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Epidemiology Study of Myopia

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Abstract
Myopia is one of the most prevalent eye disorders and has emerged as a significant public health concern globally. It is a major refractive error, affecting an estimated one-third of the global population. The rising prevalence of myopia carries substantial social, educational, and economic implications for society. In urban India, school myopia has reached epidemic levels. A study will be conducted involving all patients visiting the Ophthalmology outpatient department at NIMS Medical College and Hospital during the specified period. Myopia was diagnosed through a comprehensive ophthalmological examination, and patients were categorized into four groups based on age. In India, uncorrected refractive errors are the leading cause of visual impairment and the second most significant cause of preventable blindness. The overall prevalence of myopia in our study was found to be 0.16. Consequently, the public health and economic ramifications of myopia are substantial. The global prevalence of myopia has seen a recent increase. Previous research indicates that the ages of 9 to 16 years represent a critical period for the development of adolescent myopia. In alignment with earlier studies, we discovered that refractive development is influenced by both environmental and genetic factors for the refractive errors myopia and hyperemia, From present study it can be concluded that genetic factors plays an important role. Interaction between lifestyle and genetic susceptibility in myopia. Present study it can be concluded that high using of computer, using of more near work, watching television. Lifestyle influences the genetic e effect in children in developing myopia.

Keywords: WHO-World health organization, RD-Retinal Detachment, NGO-Non government organization, MMD-Myopic macular degeneration

Introduction
Parallel rays of light coming from infinity are focused in-front of the retina, with accommodation being rest

Types of classification: Age of onset, Degree of myopia, Clinical classification

Age of onset
Congenital Myopia, Early adult -onset Myopia (up to 20 years of age), Adult -onset Myopia (20- 40 years of age), Late -adult onset Myopia (40-60 years of age).

Degree of myopia-
Low myopia(up to 3D) ,Moderate Myopia(3D-6D) ,High Myopia (above 6D).

Clinical classification
Congenital Myopia, Simple / Developmental Myopia, Pathological/ Degenerative Myopi, Acquired-Myopia

How does pathological myopia affect the retina?
Retinal-atrophy, Lattice-degeneration, Choroid-neo-vascularisation Macular degeneration, Foster-Foch's-spot.

Risk factors
Inheritance, Premature birth, Systemic association, Down syndrome, Mar fan's syndrome, Stickler syndrome, Pierre-robin syndrome.

Degree of myopia	Visual acuity (rough estimate)
-0.50 D	6/9 -6/12
-1D	6/18
-1.50D	6/24
-2.00 D	6/36
-3.00 D	6/60
-4.00D	4/60
-5.00 D	3/60
-6.00 D	2/60

Signs
Eye large,Deep AC ,thinning of Sclera , Sluggishly reacting pupil

Symptoms
Low degree of vision for distance, Asthenopic symptoms, Excessive accommodation, Convergence weakness.

Treatment
Appropriate concave lenses, Contact lens, Refractive surgery - RK, LASIK

Aims& Objectives
To study prevalence of Myopia.
To study distribution of myopia in different age group.

Objectives: To screen all the patients between the age of different group of either gender coming to ophthalmology OPD in NIMS hospital.

Materials and Methods
Methods: A Prospective, observational study.

Study period: From Sep-2019 to mar 2020.
The study will be conducted on all patients visiting the Ophthalmology OPD at NIMS Medical College and Hospital during the specified period. Myopia was diagnosed through a comprehensive ophthalmological examination. The patients were categorized into four groups based on age: Group A: Patients aged 0-10 years. Group B: Patients aged 10-20 years. Group C: Patients aged 20-30 years. Group D: Patients aged 30-40 years.

Sample size
The sample size of a survey most typically refers to the no of units that were chosen from which data were gathered. In practice the sample size is determined based on the expense of data collection and need to have sufficient statistical power.
It may be calculated by-

$n = (Z_{1-\alpha})^2(P(1-P)/D^2)$

Reference: Kish, L. (1965). Survey Sampling. New York: Wiley where -

- $(Z_{1-\alpha}) = Z_{0.94}$= 3.84 (from normal distribution table α

  This value of 1.96 is standard for confidence interval of 95%

- P = Expected prevalence

=I/d(I is incidence, d is duration**)**

D = 5% = 0 .05 (D is the determination of absolute precession)

$n = 3.84(0.06(0.94)/0.05^2$
$=3.84((0.0564)/0.0025)$

So, the sample size required= 80

Reference article: Lei Yu, Zhi -Kui Li, Chang - Tai Xu Epidemiology and genetics of myopia
Accepted article 18- 11-2011

Following parameters were measured for each right and left eye-

- Un-corrected visual acuity (UCVA).
- Un-corrected refractive error

Inclusion Criteria
Patients of age group 0-40 years, of either gender, coming to Ophthalmology OPD in NIMS hospital diagnosed with myopia, Patients who are willing to give written informed consent for the study.

Exclusion criteria
Patients with macular pathologies.
Patients with history of systemic diseases like diabetes mellitus, hypertension.
Un-cooperative patients.

Collection of data: it includes methods of assessment including Auto-refractometre reading, Retinoscopy, Subjective refraction, study response, habitation type.

Observation & Results
This study deals with the analysis and interpretation of data. In order to have results of the investigation at a glance they are presented in tubular and graphical form. Present study done over a period of six months from October 2019 to march 2020.

Table 1: Age wise distribution of myopic patients.

Age Group (In yrs)	No of patients	Percentage
0 - 10	11	13.75%
10 - 20	17	21.25%
20 - 30	42	52..5%
30- 40	10	12.5%
Total	80	100%

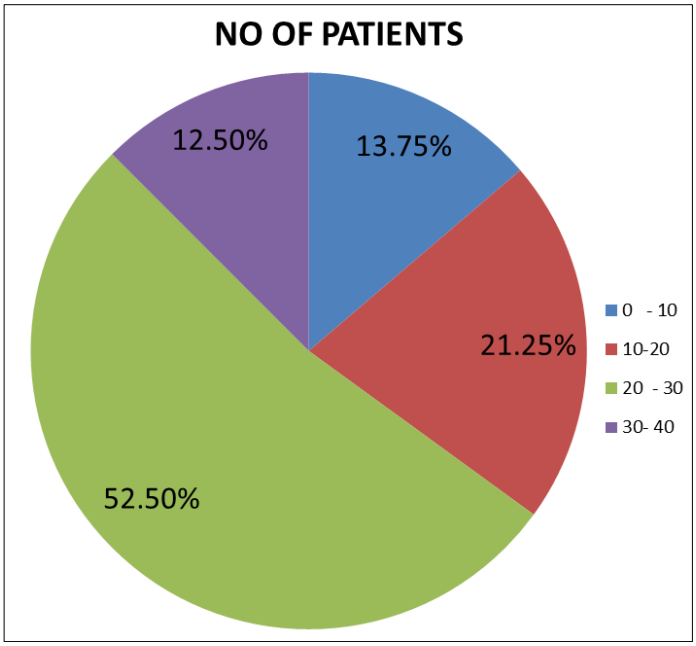

Fig 1: Pie - chart (Picto-diagram) - showing distribution of myopia according to age group

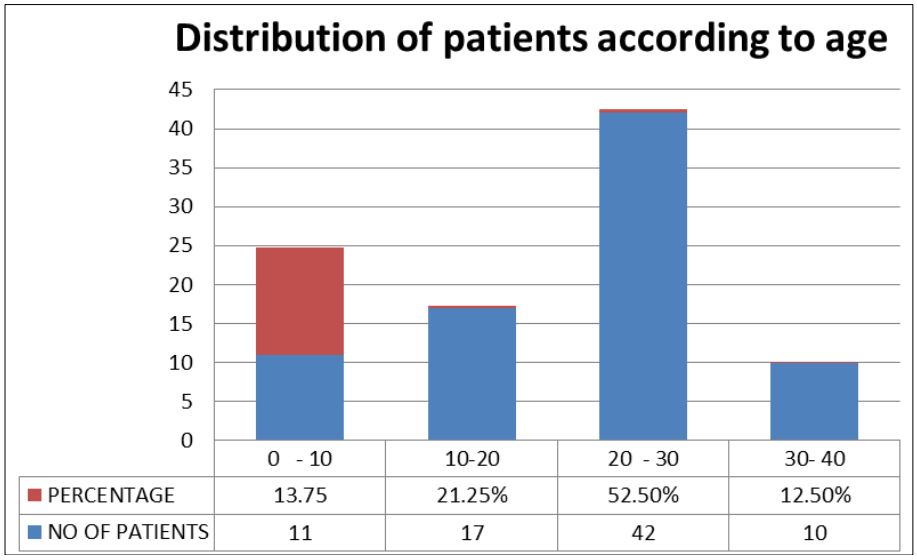

Fig 2: Bar diagram showing distribution of myopia according to age group.

Prevalence = The amount of disease at one particular point in time.

$$\text{Prevalence} = \frac{\text{no of people with disease}}{\text{No of people in the population}}$$

$$\text{Prevalence in \%} = \frac{\text{No of disease in population} * 100}{\text{No of people in population}}$$

Table 2: Prevalence of Myopic patients

Age group (in years)	Prevalence
0-10	0.11
10-20	0.17
20-30	0.47
30-40	0.08

Table 3: Graph depicting prevalence of myopic patients in various age groups.GE GROUP (in yrs)

GE Group (in yrs)	No of males (%)	No of females (%)	Total no of patients
0 - 10	6 (54.5%)	5 (45.5%)	11
10 - 20	9 (52.9%)	8 (47.1%)	17
20 - 30	20 (47.6%)	22 (52.4%)	42
30- 40	5 (50%)	5 (50%)	10
Total	40	40	80

Discussion

Myopia is the most prevalent eye disorder globally. It poses a significant public health challenge on a worldwide scale. It ranks as a primary cause of visual disability across the globe. In India, uncorrected refractive errors are the leading cause of visual impairment and the second major contributor to avoidable blindness. The overall prevalence of myopia in our study was recorded at 0.16. Consequently, the public

health and economic ramifications of myopia are substantial. Recently, the prevalence of myopia has risen globally. Prior research indicates that the ages of 9 to 16 years represent a critical period for the development of adolescent myopia. In alignment with earlier studies, we observed that the prevalence of myopia was most pronounced among individuals aged 20 to 30 years. Currently, there is no consensus regarding the prevalence of myopia between males and females. The prevalence rates of myopia do not differ significantly between boys and girls, although boys exhibit a slower progression compared to girls. Previous research has indicated that having a parent with myopia, even if only one parent is affected, increases the risk of juvenile myopia. Numerous studies have indicated that schoolchildren who engage in near work are more likely to develop myopia than their peers who spend less time on such activities. However, it is important to note that some researchers have suggested a positive correlation between higher education levels and the incidence of myopia.

Many cross-sectional studies have reported considerable variations in ethnic background, and different locations. Variation in the prevalence of myopia in different geographical areas has also been widely reported. Considerable regional differences exist from country to country even within the same geographical area. Prevalence rate in East Asia and southern Asian countries were found to be generally higher than other parts of world.

Jones *et al*. discovered that a threshold of approximately 2-3 hours of outdoor activity per day may be necessary to prevent myopia. High ambient light levels could trigger dopamine release from the retina and promote vitamin D synthesis in the body. Exercise is linked to a reduced incidence of myopia and represents a significant, potentially modifiable risk factor that could be targeted in future public health initiatives. Prevalence in children - Evaluating refractive errors in young children poses both technical and logistical challenges. The use of cycloplegia followed by retinoscopy or auto-refraction is a widely accepted method for assessment. Numerous cross-sectional studies have indicated substantial variations based on ethnic backgrounds and geographical locations. The differences in myopia prevalence across various regions have also been extensively documented. Significant regional disparities exist from one country to another, even within the same geographical area. The prevalence rates in East Asia and southern Asian nations tend to be notably higher than in other regions of the world. Prevalence in adults - The prevalence of myopia in older adults is generally lower than that in younger adults. Data from various studies indicate a significant decline in prevalence with age among individuals over 43 years old. In older individuals, index myopia is more pronounced than axial myopia due to lens nuclear sclerosis. For many years, myopia has been recognized as highly heritable; particularly, genome-wide association studies (GWAS) have successfully identified numerous common genetic variants linked to refractive errors. It is evident that this trait is complex, involving many genetic variants of minor effect that are expressed across all retinal layers, often with known functions in neurotransmitter or extracellular matrix processes. While myopia is significantly influenced by environmental factors, it has long been acknowledged to run in families, indicating a genetic predisposition. Early linkage studies and candidate gene investigations have identified up to 50 loci and genes, however, these findings have not been confirmed in replication studies. A recent investigation involving urban school children in Delhi indicated that increased time spent on near activities, such as reading and playing computer games, posed risk factors for myopia, while greater outdoor time was found to be protective. Additional risk factors for myopia included height and tobacco usage, with the measurement of axial length being correlated with height. The current use of tobacco has been linked to nuclear opacity and nuclear sclerosis, which have been reported to be associated with myopia, as noted in The Handan Eye Study. Among the environmental factors, the high-pressure educational systems, particularly at very young ages in countries like Singapore, Korea, and China, contribute to myopia due to the excessive use of near electronic devices. Other suggested causes include light levels, which may be directly related to time spent outdoors, promoting axial growth. Myopic macular degeneration (MMD) is a significant cause of vision impairment in individuals with high myopia. Various terms are utilized, including MMD, myopic retinopathy, myopic maculopathy, and myopic choroidal neovascularization. MMD encompasses signs of diffuse chorioretinal atrophy, patchy chorioretinal atrophy, lacquer cracks, and related atrophy, all of which are associated with high myopia, as reported by WHO in 2015. One study predicts that the prevalence of myopia and high myopia will significantly rise globally, potentially affecting nearly 5 billion people and 1 billion individuals by 2050. These findings have crucial implications for the planning of comprehensive eye care services, including refractive solutions such as spectacles, as well as the management and prevention of ocular complications and vision loss. The global epidemiology of myopia, as discussed by Saiko M and Cheng Ching, elaborates on the worldwide epidemic of this condition: 1 - In East Asian countries, the prevalence of myopia among school children is 36.4% in Taiwan, 34.77% in Singapore, 30.8% in Songhai, and 14% in Malaysia. 2 - In other Asian countries, the prevalence of myopia is generally lower. In the urban population of New Delhi.

Conclusion

- The prevalence of myopia was found to be higher in school and college going students.
- The prevalence of myopia is greater in between age group 20-30 years.
- The prevalence of myopia is equally distributed in males and females.
- The prevalence of myopia is higher in urban population in adolescent and young adults.
- It is important to develop public policies and preventive measure to retard the epidemic myopia.

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