***	1.720(0.627-2.833)
More than 4 hours	122	30.5	0.039	1.821(0.796-1.028)
Near work activity per hour				
0-2 hours	139	34.7		1
2-4 hours	82	20.5	0.715	1.621(0.820-7.529)
More than 4 hours	179	44.8	**0.000***	1.509(0.492-1.421)

Patients with a mild myopic grade were 0.2 times less likely to be myopic than those with a high grade (AOR = 0.209, 95% CI: 0.532-12.829), and they were statistically significant for being myopic (P-value 0.001). Additionally, those patients who had a moderate myopic grade were 0.28 times less likely to be myopic than those with a high myopic grade (AOR = 0.287, 95% CI: 0.920-2.927), and they were not statistically significant to be myopic. Patients with preschool, schooling, and university levels of 1.7, 1.8, and 1.2 were more likely to be myopic than those without education (AOR = 1.729, 95% CI: 0.745-6.122), 1.809, 95% CI: 0.157-1.821, and 1.221, 95% CI: 0.912-2.291). Additionally, patients with preschool and schooling levels were statistically significant to be myopic (P-values 0.000).

Furthermore, those were university-level and not statistically significant (P-value 0.162). Patients who had a positive family history of myopic were 1.0 times more likely to be myopic than those who had a negative family history (AOR = 1.086, 95% CI: 0.266-2.784), and they were statistically significant to be myopic (P-value = 0.000). According to the patient's outdoor activities per hour, they were 0.28 times more likely to be myopic than those made outdoor for more than 3 hours (AOR = 0.281, 95% CI: 0.726-2.983), and they were statistically significant to be myopic (P-value 0.002).

Additionally, those who did outdoor activities for 1-2 hours were 0.7 less likely to be myopic than those who did outdoor activities for more than 3 hours (AOR = 0.719, 95% CI: 3.722-2.911), and they were not statistically significant to be myopic (P-value 0.218). Based on the patients' mobile usage per hour, those who used their phones for 2-4 hours were 1.7 times more likely to be myopic than those who used them for 0-2 hours (AOR = 1.720, 95% CI: 0.627-2.833), and this difference was statistically significant (P-value = 0.001). Additionally, those who were using mobile for more than 4 hours were 1.8 times more likely to be myopic than those who were using mobile for 0-2 hours (AOR = 1.821, 95% CI: 0.796-1.028), and they were not statistically significant to be myopic (P-value 0.039).

According to the patients, those who performed near-work activities within more than 4 hours were 1.5 times more likely to be myopic than those who performed near-work activities within 0-2 hours (AOR = 1.509, 95% CI: 0.492-1.421), and they were statistically significant to be myopic (P-value = 0.000). Additionally, those who made near-work activities within 2-4 hours were 1.6 times more likely to be myopic than those who made near-work activities within 0-2 hours (AOR = 1.621, 95% CI: 0.820-7.529), and they were not statistically significant to be myopic (P-value 0.715).

4. DISCUSSION

This study found that 8% of patients attending Mogadishu Somali Türkiye Training and Research Hospital had myopia. A study in Hargeisa, Somaliland (Somalia) found that 9.1% of children had myopia [11]. The outcome was comparable to the data published from Tanzania [12]. This study found that patients aged <15 years old were 1.2 times more likely to be myopic than those aged 35 and above, and they were statistically significant to be myopic. Compared to a study conducted in Ethiopia, which was founded, the odds of being myopic among study participants within the age category of 10-13 years were more likely to be myopic, as were those participants within the age group of 14-18 years [13]. The Beaver Dam Eye Study, noticed a notable decline in persons aged 43 years and older between 1988 and 1990 [14]. This

study also found that male patients were less likely to be myopic than females, and they were statistically significant for being myopic. A study in Northwest Ethiopia revealed a statistically significant increase in female myopia compared to males [15].

In our study, patients with an educational level of schooling and university level were more likely to be myopic than those who were not educated, and they were statistically significant to be myopic. compared to a study conducted in Jordan that shows the relation between education and myopia in the whole study group. The frequency of myopia was 38% in the educated group and 16% in the non-educated group, and there was a significant relationship between the level of education and myopia [16]. This study also revealed that the majority of the respondents, 192 (48.0%), had a positive family history of myopia, while 208 (52.0%) respondents had a negative family history. Patients who had a positive family history of being myopic were more likely to be myopic than those who had a negative family history, and they were statistically significant to be myopic. In a Chinese study, 46.7% of patients with high myopia had a family history through one parent, and 19.6% had a family history through both parents, resulting in a two- to three-fold higher prevalence of myopia compared to those without any family history [17].

This study demonstrated that patients who engaged in outdoor activities for less than an hour were more likely to be myopic than those who engaged in outdoor activities for more than three hours, and this difference was statistically significant. Additionally, those who do outdoor activities for 1-2 hours are less likely to be myopic than those who do outdoor activities for more than 3 hours, and they are not statistically significant to be myopic. In an Ethiopian study, participants who did not spend more time on outdoor activities were 3.94 times more likely to be myopic than those who spent more than 2 hours per day on outdoor activities [18].

This study revealed that patients who used mobile for more than 4 hours were more likely to be myopic than those who used mobile for 0-2 hours, and they were not statistically significant to be myopic. Several studies have found a significant association between smartphone overuse and visual impairment. A Chinese study revealed no statistically significant correlation between smartphone overuse and myopia [19].

5. LIMITATIONS AND STRENGTH OF OUR STUDY

Firstly, the study's scope is limited to a particular institution, which may not accurately reflect the wider community demographics or different healthcare environments. This limits the applicability of our results to a broader and more diverse population. Furthermore, the inherent characteristics of a study conducted in a hospital setting may result in selection bias, given that the majority of the sample consists of persons actively seeking medical care. This information may not provide a true representation of how common or the specific features of myopia are in the overall population, especially for individuals with less severe or asymptomatic cases who may not seek medical attention at a hospital. Moreover, studies that depend on information provided by participants are susceptible to inherent risks such as self-reporting and recall biases. Subjects' recollection and disclosure of information regarding their behaviours, lifestyles, or family histories may be unreliable, which can lead to mistakes in the analysis of related risk factors. The novelty and strength of our study is that it is the first published study on the prevalence of myopia in Somalia, especially in south and central Somalia. Providing data from an understudied region can make a valuable contribution to the broader understanding of this public health issue.

CONCLUSION

To summarise, our investigation of myopia and its related risk factors has provided us with a sophisticated comprehension of this common visual disorder. The interplay between genetic predispositions, environmental effects, and lifestyle variables highlights the intricate nature of myopia development. The recognition of schooling as a crucial determinant linked to myopia underscores the necessity for focused interventions, particularly among the younger demographic. Enforcing preventive measures, such as frequent eye tests, can aid in the timely identification and efficient control of myopia.

AUTHORS' CONTRIBUTIONS

The author confirms sole responsibility for the following: study conception and design, data collection, analysis and interpretation of results, and manuscript preparation.

CONSENT FOR PUBLICATION

Not applicable.

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None.

CONFLICT OF INTEREST

The author confirms that this article's content has no conflict of interest.

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