PREVALANCE OF OCULAR MORBIDITY AMONG SCHOOL CHILDREN OF PERUMKADAVILA BLOCK, THIRUVANANTHAPURAM, SOUTH KERALA

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ABSTRACT

In spite of National Programme for Control of Blindness with its control strategies revised from time to time to provide comprehensive health care to the community, blindness and other conditions of ocular morbidity continue to be problems of much Public Health importance. Considering the fact that one-third of India's blind lose their eyesight before the age of 20 years and many of them are under fifteen years when they become blind, early detection and treatment of ocular morbidity among children is important. In Kerala, only some hospital based data are available based on the studies conducted in Regional Institute of Ophthalmology and Medical College Hospitals. Only piece meal data on field based studies are existing.

OBJECTIVES
1. To study the prevalence of ocular morbidity among school children of age group 9-15 years.
2. To find the socio demographic factors associated with ocular morbidity in children.

METHODOLOGY
Across sectional study was conducted among a sample of 3130 students of the age group 9-15 years from Government, Private and Aided schools of Perumkadavila Block Panchayat for three months from November 2013. Children were subjected to measurement of height and weight, general examination of the eyes, torch light examination of anterior segment and fundus examination, visual acuity for distant vision and for near vision. Colour blindness was checked using Ishihara's chart. Sociodemographic details were collected using the pretested Performa.

RESULTS
28.9% of the study group was having one or more form of ocular morbidity. Majority of the children studied were of 12 years age. Most of the ocular morbidities were either preventable or curable. Among the children having ocular morbidity the leading cause was refractive error (17.9%) followed by Vitamin A deficiency (9.6%), Conjunctivitis (0.9%), Blepharitis (0.3%), Squint (0.1%), Colour blindness (0.1%) and Ptosis (0.01%). The presence of ocular morbidity showed significant association with education, occupation and income of the parent.

CONCLUSION
The study was useful for detecting preventable and treatable causes of defective vision early in life and thus for minimizing long-term permanent visual disability.

RECOMMENDATIONS
The knowledge about the distribution and socio-demographic association of ocular morbidity would enable in planning of eye care services and to reduce visual impairment. As there is high prevalence of ocular morbidity among school children, it can be suggested that early screening programmes in primary schools can detect a good proportion of visual impairment and other ocular morbidities sufficiently early so that early interventions in such children will help in preventing the progression of the conditions which can lead to blindness.

KEYWORDS
Ocular Morbidity, Visual Acuity, Socio-demographic Factors.

INTRODUCTION
WHO defined blindness as "Visual acuity of less than 3/60 (Snellen) or its equivalent.

In 2010 among an estimated 285 million visually disabled people worldwide 90% were living in developing countries; about 80% of blindness was avoidable (Treatable or potentially preventable).[1] Ocular morbidity leads to reduced economic and social status and it may also result in premature death. The major causes of ocular morbidity worldwide are glaucoma, accidents, diabetes, vascular disorders, cataract and degeneration of ocular tissues especially of retina and hereditary conditions. An estimated19 million children are visually impaired. Out of this 12 million children are visually impaired due to refractory errors, a condition that could be easily diagnosed and corrected.

The pattern of ocular diseases vary in different parts of the world and is influenced by racial, geographic, socioeconomic and cultural factors.[2-6] Studies on ocular morbidity show conditions of conjunctiva, cornea, iris, lens, intraocular humor, retina and optic nerve, extraocular muscles and occipital centre of brain. Reasons of ocular morbidity may be congenital, traumatic, inflammatory, neoplastic, degenerative and miscellaneous conditions of these eye-related structures. These result in varying levels of ocular morbidity, which can lead to partial or total blindness. The common ocular diseases worldwide are cataract, glaucoma, conjunctivitis, corneal ulcers, uveitis, refractive errors, vitamin A deficiency, pterygium and other diseases.[7] Other eye diseases include trachoma, orbital diseases, retinitis pigmentosa, chalazion, pseudophakia/aphakia, diabetic retinopathy, congenital ptosis, optic neuropathy, strabismus, sixth cranial nerve paresis, staphyloma and choroidal melanoma, onchocerciasis and ocular malignancies.

In India according to a rapid national survey on the estimated prevalence of blindness 2006-07, estimated national prevalence of childhood blindness/low vision was 0.8 per 1000.[8] The major causes of blindness and low vision and their prevalence in India are cataract (62.6%), uncorrected refractive errors in the form of myopia, hyperopia, astigmatism (19.7%), glaucoma (5.8%), posterior segment pathology (4.7%), corneal opacity (0.9%), other causes (4.19%), surgical complications (1.2%) and posterior capsular opacification (0.9%).[8] In India, as per 2006-07 survey.[8] the prevalence of blindness was 1 percent. Visual impairment due to refractive errors is a condition that could be easily diagnosed and corrected. Of the children who are visually impaired due to refractive errors, more than 1.5% are irreversibly blind for the rest of their lives.[9] In India, uncorrected refractive errors are responsible for about 19.7% of blindness.[9]

In Kerala only some hospital–based data are available on ocular morbidity based on the studies conducted in Regional Institute of Ophthalmology and Medical College Hospitals. Field based data on the extent of the problem are not available. Only piece meal data are existing. It would be interesting and informative to do the study on school children (of age group 9-15 years) who represent a selective sample of the community. Being a captive population, children are the best group to study the prevalence of ocular morbidity, so that prevention of further progress of the conditions is possible in this population of the community.

In developing countries like India school eye screening should encompass common, but treatable and preventable ocular problems that could have immediate or long-term negative effect on the learning activities of the student.[8] It has been found that ocular morbidity among school children of the age group 10-15 years is 30-40%. This affects their scholastic performance and extra-curricular activities. It has been estimated that 80-85% of the learning process is done via visual pathway.[10]

However, if parents and teachers of children who are blind or visually impaired do not understand the nature of visual disability and fail to provide appropriate compensatory learning options; the children's opportunities, experiences and development will be more restricted than necessary.[11] Considering the fact that one-third of India's blind lose their eyesight before the age of 20 years and many of them are under fifteen years when they become blind, early detection and treatment of ocular morbidity among children is important. Children and adolescents comprise a major proportion of Indian population and are important as they are the future of country's development.[12]

In rural areas where a good proportion of people belonging to low socioeconomic group live, the prevalence of preventable and treatable causes of low vision is high. This high prevalence of ocular morbidity may a certain extent be due to under-utilization of available health infrastructure. Only a few children undergo regular and complete eye examinations.

Hence, the present study is an attempt to determine the prevalence of ocular morbidity among school children of the age group 9 to 15 years of a rural area of Thiruvananthapuram district in South India and to find out the socio-demographic factors related to ocular morbidity. This knowledge can be used for devising strategies based on the outcome of the study so that the problem of ocular morbidity in the community can be reduced.

OBJECTIVES
1. To study the prevalence of ocular morbidity among school children of age group 9-15 years.
2. To find the socio-demographic factors associated with ocular morbidity in children.

METHODOLOGY
Study Design
Cross sectional study.

Study Area
Perumkadavila Block Panchayat located 35 kilometers towards south from Thiruvananthapuram city, bounded on the north by Aryan code Grama Panchayat, south and east by Neyyattinkara Municipality and on the west by Kunnathukal Grama panchayat.

Study Population
Among the students from Government, Private and Aided schools of Perumkadavila Block Panchayat, a sample of study subjects maintaining proportion from them is selected of the age group 9-15 years. The Perumkadavila Block Panchayat is comprised of five Grama Panchayats. A total of 45 schools including Government, Private and Aided schools are there in this area.

Sample Size
Calculated using the formula $4pq/d^2$.
Prevalence, P = 11.2.
Q= 100- P = 88.8.
Effect Size =10% of P =1.12.
Sample size = (4 x11.2 x 88.4)/1.25= 3125.
The sample size is rounded to 3130.

Selection of Study Subjects
Multistage random sampling method was used.

Study Period
Three months from November 2013.
Before starting the study, Ethics Committee clearance was obtained from the Institutional Ethics Committee. Informed consent was taken from the children. In the case of children below 12 years of age, informed consent was obtained from the parents and assent from the students.

Method of Data Collection

The students of the study group were examined using a pretested performa. Screening of children was done with the help of Ophthalmic assistant from Dr. SM CSI Medical College, Karakonam. Sociodemographic details were collected. Socioeconomic status of children was assessed using modified Kuppuswamy's scale. Children were subjected to measurement of height and weight, general examination of the eyes, torch light examination of anterior segment and fundus examination with undilated pupil. Visual acuity for distant vision was assessed using Snellen's chart and for near vision using near vision test types; Colour blindness was checked using Ishihara's chart. Vitamin A deficiency was diagnosed if there is history of night blindness or on examination there were signs of conjunctival xerosis, Bitot's spots, corneal xerosis or keratomalacia. Measurement of Intraocular pressure were performed using tonometer. Cover-uncover test was done to detect manifest or latent squint. During examination, children were educated regarding prevention of ocular morbidity.

Statistical Analysis

Data were entered in Excel spread sheet. Statistical analysis was done with the help of computer package. Proportion with confidence interval was found out to estimate the prevalence of ocular morbidity. The results were tested by Pearson's Chi-square test with Yates correction wherever necessary.

RESULTS

In the cross-sectional study to assess the prevalence of ocular morbidity among school children, a total number of 3130 children were screened from the schools of Perumkadavila Panchayat. The data were analysed and tables and figures were constructed to describe the study population, to assess prevalence of ocular morbidity, to find out the relation of socio-demographic factors with ocular morbidity and to see the association of some selected variables with ocular morbidity.

DESCRIPTION OF STUDY POPULATION

Study Participants (N=3130)	Number (Percentage)
Age (Years)	
9	137(4.4%)
10	382(12.2%)
11	556(17.8%)
12	892(28.5%)
13	520 (16.6%)
14	210 (6.7%)
15	433(13.8%)
Gender	
Male	1772(56.6%)
Female	1358(43.4%)
Religion	
Hindu	2444(78.1%)
Christian	598(19.1%)
Muslim	88(2.8%)
Education of Parent	
Illiterate	1236(39.5%)
Primary school	546 (17.4%)
Middle school	302(9.6%)
High school	914(29.2%)
Higher secondary	100(3.2%)
College/professional	32(1%)

Occupation of Parent	
Unskilled worker	638(20.4%)
Semiskilled worker	544(17.4%)
Skilled worker	1640(52.4%)
Clerical/Shop	250(8%)
Professional	58(1.9%)
Income of Parent	
APL	32(1.1%)
BPL	3098(98.9%)
Table 1: Description of study population	

Majority of the children studied were of 12 years age. 56.6% were males and 43.4% were females. It is in contrary to the sex ratio of Kerala. It may be due to more dropouts among girls during the study period. Majority of children were Hindus (78.1%) followed by Christians (19.1%) and Muslims (2.8%). Parents of 39.5% of the children were illiterate and only 1% were degree holders. Parents of most of the children were skilled workers (52%) and unskilled (20%). Most of the children belonged to poor socio-economic status.
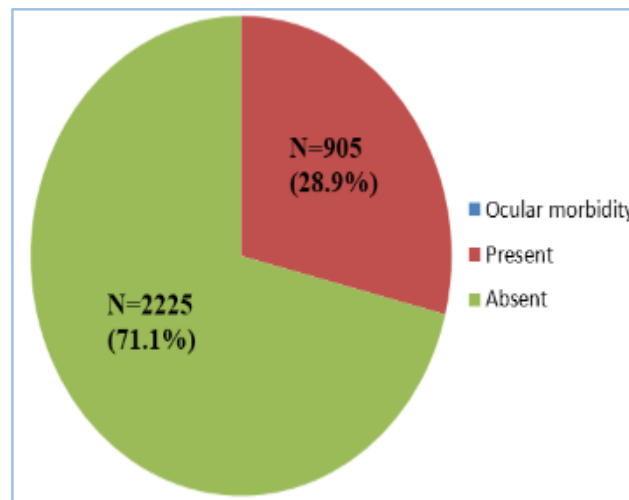
PREVALENCE OF OCULAR MORBIDITY

Fig. 1: Distribution of study group According to Ocular morbidity

28.9% of the study group was having one or more form of ocular morbidity.

Ocular Morbidity	Frequency	Percentage
No Ocular Morbidity	2225	71.1
Vitamin A deficiency	301	9.6
Refractive error	559	17.9
Conjunctivitis	28	0.9
Colour Blindness	4	0.1
Ptosis	1	0.01
Squint	3	0.1
Blepharitis	9	0.3
Total	**3130**	**100**
Table 2: Distribution of study group according to the type of ocular morbidity		

In the present study, most of the ocular morbidities were either preventable or curable. Among the children having ocular morbidity, the leading cause is refractive error (17.9%) followed by Vitamin A deficiency (9.6%), Conjunctivitis (0.9%), Blepharitis (0.3%), Squint (0.1%), Colour blindness (0.1%) and Ptosis (0.01%) respectively.
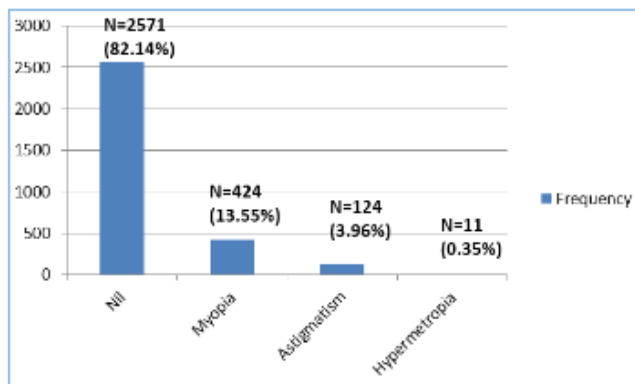
Fig. 2: Distribution according To type of Refractive error

Age	Ocular Morbidity		Total
	Present N (%)	Absent (N (%)	
9	24 (17.5)	113 (82.5)	137
10	78 (20)	304 (80)	382
11	128 (23)	428 (77)	556
12	328 (36.8)	564 (64.2)	892
13	236 (45.4)	284 (54.6)	520
14	37 (17.6)	173 (82.4)	210
15	74 (17.1)	359 (82.9)	433
Total	905	2225	3130
$\chi2 = 957.33$	df 12		P <0.001
Gender			
Male	582 (48.9)	1190 (51.1)	1772
Female	323 (31.2)	1035 (68.8)	1358
Total	905	2225	3130
$\chi2=81.350$	df 7		P <0.001
Religion			
Hindu	674 (27.6)	1770 (72.4)	2444
Christian	229 (38.3)	369 (61.7)	598
Muslim	2 (2.3)	86 (97.7)	885
Total	905	2225	3130
$\chi2= 162.239$	df 14		P <0.001
Occupation of Parent			
Unskilled	399 (62.5)	239 (37.5)	637
Semi-skilled	166 (30.5)	378 (69.5)	544
Skilled	269 (16.4)	1371 (83.6)	1640
Clerical/Shop	43 (17.2)	207 (82.8)	250
Professional	28 (48.2)	30 (51.7)	58
Total	905	2225	3130
$\chi2 = 631. 023$	df10		P <0.001

Education of Parent			
Illiterate	644 (52.1)	592 (47.9)	1236
Preschool	161 (29.5)	385 (70.5)	546
Middle school	32 (10.6)	270 (89.4)	302
High school	34 (3.7)	880 (96.3)	914
Higher secondary/PDC	18 (18)	82 (82)	100
Degree	16 (50)	16 (50)	32
Total	905	2225	3130
$\chi2 = 1678. 427$	df10		P <0.001
Table 3: Prevalence of ocular morbidity in relation to socio-demographic factors			

The prevalence of ocular morbidity was more among low socio-economic group. Presence of ocular morbidity showed significant association with education, occupation and income of parent. Some selected variables like poor nutritional status of children ($\chi2= 311.357$, df 14, P <0.001), poor reading posture ($\chi2 = 407.397$, df 7, P <0.001) and family history of ocular morbidity ($\chi2 = 2583.95$, df 21, P <0.001) showed significant association with ocular morbidity.

DISCUSSION
The pattern of ocular morbidity may vary in different parts of the world and is influenced by racial, geographic socio-economic and cultural factors.[3-7] The prevalence of ocular morbidity was 28.9% in the present study. It is comparable to a study by Rajesh Kumar et al. (24.6%) from Delhi.[11] Jayanth D and Malathi K (27.65%) from rural Maharashtra.[12] and Madhu Gupta and others (31.6%) from Shimla.[13] In a study by Chaturvedi et al. prevalence of ocular morbidity was more than 40% in rural Delhi.[14] and Kalikivayi et al. (43.5%) at Hyderabad.[15] Least prevalence of 11% was reported from Nepal; prevalance of 13% was reported by Prajapati P et al. among adolescents of Gandhinagar district.[2] prevalence of ocular morbidity among school children of age 5-16 years (13.3%) was reported by Amol Bansal.[16] et al from Kolar District, South India and 15.6% by Wedner SH et al. in rural Tanzania.[17] The common ocular diseases.[18] worldwide are cataract, glaucoma, conjunctivitis, corneal ulcers, uveitis, refractive errors, Vitamin A deficiency, pterygium. Other eye diseases include trachoma, onchocerciasis, xerophthalmia and ocular malignancies.

Refractive errors (17.9%) were the most common ocular morbidity in the present study. Most of the other studies done are on prevalence of refractive errors. Out of the total ocular morbidity, refractive errors constituted 89.6% in a study by Amol Bansal.[16] et al. at Kolar District, South India.

Madhu Gupta et al.[13] at Shimla and S Mahapatro et al. at Bhubanesar.[19] had identified refractive error as the commonest morbidity among children (22%). Prajapati et al. also had observed it as the commonest with a prevalence of 40.1% in their study at Gandhinagar.[2] Prevalence of refractive error of 32% has been reported by Kalikivayi in a study from South India.[15] and 61% among children in rural population of India by Dandona R et al.[20] In a study at Pune among adolescent school children Col A Datta et al. noted 21.19% of refractive error.[21] In the present study, 13.55% of the children

were having Myopia, 3.96% had Astigmatism and 0.35% had Hypermetropia. In a study by Amol Bansal.[20] 96% of all refractive errors were myopes and 4% were hyperopes.

Uncorrected refractive error (2.9%) was found to be an important finding among the children in the present study comparable (5.6%) to the study by Jayant D and Malathi K in rural Maharashtra.[14]

In the present study, the prevalence of Vitamin A deficiency was 9.6 percent. In a study at rural North Maharashtra by Jayant D and Malathi, 25.58% Vitamin A deficiency was reported.[12] and 29.3% was noted by Prajapati et al. at Gandhinagar.[2] Mausami Basu et al. reported 11.83% of conjunctival xerosis among students at Surat.[22] and Bhattacharya et al. observed 8.16% Vitamin A deficiency among primary school students in Darjeeling district.[23] but S. Mahapatro et al. noted least prevalence of 2.25% Vitamin A deficiency in Bhubanesar.[19] A high prevalence of vitamin A deficiency among school children aged 8–13 years have been reported in 1993 by Singh et al.[24] Vitamin A deficiency was the commonest morbidity (33.8%) in a study done in Karnataka.[25]

Prevalence of conjunctivitis was 0.9% in our study. Jayant D and Malathi K reported a prevalence of (2.57%) at rural Maharashtra.[12] Madhu Gupta et al. (0.8%) in Shimla,[13] and by Prajapati (3.8%) et al. at Gandhinagar.[2] and Kumar R et al. (4.6%) in urban and rural Delhi.[11] High prevalence may be due to the poor personal hygiene. Higher prevalence of conjunctivitis and blepharitis (1.5-17.5%) has been reported in other parts of India.[26-28]

In the present study, 0.1% had squint. Prevalence of squint has been reported from Haryana, Rajasthan, West Bengal and Delhi.[14,26]

The prevalence of ocular morbidity was more among low socio-economic group. Presence of ocular morbidity showed significant association with education, occupation and income of parent. Poor nutritional status of children, Poor reading posture and family history of ocular morbidity from studies done by medical students from south India showed significant association with ocular morbidity comparable to present study.

SUMMARY AND CONCLUSION

A cross-sectional study on the prevalence of ocular morbidity among school children of rural Kerala, South India was done during a period of three months from November 2013 with the objectives 1. To study the prevalence of ocular morbidity among school children of the age group 9-15 years of Perumkadavila panchayat and 2. To study the association of socio-demographic factors of children with ocular morbidity.

The study group included 3130 children from schools selected by multistage sampling technique. Data were collected using pretested performa. Ocular morbidity included external examination of the eye, assessment of visual acuity, test for colour vision and squint. Out of total number of children studied 56.6% were males and 43.4% were females.

Among the children having ocular morbidity the leading cause was refractive error (17.9%) followed by Vitamin A deficiency (9.6%), Conjunctivitis (0.9%), Blepharitis (0.3%), Squint (0.1%), Colour blindness (0.1%) and Ptosis (0.01%). Among children having refractive error, most of them were myopic. The prevalence of ocular morbidity was more in children of low socio-economic group. The presence of ocular morbidity showed significant association with education,

occupation and income of the parent. Some selected variables like nutritional status of children and complaint of diminished vision were associated significantly with ocular morbidity. Uncorrected refractive errors were 2.9%. Also family history of defective vision and habits like reading posture showed significant association with myopia in children.

Among the children studied, three of them had congenital colour blindness. The study could serve as useful purpose for detecting correctable causes of defective vision early in life and thus minimizing long term permanent visual disability. All the children were given health education regarding ocular hygiene, consumption of nutritious food including green leafy vegetables and importance of observing right reading posture. All the children found to be having refractive error were provided with spectacles corrected to visual acuity 6/6.

RECOMMENDATIONS

The knowledge about the distribution and demographic association of ocular morbidity would enable in planning of eye care services to reduce visual impairment caused by them. As there is high prevalence of ocular morbidity among school children, it can be suggested that early screening programmes in primary schools can detect a good proportion of visual impairment and other ocular morbidities sufficiently early so that early interventions in such children will help in preventing the progression of the conditions, which can lead to blindness.

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