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Research Article

Study of Prevalence of Refractive Errors in School Children of Villupuram & Puducherry

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Abstract: Refractive Error (RE) is a common cause of visual impairment among school children in low and middle income countries which has been confirmed by a series of studies conducted during the last decade. Aims of the study were to study the prevalence and determinants of refractive errors in male and female children aged 9 – 14 years. This study also compares with similar studies worldwide for commonality and inferences which show that prompt detection and appropriate correction can reduce the visual morbidity due to amblyopia. This was a cross sectional study on 1460 school children of 9-14 years age group in two private schools of Puducherry and Villupuram. Students were screened for defective vision with the help of Snellens' chart and pin hole test. An optometrist confirmed the findings. Comprehensive ocular examination was done by an ophthalmologist for those who did not improve with spectacles. Data was analyzed to understand prevalence of refractive errors in children. Data analysis was done with the Chi-square / Fischer Exact test. Results were as follows. 53.6% of the study population were boys and 46.4% were girls. The prevalence of refractive error in school children was 7.46%. The prevalence of myopia, hypermetropia and associated astigmatism in children were 6.85%, 0.61%, 1.64% respectively. Children 12 to 14years attending urban schools were most likely to have uncorrected myopia. To conclude, the prevalence of uncorrected refractive error, especially myopia, was high in school children. Regular ophthalmic screening of school children is recommended and collective responsibility is the strategy.
Keywords: Refractive Error, children, myopia, Villupuram, Puducherry, school screening

INTRODUCTION

Refractive errors (RE) are optical imperfections that prevent the eye from properly focusing light on the retina, causing blurred vision. The primary refractive errors are myopia, hyperopia and astigmatism. The World Health Organization (WHO) has grouped uncorrected RE among the leading causes of blindness and visual impairment in the world [1]. Childhood blindness is considered as one of the priorities in Vision 2020– Right to sight [2]. It is estimated that there are 1.4 million blind children in the world, two thirds of whom live in developing countries and of all these children it is estimated that 2, 70,000 live in India [3].About 80% of this is avoidable blindness, although a large number of those affected remain blind due to lack of appropriate access to eye care [4].

During the last decade, studies confirmed that the prevalence of uncorrected refractive errors is high for children in low and middle income countries and have extensive social and economic impacts, such as limiting educational and employment opportunities of economically active persons, healthy individuals and communities [5]. Uncorrected refractive error may have larger impact on the learning capability and potential of school children. Timely detection and intervention can improve a child's potential tremendously during the formative years [6]. For India to continue to reap the benefits of the on-going demographic transition, it is vital that the younger population need to be physically healthy and the country needs to address the health issues urgently[7].

MATERIALS AND METHODS

This was a cross sectional study. The study was given ethical clearance by the ethics committee of Sri Lakshmi Narayana Institute of Medical Sciences. It was carried out in two private schools, one in Villupuram, a small town near Puducherry and the other in Puducherry. The study group comprised of all the school children in the age group of 9– 14 years. A pilot study was conducted and a questionnaire was finalized in order to collect information from the students. The distant vision of a child was tested utilizing Snellens' chart. The visual acuity was tested at 6 meters and if

uncorrected vision was less than 6/9 in either eye, the child was declared to have defective vision. All students with defective vision were examined by the refractions. Vision was repeated with pin hole and appropriate spectacle correction was given. Children already wearing spectacles were also examined and any change in refractive error was noted.

Myopia was considered when the measured refraction was more than or equal to −0.5 dioptres spherical equivalent in one or both eyes. Hypermetropia was considered when the measured objective refraction was greater than or equal to +1.00 dioptres spherical equivalent in one or both eyes. Astigmatism was considered to be visually significant if ≥1.00 D. The visual acuity, types of refractive error and spectacle correction were noted down. Children with other ocular problems were referred to the department of ophthalmology inSri Lakshmi Narayana Institute of Medical Sciences, for a comprehensive ophthalmic examination by an ophthalmologist and prescribed accordingly. The data was entered and analysis was done.

Statistics

Statistical Chi-square/ Fisher Exact test was done to find the significance of study parameters on categorical scale between two or more groups.

RESULTS:

The study population comprised of 1460 students. All the children were screened for defective vision with the help of Snellens' chart. The study group had 46.4%girls and 53.6% boys in both schools. 35.34% and 64.66% children belonged to the age group of 9 – 11 and 12-14 years respectively. Out of 1460 students (100%), 8.84% have visual impairment, (Figure 1)out of which 84.49% were confirmed to have refractive errors, leaving the remaining 15.5 % to other causes (figure 2). 91.74% had myopia and 8.26% had hyperopia (figure 3). Of the myopes, 24% had associated astigmatism(figure4). The other causes were mainly amblyopia, squint, corneal opacity, cataract, iris coloboma and optic atrophy (figure 5). Another important inference was that only 11.93% students were wearing glasses, the rest 88.07% were still uncorrected (figure 6).

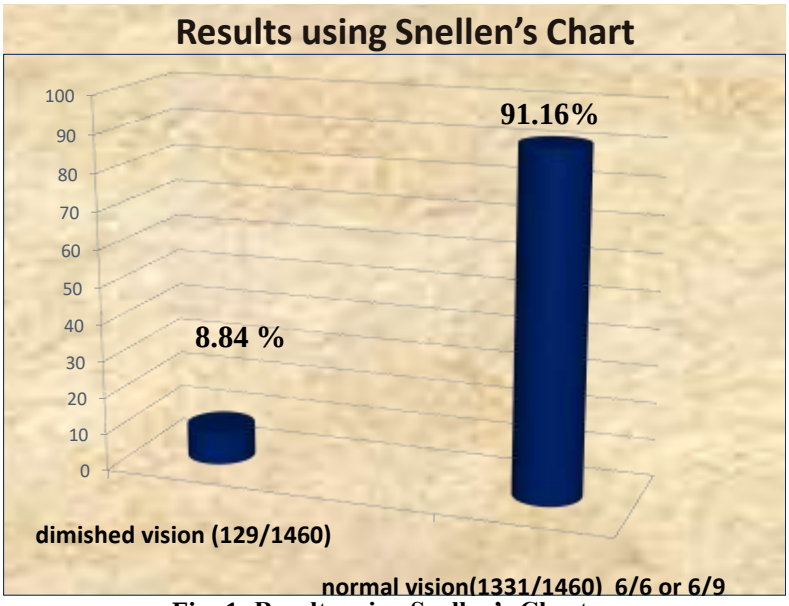

Fig- 1: Results using Snellen's Chart

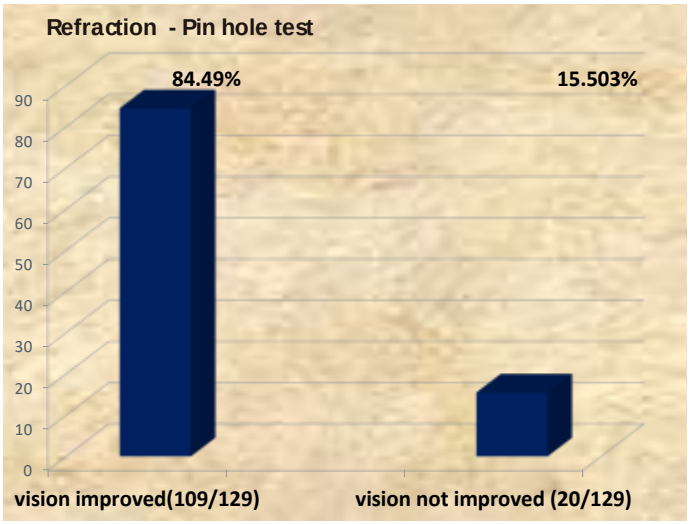

Fig-2: Refraction –pin hole test

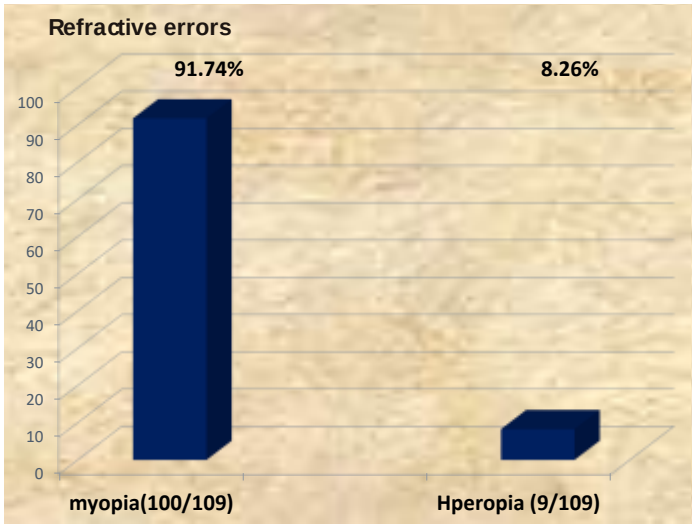

Fig- 2: Refractive errors

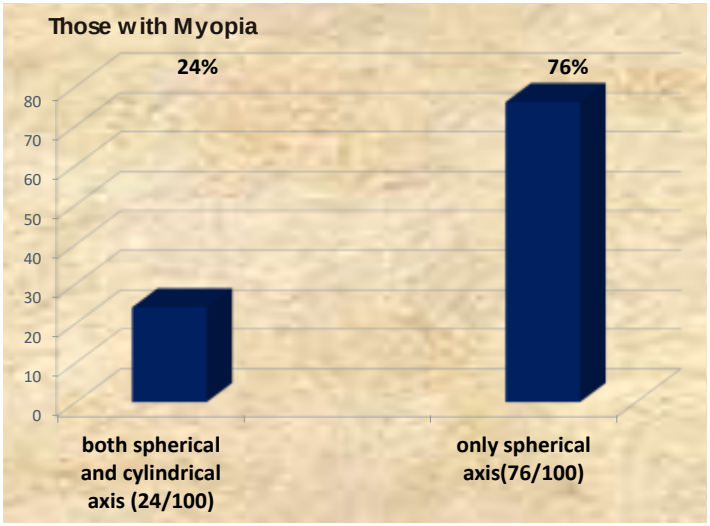

Fig-4: Myopia

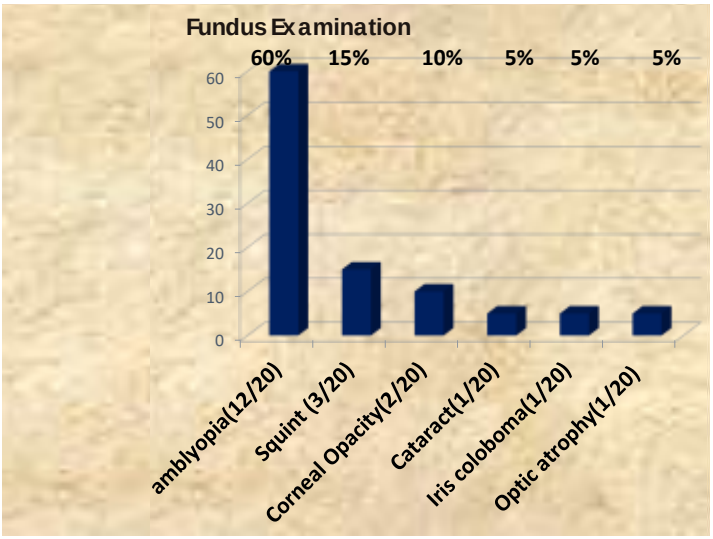

Fig-3: Fundus Examination

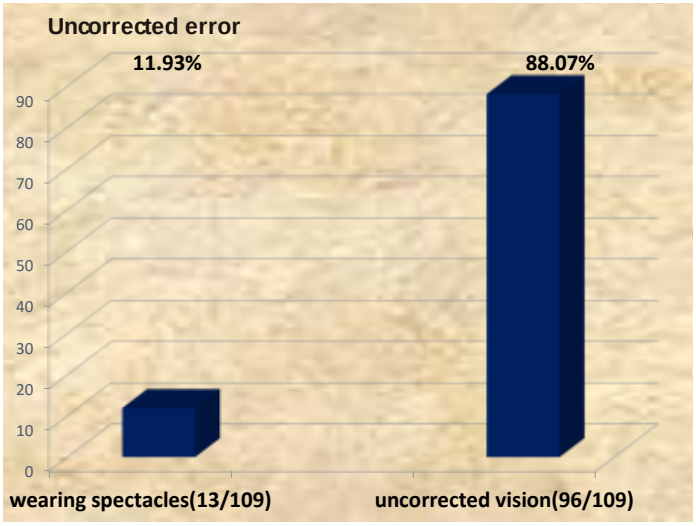

Fig-4: Uncorrected error

The number of boys and girls with refractive errors were almost similar in this study-

Boys = 56/109 (53.21%)
Girls = 53/109(46.79%)

Myopia was the commonest type of refractive error followed by astigmatism and hyper metropia [Table 1]. We further classified myopia according to severity into high, moderate and low myopia[Table 2]. Association of socio-demographic variables-age and gender, with types of refractive errors were studied [Table 3].

Table-1: Distribution of Type of Refractive Errors among Cases (of refractive error) and the Study Group (total no. of school children)

Type	No of Children	% among the cases	% among the study group
Myopia	76	69.72%	5.21%
Hyperopia	9	8.25 %	0.62%
Myopic Astigmatism	24	22.02%	1.64%
Total	109	100%	7.47%

Table-2: Severity of myopia

	<-3D	-3D to -6D	>-6D	Total
No. of Cases	91	9	0	100

Table-3: Association of Socio-Demographic Variables with Type of Refractive Errors

Socio-demographic variables	Myopia N=76	Hyperopia N=9	Astigmatism N=24	p value
Age (yrs)				0.017
9-11	17 (22.37)	6 (66.66)	6 (25)	
12-14	59 (77.63)	3 (33.33)	18 (75)	
Gender				0.441
Boys (56)	39	3	14	
Girls (53)	37	6	10	

DISCUSSION

It is found that the school health services are very minimum and there are no extra facilities provided other than those of utmost importance. The prevalence of refractive error in this study population was 8.84% similar to the prevalence rate observed by Pavithra MB *et al.;* (2013) in Bangalore (7.03%) [6], GVS Murthy et al (2002) in New Delhi (6.4 %.)[8], Kumar *et al.;* Lucknow (7.4%) [9] and Sriram C in Tamil Nadu(7%)[10].Similar studies from different parts of the world showed a prevalence of (8.2%) in Baltimore (USA) [11], (12.8%) in Shunyi district in China [12], (2.9%) in Nepal [13], (15.8%) in Chile[14]. Myopia was the most common type which constitutes for 69.72% of the refractive errors. Myopic astigmatism was seen in 22.02% and hyper metropia was seen in 8.25% of the cases. Similar results were found in other Indian studies. [6, 15]

The prevalence of refractive errors was found to be more in the older age group of 12-14 years (8.47%) than in the younger age group of 9-11 years (5.6%). This is similar to studies conducted in Bangalore (7.5% in 13-15 years age group and 6.6% in 7-9years age group) [6] and Ahmedabad (40% in 17 years old students compared to only 6.7% in 11 year old children.) [15]. S Matta *et al.;* in their study found that prevalence of refractive error increased with increasing age especially in the age group of 10- 14 years [16].

The number of boys and girls with refractive errors were similar in this study and hence no sex predilection noted here. However some studies show evidence of increased prevalence in female students [17, 18], which was attributed to the earlier attainment of puberty by girls with respect to boys. This was in contrast to the findings of Sriram C *et al .;* in their study in Tamil Nadu which showed refractive errors more in male children(21.5%) than female children(17%) [10].

Also it was found that in myopia, the association with increasing age was significant (p=0.017) but gender was not significantly associated (p=0.441). This is similar to a study conducted in Nepal [11]. The current study shows that the severity of myopia is below -3D in most of the children (91%), which is likely to increase with increase in age. Amongst the causes other than refractive errors, the highest is amblyopia (60%) which is easily treatable if discovered within 7-8 years of age. This clearly shows if these amblyopic children were corrected earlier, they would have had good vision by now.

Also, 88.07% of the cases were uncorrected refractive errors which emphasize the need for regular screening of school children. It becomes quite evident that REs are prevalent in the school going children in middle – income country like India that has aspirations to become the world leader in future. The limitation of this study is that only 1-2 schools could be covered out of so many. Also, most of the children, especially those of Villupuram, one of the backward districts, might not have the privilege to go to school. Hence population based studies are recommended to assess the real picture.

To address the challenges of the health sector and especially in the field of rectifying the REs, studies from all over the continents and from India suggest early screening, spectacle compliance, spreading awareness and involvement of students & parents association to motivate students for use of spectacles [19]. Improved utilization of existing eye care services plays a commendable role. National Programme for Control of Blindness is to be integrated with Sarva Shiksha Abhiyan**.** Also, the studies suggest that we need to have a public-private partnership in strengthening the health services.

India, as a middle Income country with a demographic dividend, is in an advantageous position of having more working population. In order to enhance the potential of the individual, learning capacity and also to prevent the socio-economic

problems, adequate attention needs to be given by the government and the citizens for an inclusive approach to address the problem at an early stage. The country needs to have a vision and a goal for all - "Correct the Refractive errors of the children to improve the eye health to access educational opportunities and to become employable to improve the productivity of the individual and the country by 2020".

Government can look at the possibility of convergence of existing programmes for children to make it effective. With the private sector, it can conduct "awareness campaigns" like it was done in the case of Polio. Corporates, under their Corporate Social Responsibility Schemes can create awareness on health issues, conduct free eye camps for school children. Resident Welfare association, civil society organizations can spread awareness on the need of screening tests and usage of spectacles. Schools also play an important role in spreading the importance of regular ocular screening among the communities.

CONCLUSION

Our collection of data and also the recommendations of the other studies support the fact that regular vision screening of school children in India will be very useful in early detection and correction of avoidable problems. This study also supports the studies conducted in other areas that the school age is a high risk group for refractive errors. Children are not aware of their problems and the prevalence of undetected refractive error is high. As recommended in the national and international studies, like all developing countries, India needs to strengthen the school health services.

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