Prevalence of Myopia and Its Related Factors Among Health University Students in Aseer region, Saudi Arabia

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ABSTRACT

Background: Refractive errors (REs) are defined as a condition, in which the optics of the no accommodating eye are unable to take parallel light rays to concentrate on the retina. Students had a higher prevalence of myopia in comparison with others. The exposure and use of the computer with study for long times are associated with the development and progression of myopia.

Aim: to assess prevalence of myopia among health university students at King Khalid University and its related factors.

Methodology: A descriptive cross-sectional approach was used targeting King Khalid University health college students. Data were collected using an electronic questionnaire. The questionnaire covered student's demographic data, myopia, related factors, and vision-related behaviours.

Results: A total of 1428 health university students were included, 502 (35.2%) from college of Pharmacy, 431 (30.2%) from college of Medicine, 252 (17.6%) from college of Nursing, and 243 (17%) from college of Dentistry. Students ages ranged from 18 to 30 years with a mean age of 22.7 ± 2.4 years old. Exact of 743 (52%) were females. A total of 696 (48.7%) students had myopia, which was in both eyes among 438 (62.9%), right eye among 150 (21.6%), and on left eye among 108 (15.5%). A total of 512 (35.9%) of the students wear glasses, 108 (7.6%) were lenses and 208 (14.6%) wear both. Family history of myopia and reading distances beside other factors were significantly associated with higher risk of myopia.

Conclusions: In conclusion, the current study revealed that about half of the health college students at King Khalid university were myopic mianly college of medicine students. Myopia was bilateral among most of the students and family history was significantly associated with higher risk.

Keywords: ***Myopia, refractive errors, university, health colleges students, prevalence, risk factors, Saudi Arabia.***

INTRODUCTION

Refractive errors (RE) are the most frequent visual problem among all categories of the population [1]. RE are categorized as a public health challenge. Globally, many studies and WHO reports specify that refractive errors are the leading cause of visual impairment and the second cause of visual loss where 43% of visual impairments are due to refractive errors [2]. Naidoo et al [3]. reported that neglected refractive errors led to visual impairment among more than 100 million people and blindness in 6.8 million people in 2010 [4].

Myopia is a spherical refractive defect that makes it difficult for the eye to see objects that are far away. Sometimes people refer to it as shortsightedness or nearsightedness [5, 6]. With respect to corneal curvature and lens thickness, expanded anteroposterior eyeball diameter and strong refractive power cause light to refract to a focal point in front of the retina [7]. Myopia is considered as one of the most frequent refractive error which is defined as a refractive error spherical caused by extreme refractive power relative to corneal curvature and thickness lens and / or increased anteroposterior diameter of the eyeball, causing a light refraction to a focal point in front of the retina [8, 9]. Globally, the uncorrected refractive error was leading cause of distance vision impairment, reported among 108 million people, and the second most common cause of blindness. [10]. Recently, studies showed high prevalence of myopia during last few years, especially in Asian countries, which is why multiple studies trying to find the factors that produce these change [11-13].

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Despite several attempts to explain myopia, its precise cause is still unknown. On the other hand, a number of genetic and environmental risk factors have been linked to the onset and progression of myopia. Having myopic parents has been linked in several studies to an increased risk of getting the condition [14-16]. It is believed that being younger when myopia first appears increases the likelihood of myopia progressing [17]. According to other research, environmental factors including a higher educational attainment, more near work, and fewer outdoor activities may have an impact on myopia [18, 19]. Moreover, using a computer or smartphone on a regular basis is common, and using digital devices might cause myopia to develop or worsen [20].

Students, mainly health students had a higher prevalence of myopia in comparison with others. The exposure and use of the computer with study for long times are associated with the development and progression of myopia[21,22]. Medical students showed higher risk relative to other students as a consequence of spending a lot of hours reading, doing vision work nearby and using electronic devices. Thus, medical students consider themselves population with a high predisposition to myopia [23].

MATERIAL AND METHODS

A descriptive cross-sectional study was conducted targeting all health colleges students in King Khalid University during the period from 14/3/2024 to 14/5/2024. Male and female health university students at King Khalid University (College of Medicine, College of pharmacy, College of Dentistry, College of Nursing students) from 18 years old to 30 years old were included. On the other hand, other respondents than students, physicians, male and female of non-colleges of Medicine, Pharmacy, Dentistry and Nursing were excluded. Data were collected using a pre-structured questionnaire by the researchers after intensive literature review and field expert's consolation. The study questionnaire covered student's college, demographic data, eye disease and surgery history, myopia and related data, vision related behaviours and other risk factors of myopia such as parent's history, reading distance and eye visual assessment. Before enrollment, students were given details about the study's objectives, including duration and confidentiality. They were also informed that their data would be confidential and only for study-related purposes, but their identities would be kept private. The study questionnaire was reviewed by a panel of 3 experts for assessing content validity and applicability with all modifications were applied. The final questionnaire was uploaded online using social media platforms by the researchers, and their friends and sent to the targeted study students. The study questionnaire was uploaded till no more new answers were obtained.

DATA ANALYSIS

The data were collected, reviewed and then fed to Statistical Package for Social Sciences version 26 (Released 2019; IBM Corp., Armonk, New York, United States). All statistical methods used were two tailed with alpha level of 0.05 considering significance if P value less than or equal to 0.05. Descriptive analysis was done by prescribing frequency distribution and percentage for categorical study variables including demographic data, myopia related data, vision related behaviours and other students vision related factors.

The overall prevalence of myopia was graphed. Cross tabulation for showing factors associated with students' myopia using Pearson chi-square test for significance and exact probability test if there were small frequency distributions. Multiple stepwise logistic regression model was applied to assess the most significant predictors of having myopia among study participants controlling for all other potential confounders based on adjusted odds ratio with its 95% confidence interval.

RESULTS

A total of 1428 health university students were included, 502 (35.2%) from college of Pharmacy, 431 (30.2%) from college of Medicine, 252 (17.6%) from college of Nursing, and 243 (17%) from college of Dentistry. Students ages ranged from 18 to 30 years with a mean age of 22.7 ± 2.4 years old. Exact of 743 (52%) were females. A total of 492 (34.5%) of the students had eye diseases, Other than myopia "nearsightedness and 282 (19.7%) had corrective refractive surgery before (Table 1).

Table 1. Bio-demographic data of study health university students, King Khalid University (n=1482)

Bio-demographic data	No	%
College		
College of Pharmacy	502	35.2%
College of Medicine	431	30.2%
College of Nursing	252	17.6%
College of Dentistry	243	17.0%
Age in years		
18-20	242	16.9%
21-23	734	51.4%
24+	452	31.7%
Gender		
Male	685	48.0%
Female	743	52.0%
Do you have any eye diseases, Other than myopia "nearsightedness?		
Yes	492	34.5%
No	936	65.5%
Have you ever had any corrective refractive surgery before?		
Yes	282	19.7%
No	1146	80.3%

Regarding Prevalence of myopia among health university students (Figure 1), a total of 696 (48.7%) students had myopia, which was in both eyes among 438 (62.9%), right eye among 150 (21.6%), and on left eye among 108 (15.5%). A total of 512 (35.9%) of the students wear glasses, 108 (7.6%) were lenses and 208 (14.6%) wear both. Wearing visual aids was for all day long among 403 (50.4%), but 252 (31.5%) wear most of the day and 144 (18%) wear occasionally.

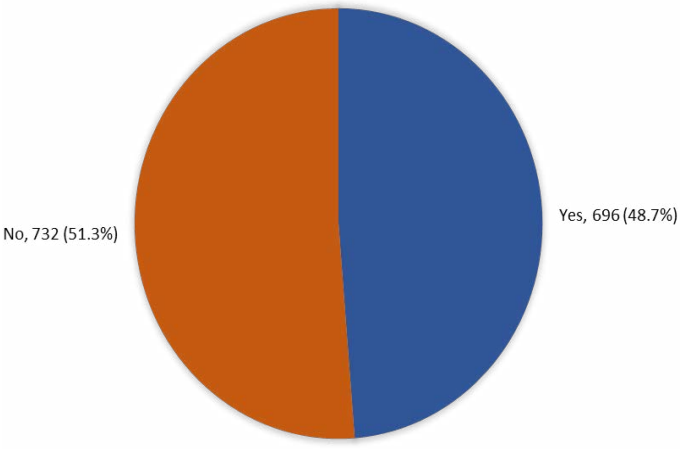

Figure 1. Prevalence of myopia among health university students, King Khalid University (n=1482)

Table 2. Health university students vision related behaviours, King Khalid University

Factors		Myopia				p-value
		Yes		No		
		No	%	No	%	
Do you have bad posture while reading or writing?	Yes	464	61.9%	286	38.1%	.001*
	No	232	34.2%	446	65.8%	
Do you have the habit of taking breaks after 30 minutes of continuous reading	Yes	360	52.9%	321	47.1%	.003*
	No	336	45.0%	411	55.0%	
How much time do you spend each day using digital device?	None	52	34.7%	98	65.3%	.001*
	Less than 1 hour	66	58.4%	47	41.6%	
	1-2 hours	88	53.0%	78	47.0%	
	2-3 hours	73	36.7%	126	63.3%	
	More than 3 hours	417	52.1%	383	47.9%	
What is your average sleep time per day?	Less than or equal 7 hours	408	53.4%	356	46.6%	.001*
	More than 7 hours	288	43.4%	376	56.6%	
How much time do you spend on near work every day?	Less than or equal to 2 hours	84	47.7%	92	52.3%	.001*
	2-4 hours	162	55.5%	130	44.5%	
	4–6 hours	217	52.3%	198	47.7%	
	6-8 hours	142	48.1%	153	51.9%	
	> 8 hours	91	36.4%	159	63.6%	
How much time do you spend outdoors every day?	< 1 hour	200	59.9%	134	40.1%	.001*
	1-2 hours	258	49.0%	268	51.0%	
	> 2 hours	238	41.9%	330	58.1%	
Do you exercise weekly?	Yes	334	52.2%	306	47.8%	.125
	No	362	45.9%	426	54.1%	
How frequently do you engage in sports practice	None	172	40.6%	252	59.4%	.096
	Irregularly	333	54.5%	278	45.5%	
	Regularly	191	48.6%	202	51.4%	
Do you use appropriate lighting for studying?	Yes	493	53.6%	426	46.4%	.001*
	No	203	39.9%	306	60.1%	
Do you practice any eye exercises?	Yes	195	55.6%	156	44.4%	.003*
	No	501	46.5%	576	53.5%	
How frequently do you wash your eyes at night?	None	207	39.4%	319	60.6%	.001*
	Irregularly	225	54.1%	191	45.9%	
	Regularly	264	54.3%	222	45.7%	

Table 3. Bivariate analysis of personal and medical factors associated with myopia among study health college students

Factors		Myopia				p-value
		Yes		No		
		No	%	No	%	
College	College of Dentistry	112	46.1%	131	53.9%	.040*
	College of Medicine	235	54.5%	196	45.5%	
	College of Nursing	115	45.6%	137	54.4%	
	College of Pharmacy	234	46.6%	268	53.4%	
Age in years	18-20	121	50.0%	121	50.0%	.806
	21-23	360	49.0%	374	51.0%	
	24+	215	47.6%	237	52.4%	
Gender	Male	305	44.5%	380	55.5%	.002*
	Female	391	52.6%	352	47.4%	
Do you have any eye diseases, Other than myopia?	Yes	350	71.1%	142	28.9%	.001*
	No	346	37.0%	590	63.0%	
Have you ever had any corrective refractive surgery before?	Yes	211	74.8%	71	25.2%	.001*
	No	485	42.3%	661	57.7%	
How often is visual assessment performed?	Every 6 months	220	72.6%	83	27.4%	.001*
	Every year	299	62.8%	177	37.2%	
	I don't go for visual assessment	177	27.3%	472	72.7%	
Do your parents have myopia	Father	178	52.7%	160	47.3%	.001*
	Mother	116	58.3%	83	41.7%	
	Both	196	67.8%	93	32.2%	
	Neither	206	34.2%	396	65.8%	

P: Pearson X^2 test
** P < 0.05 (significant)*

Table 4. Bivariate analysis of vision-related behavioral factors associated with myopia among study health college students

Factors		Myopia				p-value
		Yes		No		
		No	%	No	%	
Do you have bad posture while reading or writing?	Yes	464	61.9%	286	38.1%	.001*
	No	232	34.2%	446	65.8%	
Do you have the habit of taking breaks after 30 minutes of continuous reading	Yes	360	52.9%	321	47.1%	.003*
	No	336	45.0%	411	55.0%	
How much time do you spend each day using digital device?	None	52	34.7%	98	65.3%	.001*
	Less than 1 hour	66	58.4%	47	41.6%	
	1-2 hours	88	53.0%	78	47.0%	
	2-3 hours	73	36.7%	126	63.3%	
	More than 3 hours	417	52.1%	383	47.9%	
What is your average sleep time per day?	Less than or equal 7 hours	408	53.4%	356	46.6%	.001*
	More than 7 hours	288	43.4%	376	56.6%	
How much time do you spend on near work every day?	Less than or equal to 2 hours	84	47.7%	92	52.3%	.001*
	2-4 hours	162	55.5%	130	44.5%	
	4–6 hours	217	52.3%	198	47.7%	
	6-8 hours	142	48.1%	153	51.9%	
	> 8 hours	91	36.4%	159	63.6%	
How much time do you spend outdoors every day?	< 1 hour	200	59.9%	134	40.1%	.001*
	1-2 hours	258	49.0%	268	51.0%	
	> 2 hours	238	41.9%	330	58.1%	
Do you exercise weekly?	Yes	334	52.2%	306	47.8%	.125
	No	362	45.9%	426	54.1%	
How frequently do you engage in sports practice	None	172	40.6%	252	59.4%	.096
	Irregularly	333	54.5%	278	45.5%	
	Regularly	191	48.6%	202	51.4%	
Do you use appropriate lighting for studying?	Yes	493	53.6%	426	46.4%	.001*
	No	203	39.9%	306	60.1%	
Do you practice any eye exercises?	Yes	195	55.6%	156	44.4%	.003*
	No	501	46.5%	576	53.5%	
How frequently do you wash your eyes at night?	None	207	39.4%	319	60.6%	.001*
	Irregularly	225	54.1%	191	45.9%	
	Regularly	264	54.3%	222	45.7%	

P: Pearson X^2 test
** P < 0.05 (significant)*

Table 5. Multivariate logistic regression analysis of determinants of myopia among participants

Factors	p-value	AOR	95% CI	
			Lower	Upper
History of having any eye diseases, other than myopia	.001*	2.30	1.80	3.10
History of undergoing refractive error surgery	.001*	2.50	1.70	3.60
The usual reading distance more than 15 cm	.001*	0.59	0.46	0.75
Frequency of performing visual assessment every 6 months Vs. others	.001*	3.61	1.60	7.14
Frequency of performing visual assessment every year Vs. others	.001*	2.30	2.00	2.80
Had any parents with myopia	.020*	1.20	1.00	2.60
Have bad posture while reading or writing	.001*	2.20	1.70	2.90
< 1 hour spend each day using digital device	.001*	1.44	1.28	1.61
> 2 hours spend on near work every day	.007*	0.86	0.78	0.96
Use appropriate lighting for studying	.021*	1.40	1.10	1.90
Regular doing eye exercises	.047*	1.17	1.00	1.60

AOR: adjusted odds ratio
CI: Confidence interval
** P < 0.05 (significant)*

Table 2 shows that 750 (52.5%) of the study students reported having poor posture when writing or reading and 747 (52.3%) of the students were not taking breaks after 30 minutes of continuous reading. Eight hundred (56%) of the participants spent more than3 hours using digital devices daily, 764 (53.5%) reported having ≤7 hours of sleep. Also, 415 (29.1%) spent 4-6 hours or more daily doing near work, whereas 295 (20.7%) spent 6-8 hours daily. Likewise, 526 (36.8%) spent 1-2 hours outdoors daily and 568 (39.8%) spent more than 2 hours. Six hundred and forty participants (44.8%) reported a history of weekly exercise, and 393 (27.5%) reported regularly engaging in sports practice. The use of appropriate lighting for studying and practicing eye exercises was reported by 919 (64.4%) and 351 (24.6%) of the participants, respectively, while regular eye washing at night was reported by 486 (34%).

Table 3. Bivariate analysis of personal and medical factors associated with myopia among study health college students. Myopia was reported among 54.5% of College of Medicine students compared to 46.6% for College of Pharmacy students, 46.1% of College of Pharmacy students and 45.6% of College of Nursing students (P=.040). Also, 52.6% of female students had myopia versus 44.5% of males (P=.002). Myopia was detected among 71.1% of students with eye diseases, Other than myopia compared to 37% of others (P=.001), 74.8% of students who had had any corrective refractive surgery before versus 42.3% (P=.001), 72.6% of students who do visual assessment every 6 months compared to 27.3% of those who don't go for visual assessment (P=.001). and among 67.8% of students with both parents have myopia versus 34.2% of others with no parents had myopia (P=.001).

With regard to vision-related behavioral factors associated with myopia (Table 4), 61.9% of students who have bad posture while reading or writing had myopia versus 34.2% (P=.001), and 52.9% of students with the habit of taking breaks after 30 minutes of continuous reading had myopia compared to 45% of those who did not (P=.003). Additionally, myopia was detected among 58.4% of students who spend less than 1 hour each day using digital device compared to 34.7% of others who did not use (P=.001). Myopia was reported among 53.4% of students who sleep less than 7 hours daily (P=.001), and among 55.5% of those who spend 2-4 hours on near work every day compare to 36.4% of those who spend more than 8 hours. A total of 59.9% of students spend less than 1 hour outdoors every day had myopia compared to 41.9% of those who spend more than 2 hours (P=.001). Also, 53.6% of students of students who use appropriate lighting for studying had myopia versus 39.9% of others (P=.001), 55.6% who practice any eye exercises had myopia versus 46.5% (P=.003), and 54.3% of those who regularly wash their eyes at night versus 39.4% of others who did not (P=.001).

Table 5. Multivariate logistic regression analysis of determinants of myopia among participants. Among all included factors, what in the table 5 were the most significant predictors. Frequency of performing visual assessment every 6 months (OR=3.6), History of undergoing refractive error surgery (OR=2.5), History of having any eye diseases, other than myopia (OR=2.3), Frequency of performing visual assessment every year, Have bad posture while reading or writing (OR=2.2), spending less than 1 spend each day using digital device (OR=1.4), Use appropriate lighting for studying (OR=1.4), and Regular doing eye exercises (OR=1.17) were significantly associated with higher likelihood of myopia. On the other hand, the usual reading distance more than 15 cm (OR=0.59), and spending more than 2 hours on near work every day (OR=0.86) were significantly associated with low likelihood for myopia.

DISCUSSION

The current study aimed to assess the prevalence and factors associates with myopia among health students in King Khalid university. Up to researcher's knowledge, there is no information Regarding myopia among health university students at King Khalid University Furthermore it, That the risk factors described in other populations are similar to those of the study subject, so the goal of our work was to find out the extent of the spread Myopia in health university students as well as the study of risk factors to disease progression.

The current study showed that neatly half of the students reported having myopia which was in bilateral among two-thirds. About one-third of the students wear glasses, with less than 10% were lenses 14.6% wear both. Wearing visual aids was for all day long among half of them and one-third wear most of the day. Similar prevalence was reported by Makhdoum H et al. [24] where 57.3% of the students had myopia. Also, Alamri et al. [25] reported for the same prevalence among King Khalid University medical students as almost half of the participants were myopic. A lower prevalence was reported in Jazan by Abuallut II et al. [26] who assessed that the overall prevalence of myopia among medical students in Jazan University was 33.8%. Other studies reported similar prevalence as studies that had been conducted in Qassim (53.7%), and Riyadh (44.4%) [27, 28] but Alruwaili WS et al. [29] reported relatively high myopic prevalence among the students in Aljouf (74.1%). Internationally, the prevalence of myopia among medical students in Norway was found to be 50.3%, according to Midelfart A et al. [30]. This is almost exactly the same as the estimated prevalence established in the current study. Mozolewska-Piotrowska K et al. [31] reported a greater prevalence, demonstrating that 75% of ametropic eyes had myopia. After two years of follow-up, 50% of myopic students showed a statistically significant increase in their refractive error. Of the students who were initially emmetropic, 13% developed myopia. The higher educational attainment and academic duties of health students may account for the increased prevalence of myopia, since they tend to spend more time on near-work activities like reading and less time outside [32].

The current study also showed that family history of myopia was significantly higher among myopic students than others. This was also reported by Makhdoum H et al. [24] and many other research studies that proposed that family history with myopia may increase the probability of developing myopia [33, 34]. Also, over 75% of the individuals in our study worked close to screens. Furthermore, myopia development was more common in participants who read at a distance of less than 15 cm than in those who read from a distance of more than 15 cm. Myopia is more likely to develop in youngsters who w engages in near work, according to research from China and Australia [35, 36]. Reference to the current research, reading continuously for longer than thirty minutes raises the risk of myopia, maybe as a result of a longer accommodative lag. Furthermore, Dutheil et al. [37] discovered that working close to one's place of employment increased the likelihood that an adult will develop myopia by 21%. Still, this risk has not confirmed by many other researches [18, 33]. Other factors were associated with developing myopia among the current study participants including history of having any eye diseases, other than myopia history of undergoing refractive error surgery, history of having any eye diseases, other than myopia, frequency of performing visual assessment every year, have bad posture while reading or writing, spending less than 1 hour each day using digital device, use appropriate lighting for studying, and regular doing eye exercises. Similar results were reported by Wakode NS et al. [38] who documented that the average weekly reading time for myopic students was approximately 25 hours, while emmetropic students read for 10 hours on average. P=0.001 indicated statistical significance.

When comparing myopic students to emmetropic students, a strong and substantial correlation was shown for achievement in a carrier other than regular study (P=0.001). The combined hours spent on computer work, TV watching, and video gaming were statistically significant for myopia.

Our study was limited by the use of a self-administered questionnaire, which raises issues with recall and subjectivity. Also, it took the chance of using a non-representative sample by using a non-probability sampling technique (convenience). One of our study's advantages is the use of a validated and trustworthy questionnaire. Academic students were another group we chose for our sample since they would be more familiar with the vocabulary and survey questions.

CONCLUSIONS AND RECOMMENDATIONS

In conclusion, the current study revealed that nearly 1 out of each 2 students were myopic that affected both eyes among two thirds of them. Also, it is clear that the majority of myopic medical students' parents are similarly myopic. Therefore, a more significant genetic component might be involved in the development of myopia. Many other factors were associated with higher risk of myopia among the study students. This data could help health care professionals to develop targeted myopic control policies for the population of students in medical field & insure the policies are more rational, useful, & effective. Myopia has a very high public health burden, making screening programs and education essential for managing the condition and halting its progression.

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Competing Interest: None

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