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Factors affecting prevalence of myopia among undergraduate medical students: A cross-sectional study

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ABSTRACT

Background: Myopia, often known as nearsightedness, is the most common cause of vision impairment and is becoming more and more common globally. Presently it is effecting more among professional students who are busy in studies and having screen time more than usual. The aim of present study is to evaluate the factors affecting prevalence of myopia among medical undergraduates.
Materials and Methods: The present cross sectional study was conducted among 590 undergraduate medical students of Punjab Institute of Medical Sciences, Jalandhar, Punjab for a period of two months. The self-administered questionnaire was created and sent to students through google forms and whatsapp. Results were analyzed using SPSS version 25.0 keeping level of significance at p less than 0.05.
Results: Prevalence of myopia among undergraduate medical students was found to be 70.3%. Maximum students were in the age group of 21-25 years (62.7%), females (58.7%) were more in number as compared to males (41.3%). Total 42.2% of students have family history related to myopia out of which 77.1% had myopia. Association between sociodemographic, parental, lifestyle factors and prevalence of myopia was done; only parental history showed significant results with p value 0.003.
Conclusion: The current study revealed that there is high prevalence of myopia among undergraduate medical students specially in females. Positive parental history has significant association with prevalence of myopia.

1. Introduction

The most common kind of refractive error, myopia, is a complicated condition involving both environmental and hereditary variables. Myopia is the most common form of distance vision impairment worldwide and a major risk factor for vision loss. Different areas and ethnic groups have different prevalence rates for myopia, according to independent studies. In the last 50 years, the prevalence of myopia in Asian countries, has dramatically increased.[1] The increase in the prevalence of myopia has huge social, educational, and economic consequences to the society.[2]

Many research have tried to explain the myopia's etiology, however the specific cause of myopia remains unknown. The development of myopia is significantly influenced by environmental variables. The relationship between genetic and environmental variables and the genesis of myopia remains controversial, with conflicting results in different research.[3] A number of factors, including near-work load, occupation, education, income, outdoor activities, lens opacity, ocular dimensions, parental myopia, gender, and ethnicity, have been identified as potential risk factors for the development of myopia.[4–6] It has been suggested that near-work activities including writing,

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reading, using a computer or smartphone, and playing video games are to blame for the noticeable increase in the prevalence of myopia.[7] According to a research, those with higher incomes, nicer housing, higher education levels, and near-work related vocations have a higher prevalence of myopia.[8] Numerous epidemiological research suggested that spending more time outside could be linked to a lower incidence of myopia.[9] Youngsters with myopic parents appear to be more likely to develop myopia. According to the survey, the percentage of schoolchildren with both emmetropic parents who are 13.7±0.5 years old had 6.3% myopia, compared to 18.2% for children with one myopic parent and 32.9% for children whose parents are myopic.[10]

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.[11] Since they comprise the young elite population of the future society, more attention should be paid to their visual health. Hence the present study was conducted to determine prevalence of myopia among medical undergraduates and its determinants. By recognizing it, we can suggest some lifestyle modifications to reduce the development and progression of myopia.

2. Materials and Methods

The present cross-sectional study was conducted among undergraduate medical students of Punjab Institute of Medical Sciences, Jalandhar, Punjab for a period of two months. Ethical approval was taken from institutional review board before the commencement of study. Informed consent was taken from each student before participation in the study.

The sample size was calculated using following formula:

N = (Zα/2) 2* (PQ)/ E2,

where N = Sample size,

Zα/2 = Z value at 5% error (1.96),

P = Taken as 42.1% (11),

Q = 1-P and

E = Allowable error (taken as 10% of P)

N = (1.96) 2 * (0.421*0.579)/ (0.04) 2 N = 585 (minimum sample size)

Therefore, the final sample size taken in our study was 750 in our study.

The students were enrolled on the basis of following inclusion and exclusion criteria:

2.1. Inclusion criteria

All undergraduate medical students of Punjab Institute of Medical Sciences, Jalandhar, who were willing to participate.

2.2. Exclusion criteria

Students who have hyperopia, amblyopia, eye diseases, and history of refractive correction surgery.

For this study, myopia is defined as the need to use spectacles or contact lenses for distant vision.[12,13] The sensitivity and specificity of identifying myopia correctly by self reporting is quite high.[14] The five batches of undergraduate medical students were invited to participate in the study via a Google form link of questionnaire which was shared through official Whatsapp groups of undergraduate medical students. The self-administered questionnaire was created (by review of existing literature) and was internally validated by two senior faculty members of Department of Ophthalmology of the medical college. The repeatability of the questionnaire was checked by pre testing it on ten interns. The questionnaire consists of 3 sections:

1. Demographics: In this section of the questionnaire, data will be collected pertaining to the age, sex of the participants, place of residence, professional year, height and weight.
2. Parental history: This section of the questionnaire will focus on: family history of refractive errors, age when refractive error was diagnosed. This will help us in determining the prevalence of refractive errors in medical undergraduates and association of genetic factors with myopia.
3. Lifestyle: This section of the questionnaire will be used to explore the dietary habits of the students, the kind of daily activity and exercise habits of the students including eye exercises, hours of study, screen time, type of screen used, posture and distance from screen while using screen, sleep pattern, duration of day for which they wear glasses.

The Google form was set to accept only one response from one Google account, thus limiting duplication of responses. Data from the questionnaire was collected according to the scales for each question, this data was further analyzed and divided under the sections of demographics, refractive errors, dietary factors, daily activity and general practices. Content analysis for qualitative data was done. According to the questionnaire, students having myopia and students not having myopia were derived and compared. All the data was kept confidential.

Statistical analysis: Data was downloaded from Google form in the form of an excel sheet. The data was checked for incomplete data and inconsistencies. After removing the incomplete forms the total sample came out to be of 590 students. The sheet was imported in SPSS version 25. Prevalence of myopia was calculated. Association of sociodemographic, parental and lifestyle factors evaluated with the development of myopia using chi-square test. A p-value of less than 0.05 was considered significant.

3. Results

Prevalence of myopia among undergraduate medical students was found to be 70.3% as shown in Figure 1.

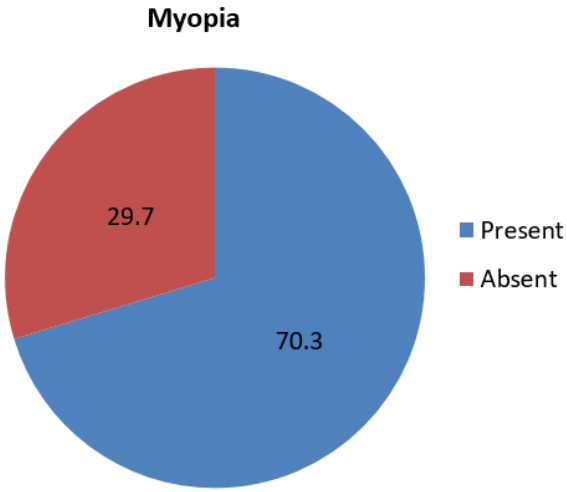

Figure 1: Showing prevalence of myopia among students

In the present study out of 590 students maximum student s were in the age group of 21-25 years (62.7%), followed by 18-20 years (36.8%) and greater than 25 years (0.5%). Female (58.7%) were more in number as compared to males (41.3%). Most of the students live in urban environment (73.7%). Maximum students who filled the form were of final prof (40.8%) and least was interns (18.5%) as shown in Table 1.

Table 1: Showing demographic characteristics of students

Variable		Frequency (%)
Age (in years)	18-20	217 (36.8)
	21-25	370 (62.7)
	>25	3 (0.5)
Gender	Male	244 (41.3)
	Female	346 (58.7)
Place of residence	Urban	435 (73.7)
	Rural	58 (9.8)
	Semi	97 (16.4)
Academic year	First prof	120 (20.3)
	Second prof	120 (20.3)
	Final prof	241 (40.8)
	Interns	109 (18.5)

57.8% of students do not have any family history related to myopia. Maximum students (38.3%) suffering from myopia are using spectacles for more than 5 years, 34.6% were using it from last 1 to 5 years and 27.1% were not using the spectacles as shown in Table 2.

Most of the students (44.7%) follow vegetarian diet. 56.3% students watch tv/tablets/read books at a distance of 1 foot away, only 4.7% read from 10 feet away. 72.5% students take sleep of less than 7 hours a day. The most frequent position while doing any work was sit with buttocks slipping forward. 30% of students have screen time of 3 to 4 hours a day. Maximum students (89.2%) do not perform any exercise related to eyes as shown in Table 3.

Table 2: Showing history of myopia among medical students

Variable		Frequency (%)
Parental history	In one parent	78 (13.2)
	In both parents	171 (29)
	Absent	341 (57.8)
Duration of using spectacles	Not using	160 (27.1)
	1 – 5 years	204 (34.6)
	More than 5 years	226 (38.3)

Table 3: Showing lifestyle factors related to myopia among medical students

Question	Options	Frequency (%)
What are your dietary preferences?	Eggetarian	72 (12.2)
	Gluten free	3 (0.5)
	Non vegetarian	242 (41)
	Vegetarian	264 (44.7)
	Vegan	3 (0.5)
	Others	6 (1)
At what distance do you read books or watch tablets/tv	1 foot away	332 (56.3)
	10 feet away	28 (4.7)
	2 feet away	230 (39)
How many hours of uninterrupted sleep do you take in 24 hours	Less than 7 hours	428 (72.5)
	More than 7 hours	162 (27.5)
Body posture while studying (sit with buttocks slipping forward)	Always	18 (3.1)
	Frequently	170 (28.8)
	Never	201 (34.1)
	Rarely	184 (31.2)
	Don't remember	17 (2.9)
Screen time a day	2 to 3 hours	129 (21.9)
	3 to 4 hours	177 (30)
	4 to 6 hours	114 (19.3)
	Less than 2 hours	59 (10)
	More than 6 hours	111 (18.8)
Frequency of performing eye exercise	No	526 (89.2)
	Yes	64 (10.8)

Association between sociodemographic, parental and lifestyle factors and prevalence of myopia was done and it was found that only parental history showed significant results with p value 0.003 as shown in Table 4.

Table 4: Showing association of sociodemographic, parental and lifestyle factors and prevalence of myopia among students

Variable		Myopia		P value
		Present	Absent	
Age (in years)	18-20	153 (70.5)	64 (29.5)	0.988
	21-25	260 (70.3)	110 (29.7)	
	>25	2 (66.7)	1 (33.3)	
Gender	Male	159 (65.1)	85 (34.5)	0.077
	Female	256 (73.9)	90 (26.01)	
Place of residence	Urban	39 (67.2)	19 (32.8)	0.058
	Rural	78 (80.4)	19 (19.6)	
	Semi	298 (68.5)	137 (31.5)	
Academic year	First prof	78 (65)	42 (35)	0.494
	Second prof	87 (72.5)	33 (27.5)	
	Final prof	170 (70.5)	71 (29.5)	
	Interns	80 (73.4)	29 (26.6)	
Parental history	Present	192 (77.1)	57 (22.9)	0.003*
	Absent	223 (65.4)	118 (34.6)	
What are your dietary preferences?	Eggetarian	52 (72.2)	20 (27.8)	0.479
	Gluten free	2 (66.7)	1 (33.3)	
	Non vegetarian	165 (68.2)	77 (31.8)	
	Vegetarian	6 (100)	0 (0)	
	Vegan	3 (100)	0 (0)	
	Others	187 (70.8)	77 (29.2)	
At what distance do you read books or watch tablets/tv	1 foot away	243 (73.2)	89 (26.8)	0.174
	10 feet away	17 (60.7)	11 (39.3)	
	2 feet away	155 (67.4)	75 (32.6)	
How many hours of uninterrupted sleep do you take in 24 hours	Less than 7 hours	301 (70.3)	127 (29.7)	0.992
	More than 7 hours	114 (70.4)	48 (29.6)	
Body posture while studying (sit with buttocks slipping forward)	Always	13 (68.4)	6 (31.6)	0.80
	Frequently	28 (68.3)	13 (31.7)	
	Never	102 (63.4)	59 (36.6)	
	Rarely	90 (68.7)	41 (31.3)	
	Don't remember	182 (76.5)	56 (23.5)	
Screen time a day	2 to 3 hours	88 (68.2)	41 (31.8)	0.709
	3 to 4 hours	131 (74)	46 (26)	
	4 to 6 hours	81 (71.1)	33 (28.9)	
	Less than 2 hours	39 (66.1)	20 (33.9)	
	More than 6 hours	76 (68.5)	35 (31.5)	
Frequency of performing eye exercise	No	369 (70.2)	157 (29.8)	0.776
	Yes	46 (71.9)	18 (28.1)	

4. Discussion

The purpose of the current study was to determine the prevalence of myopia and its associated factors among medical students at the Punjab Institute of Medical Sciences in Jalandhar, Punjab. Since myopia is becoming more commonplace worldwide, research has been done to determine the most likely causes of the condition. There is still much to learn about the mechanisms of myopia, although there is evidence linking hereditary and environmental variables to the condition. The prevalence of myopia is linked to a family history of the condition.[15,16]

In the present study out of all the students examined 70.3% were suffering from myopia. Abuallut II et al assessed that the overall prevalence of myopia among medical students in Jazan University was 33.8% which was lower than our results.[17] the results were similar to study done by Mozolewska-Piotrowska K et al who showed that Myopia was found in 75% of ametropic eyes.[18]

Most of the students were from age of 21 to 25 years (62.7%) out of which 70.3% were diagnosed with myopia . Female students (58.7%) were higher in number as compared to males and 73.9% of them were having myopia in current study. In a study conducted by Alamri AR et al showed that a significantly higher propertions of those having myopia were old, aged students > 25 years, male students which were dissimilar to our study.[19]

Total 42.2% of students have family history related to myopia out of which 77.1% had myopia. The results of parental history with myopia showed significant results in the research. In a study involving 4798 children between the ages of 16 and 18, Wu et al found that parental myopia increases the likelihood of developing myopia (OR=2.28, 95% CI=1.80–2.801).[20] It was discovered that having myopic parents was linked to a higher incidence of myopia in offspring in the Singapore Cohort Study of the Risk Factors for Myopia (SCORM).[21] According to these findings, myopia is significantly influenced by hereditary factors. But it's important to remember that lifestyle choices and behaviors have an impact, particularly when parents with narrow-minded views may raise their kids in similar environments.

The others factors related to lifestyle, dietary factors, screen time etc. does not show any significant results on myopia prevalence in our study. From the previous literature it was found that everyone uses computers and smartphones extensively in their daily lives. The development of myopia[22] is also influenced by the use of these devices. Myopia is observed to be more common in highly educated populations.[23] It has been demonstrated that near-work, especially continuous reading without breaks, can cause myopia.[24,25]

The limitations of the present study, include its cross–sectional setting, it's targeting of undergraduate medical students who might be more suitable for developing myopia due intensive reading and writing, and the relatively lower sample size in such type of studies.

5. Conclusion

The current study revealed that there is high prevalence of myopia among undergraduate medical students. Female students were affected than males. Positive parental history has significant association with prevalence of myopia. To stop the growth and burden of refractive errors, medical students need to be better informed about refractive errors in general, especially myopia, which is a prevalent disorder that can be detected early and managed.

6. Source of Funding

None.

7. Conflict of Interest

None.

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