



## Research Article

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### **STUDY OF RISK FACTORS IN MYOPIC INDIVIDUALS AMONG MEDICAL STUDENTS IN CHENNAI, TAMIL NADU**

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Myopia, near work, academics, medical students

#### ABSTRACT

**Background:** The incidence of myopia is increasing at an alarming rate. Investigating the causes of myopia gives us a better understanding of it. This gives us better odds of preventing the occurrence and retarding the condition's progression. The study used a method called stratified sampling to select 100 individuals who were near-sighted. They belonged to the age of 17-30 years old and pursued medicine in the district of Kanchipuram. The role of risk factors was assessed through a questionnaire. **Result:** The percentage of subjects with low, medium, and high myopia was 77, 18, and 5, respectively. The role of heredity, diet, academic performance, time spent doing near work, and outdoor work was indeed found to play significant roles in the development and progression of myopia. **Conclusion:** The incidence of myopia is constantly increasing, especially in Asian countries. To prevent myopia and its complications, we need to take significant steps to reduce the risk factors that can be changed.

#### INTRODUCTION

Myopia is a condition in which the near vision is clear but the distant vision is blurred and distorted. It is due to the refractive error of the eye causing the parallel rays of light to converge at a point in front of the retina thereby forming the image in front of the retina. The structural defect contributing toward myopia maybe the increased anteroposterior diameter of the eyeball

(most common cause), increased curvature of lens cornea or both. Although there are other causes for myopia like excessive accommodation, position of lens, increased refractive index of lens; the formerly mentioned two structural defects are the most common cause of simple myopia. Simple myopia is one of the clinical types wherein the short sightedness usually develops within 20 years of age, especially among school going children.

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Thus, also known as school myopia, juvenile myopia or developmental myopia. Myopia is not a life-threatening condition but Myopes carry higher risks of developing ocular morbidity which includes retinal detachment, glaucoma, myopic macular degeneration, and cataracts. Incorrectable visual impairment are seen in 4% of myopes and 39% of high myopes in individuals who are more than 75 years of age [1]. By 2050, the burden on myopia will be increased in 9.8% of the population who are high myopic and 49.8% of the population who are myopic. The prevalence of uncorrectable visual impairment is estimated to increase 13-fold by 2055 in high-risk areas. Myopia is diagnosed by performing clinical refraction it is usually corrected by concave lenses in the form of spectacles and contact lenses. Although the contact lenses are usually recommended for high myopic cases, many myopic individuals go for the contact lenses or even surgical intervention due to cosmetic purpose and discomfort of spectacles. The psychological picture of children with untreated myopia frequently changes. Because of their near-sightedness and poor vision, children and adolescents tend to be reserved, studious, and have little interest in outdoor activities [2]. Myopia is a silently growing epidemic which is going unnoticed mainly as it is posing no threat to life. There are several risk factors for a disease/condition to develop. Fortunately, there are more than one modifiable risk factors in case of myopia. In this study, we will analyse the influence of heredity (in relation to number of parents, siblings, second degree relatives affected with myopia as well), time spent in doing near work, outdoor work and sunlight exposure, diet habits and carbohydrates intake, academic pressure and performance in contributing towards developing myopia. Thus, curbing the various risk factors not only helps to prevent /delay the occurrence of myopia but also retard the progression of it.

## METHODOLOGY

As we assess the role of risk factors in myopia, individuals suffering from myopia are subjects of the study. Medical students suffering from myopia belonging to the age group 17-30 years in Kanchipuram were selected. A sample size of 100 were chosen to participate in the research. The role of risk factors was assessed through a semi structured questionnaire.

**Study method:** Cross sectional study design.

**Sampling method:** Purposive sampling method

**Inclusion criteria:** Participants must have a confirmed diagnosis of myopia based on refractive error of -0.5 dioptre or lower.

**Exclusion criteria:** Participants with severe eye diseases or conditions that may affect visual acuity or eye health (e.g., macular degeneration, retinal detachment) were excluded from the study.

**Study period:** The study was conducted during the period of May 2022- July 2022 after obtaining their informed consent to participate in the study titled “Study of Risk Factors in myopic individuals among medical students in Chennai-Tamil Nadu”. Ethics approval was obtained from Institutional Human Ethics Committee of Sree Balaji Medical College and Hospital.

## RESULT

Among the 100 myopic subjects, 29 were males, 71 were females. Regarding myopia, 77 were found to be low myopic; 18 were found to be medium myopic, 5 were found to be high myopic. They were not suffering from any other condition or disease affecting the eye. None of them had undergone any surgery involving the eye. The degree of influence of the risk factors are as follows:

### Role of heredity

The genetic role is one of the most crucial one in establishing myopia. Out of the 100 subjects, 35 of them have one of their parent sufferings from myopia, 5 of them have both their parents suffering from myopia. Majority of the study participants (60%) didn't have any parents suffering from myopia. Out of these hundred myopic subjects, 44 of them have one of their siblings suffering from myopia, 3 of them have two of their siblings suffering from myopia, and 2 participants have more than 2 siblings suffering from myopia. Majority of the study participants (51%) didn't have any of their siblings suffering from myopia (Table 1). The number of second-degree relatives of these subjects affected were analysed. Out of the 100 subjects, 23 of them have none of their second relatives suffering from myopia, 58 of them have 1-3 of their second relatives suffering from myopia, 12 of them have 3-6 of their second relatives suffering from myopia, 7 of them have more than 6 of their second relatives suffering from myopia.

### Role of indoor activity

Data on the number of hours spent on electronics; studying, reading and writing; doing near work hobbies before becoming myopic were collected and assessed. (Table 2)

**Table 1:** Number of parents, siblings and second-degree relatives of the subjects suffering from myopia as well

SNo	Variables	Frequency (n =100)	Percentage (%)
<b>1</b>	<b>No. of parents</b>		
	None	60	60
	One	35	35
	Both	5	5
<b>2</b>	<b>No of siblings</b>		
	None	51	51
	One	44	44
	Two	3	3
	More than 2	2	2
<b>3</b>	<b>No of 2° Relatives</b>		
	None	23	23
	1-3	58	58
	3-6	12	12
	>6	7	7

**Table 2:** Number of hours spent every day by the subjects in near work

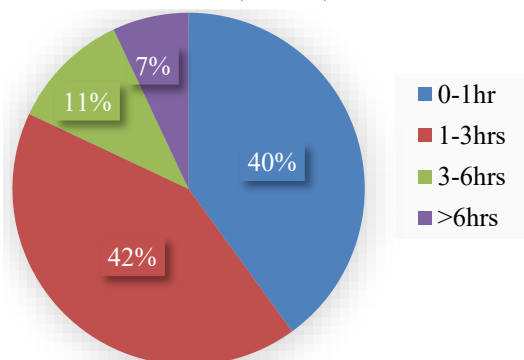
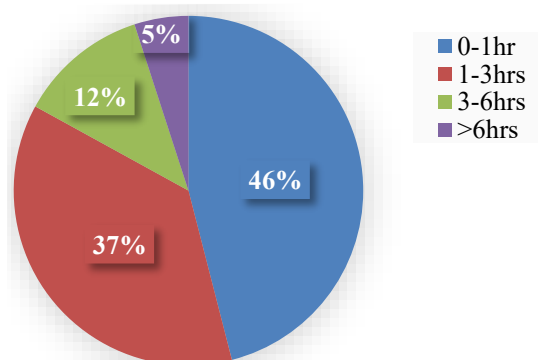
SNo	Indoor activity	Time spent (hour)			
		0-1	1-3	3-6	>6
1	Electronics (%)	17	38	25	20
2	Academics (%)	19	34	23	24
3	Near work hobby (%)	40	42	13	5

**Role of outdoor activity**

Data on the amount of time spent exposed in sunlight (Fig 1) and the amount of time spent doing outdoor activity (Fig 2) were collected and assessed. Majority of the study participants spent up to 3 hours in sunlight (82%) and doing outdoor activity (83%).

**Role of dietary habits**

Data on the intake of balanced diet and excessive carbohydrates were collected and assessed (Table 3)

**Fig 1:** Amount of time spent exposed in sunlight**Fig 2:** Amount of time spent doing outdoor activity**Table 3.** Diet and carbohydrate intake of the subjects.

SNo	Variable	No of subjects, n=100	Percentage (%)
<b>1</b>	<b>Degree of balanced diet consumed</b>		
	Excellent	9	9
	Good	50	50
	Fair	36	36
	Poor	5	5
<b>2</b>	<b>High carbohydrate intake</b>		
	Yes	54	54
	No	12	12
	Maybe	34	34

**Role of academics**

Data on the academic pressure experienced by these subjects and their academic performance were collected and assessed. Out of them, 21 reported their study pressure to be low, out of them, 45 reported their study pressure to be fair, out of them, 26 reported their study pressure to be high, out of them, 8 reported their study pressure to be very high. (Fig 3)

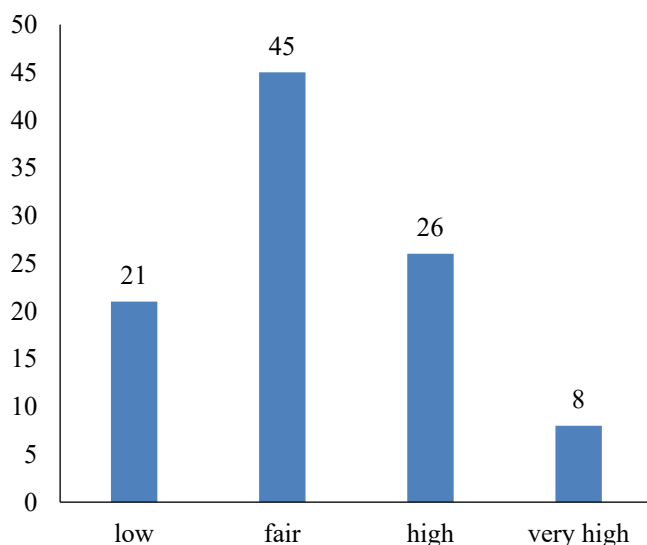
Regarding the academic performance, out of these 100 myopic individuals 3 stated their academic performance to be less than 50 percent, 15 stated their academic performance to be between 50-70 percent, 52 stated their academic performance to be between 70-90 percent, 30 stated their academic performance to be above 90 percent. (Fig 4)

**DISCUSSION**

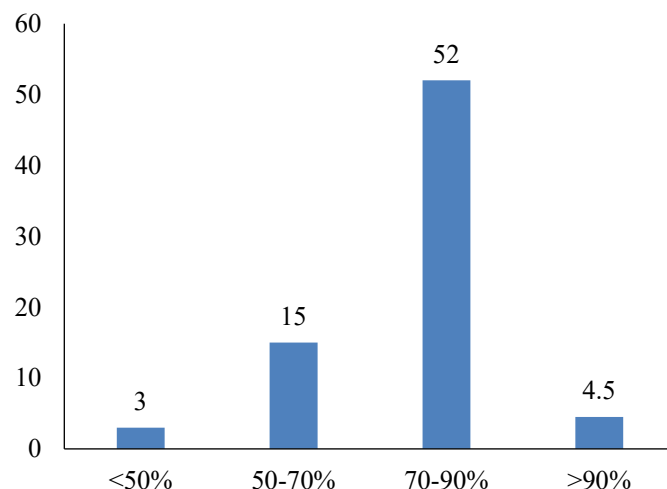
In school-age and college going cohorts, the prevalence of myopia rises, surpassing 20–25 % in the adolescents and 25–35 % in young adults in the United States and other developed nations. Some parts of Asia reported much higher prevalence. Over the age of 45, myopia prevalence starts to slightly diminish. According to certain studies, myopia is more common in women than in men [3].

Numerous studies have found that children with myopic parents are more likely to have the condition than children with normal parents. It is also reported that having two myopic parents is riskier than having just one [4]. This study adds more evidence to the role of heredity in myopia. Increased exposure to bright light and spending less time focusing on close objects have both been suggested as possible protective mechanisms, although both theories have not yet been proven [5]. Myopia is positively correlated with familial history and reading activity as determined by the number of books read in each week [6]. Myopia is also positively associated to educational level and educational stream. There was an association observed between reported increased close-up activity in children and tuition going children [7]. Although the role of diet is still controversial, certain researchers do claim increased carbohydrate intake increases the incidence of myopia [8]. Children who developed myopia consumed more food ingredients overall than myopic children did. The energy consumption, protein, fat, and carbohydrate intake showed statistically significant difference among myopes and non-myopes ( $p < 0.05$ ) [9].

Our study also describes the role of genetics (increased risk when first, second degree relatives are also myopic), increased near work, decreased outdoor activity, decreased sunlight exposure, increased academic pressure, increased academic performance and diet rich in carbohydrates in the development of myopia. Most near-sighted patients see marked improvement with treatment. Early and timely treatment of myopia helps in preventing the social and academic challenges that can come along with impaired vision [10].



**Fig 3:** Role of study pressure



**Fig 4:** Academic performance

### CONCLUSION

The results of the study thus suggest that there are various environmental, dietary, academic and genetic risk factors in establishing myopia. Majority of these factors are modifiable. Thus, eliminating these factors serve as primary prevention of the condition. Myopia is a silently growing epidemic that poses the individuals to the risk of vision morbidity. Since myopia usually develops during primary and secondary education, sufficient measures must be taken in both home and school to eliminate or minimise these risk factors in order to curb this growing epidemic.

### FINANCIAL ASSISTANCE

Nil

### CONFLICT OF INTEREST

The authors declare no conflict of interest

### AUTHOR CONTRIBUTION

Seshadhri Arumugam designed the entire work. S. Balabaskaran, B. A. Abhilash, K. Sowmiya, Krishna Prasanth Baalann, and B. N. Surya contributed to making necessary corrections and revision of the manuscript. All the authors checked the final draft.

### REFERENCES

- [1] Optometric clinical practice guidelines, care of the patient with myopia. Available from <https://www.aoa.org/documents/optometrists/CPG-15.pdf> accessed on 27 June 2019.
- [2] Khurana AK, Khurana B, Khurana AK. Comprehensive Ophthalmology. 7th edition. India: Jaypee Brothers Medical Publications; 2019: 39-41.

- [3] Theophanous C, Modjtahedi BS, Batech M, Marlin DS, Luong TQ, Fong DS. Myopia prevalence and risk factors in children. *Clin Ophthalmol* **12**, 1581-7 (2018)
- [4] Goldschmidt E, Jacobsen N. Genetic and environmental effects on myopia development and progression. *Eye (Lond)* **28**, 126-33 (2014)
- [5] Saw SM. A synopsis of the prevalence rates and environmental risk factors for myopia. *Clin Exp Optom* **86**, 289-94 (2003)
- [6] Saw SM, Hong CY, Chia KS, Stone RA, Tan D. Nearwork and myopia in young children. *Lancet* **357**, 390 (2001)
- [7] Saw SM, Wu HM, Seet B, Wong TY, Yap E, Chia KS et al. Academic achievement, close up work parameters, and myopia in Singapore military conscripts. *Br J Ophthalmol* **85**, 855-60 (2001)
- [8] Berticat C, Mamouni S, Ciais A, Villain M, Raymond M, Daien V. Probability of myopia in children with high refined carbohydrates consumption in France. *BMC Ophthalmol* **20**, 337 (2020)
- [9] Rafat R, Shaneshin M, Dorosti A. Association between nutrition and likelihood of myopia among children in Eslamshahr. *Iranian Journal of Endocrinology and Metabolism* **15(2)**, 158-165 (2013)
- [10] Nearsightedness (Myopia) available at <https://www.healthline.com/health/nearsightedness> accessed on 27 June 2019