



PROFILE OF OCULAR MORBIDITY AMONG SCHOOL CHILDREN OF DEHRADUN

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ABSTRACT **Background:** Childhood is a vulnerable age of growth and development. Ocular conditions whether congenital or acquired need timely identification and intervention. Ocular Morbidity (OM) describes eye diseases that are either significant to the individual seeking care or to the eye health professional opining on the same, and can be classified as modifiable and non-modifiable. Our study helps to throw some light on existing ocular morbidity among school going children in Dehradun. **Objectives:** Screening of school-children for ocular morbidity and to study their distribution in different age groups. **Material and Method:** Thirty schools were selected randomly by lottery method. The informed consent duly signed both in Hindi and English were taken from the principal of the school, and a date for screening was fixed. Examination was done in the respective school campuses where the information required from the students was obtained through interviews and a pre-tested semi-structured questionnaire. **Statistical analysis:** Analysis was carried out by using statistical package for social science system SPSS [version 23.0; SPSS Inc., Chicago, IL, USA] for proportions. Chi square tests were applied where applicable. A p value of less than 0.05 was considered significant. **Result:** The total children screened in the schools were 6868, out of which 4225 were referred to hospital for detailed ocular examination. Of those referred, 3524 (83.4%) presented to the hospital while 16.6% failed to visit the hospital. The study showed that among different types of ocular morbidity, refractive errors were present in 53.4% children, followed by allergic conjunctivitis in 25.2%, amblyopia in 8.9%, squint in 2.85, ptosis in 2.4%, corneal disorders in 2%, ocular trauma in 1.9%, cataract or pseudophakia in 1.8%, vitamin A deficiency in 1.2% children and non-modifiable disorders in 0.5%. **Conclusion:** The study gives an idea of ocular morbidity prevalent in the region, and creates awareness for both the who provide care, and those who need help.

KEYWORDS : Prevalence, Ocular Morbidity, Amblyopia

INTRODUCTION

Vision is essential for the proper learning and growth in children. [1] Vision disorder is the leading cause of disability in childhood.[2] Lack of timely attention to such conditions could have an irreparable impact on development, education, social and vocational opportunities.[3] It is estimated that 1.5 million children suffer from Severe Visual Impairment and Blindness and of these 1 million live in Asia alone. As per data available, 75% of this blindness is treatable and/or preventable.[4] The available data suggest that the prevalence ranges from 0.3/1000 children in developed countries to 1.5/1000 in developing countries.[5] In India, the rise in people having visual impairment has been estimated from approximately 6.26 million people in 2010 to 19 million by 2020, with it having social and economical implications in the future.[6,7]

Ocular Morbidity (OM) describes eye diseases that are either significant to the individual seeking care or to the eye health professional opining on the same. OM can be classified as modifiable and non-modifiable. Modifiable ocular morbidity includes refractive error, allergic conjunctivitis, amblyopia, corneal disorders, vitamin A deficiency disorders (VADD), ptosis, strabismus, cataract. Congenital abnormalities such as anophthalmos, microphthalmos, retinal disorders, coloboma or rarely phthisis bulbi constituted the non-modifiable ocular morbidities. Proper assessment of OM helps in the allocation of resources to alleviate the issues. It improves the knowledge related to the availability and access of infrastructure, services, trained manpower, and community awareness. As schools are considered one of the best centers for effectively implementing the comprehensive eye healthcare program [8], this study was conducted with the objective of estimating the prevalence of ocular morbidity among school children of age group 5-16 years, with the purpose to find out the prevalence and causes of various ocular morbidities among school going children of Dehradun.

MATERIAL AND METHODS

The ethical committee approval was duly sought, especially asserting our lack of any financial interest, and any outsourced funding. The present study is a cross sectional, observational study that was conducted in the schools of Dehradun, over a period of 18 months. The duration began prior to the Covid surge and went on till conditions became near normal for schools to resume offline. All the school children in 5-16 years age group in the study population constituted the study subjects who were screened, and then grouped as 5-8 years, 9-

12 years and 13-16 years, respectively.

Inclusion criteria:

1. All school going children of age group 5-16 years.
2. All children of both the sexes.
3. Children with previously diagnosed eye diseases.
4. Children already wearing glasses.

Exclusion criteria:

1. Children who were absent on the day of examination
2. Children who were uncooperative.

Sample size:

The total sample size was estimated by using the formula: $n = 4pq/d^2$ where,
 n = sample size
 p = prevalence of ocular morbidity (23%)
 $q = 100 - p = 100 - 23 = 77$
 d = error in estimation = 5%

The sample size was calculated by the prevalence of ocular morbidity in the school children as 23% with an allowable error of 5% and 95% confidence interval. Out of 6868 screened, 4225 were found to have ocular morbidity and were referred to hospital. Out of 4225 children with OM, 3524 visited hospital for ophthalmological examination and were included in the study.

There were over 300 schools, as per the list from the District Education Officer in Dehradun, out of which, thirty schools were selected randomly by lottery method. The informed consent duly signed both in Hindi and English were taken from the principal of the school, and a date for screening was fixed. Examination was done in the respective school campuses in clean, quiet and well-lit rooms. The information required for the study subjects was obtained from the school students using the interview method using a pre-tested semi-structured questionnaire. The questionnaire included demographic profile, and history of ocular complaints from the children as well as the teachers. Visual Acuity (VA) was measured using the Snellen's VA chart at 6 meters. Children with VA 6/9 or worse underwent a pinhole vision to differentiate refractive errors from pathological conditions. The children where vision didn't improve with pinhole were labeled as amblyopia in absence of any organic cause. Gross examination of the lids, lacrimal sac, conjunctiva, cornea, anterior chamber, pupil, iris and lens using a torch light was done to categorize allergic conjunctivitis,

ptosis, corneal disorders, vitamin A deficiency disorders, cataract or trauma. Hirschberg test, cover-uncover, and alternate cover were done to look for strabismus. Undilated fundus examination was done to look for causes of non-modifiable morbidity such as coloboma or retinal disorders. Children with VA 6/9 or worse were referred to the our teaching hospital for a detailed examination and feasible management of the eye that included cycloplegic refraction and post-mydratic test (PMT) for adequate correction of refractive errors.

Statistical analysis:

Data entry was done using MS Excel 2007. Collected data was entered in the master sheet and analysis was carried out by using statistical package for social science system SPSS [version 23.0; SPSS Inc., Chicago, IL, USA] for proportions. Descriptive statistics such as frequencies and percentages were calculated and appropriate statistical tests such as Chi square test were applied to find out significant association between independent and dependent variables. A p value of less than 0.05 was considered significant.

Result

The total children screened in the schools were 6868, out of which 4225 were referred to hospital for detailed ocular examination. Of those referred, 3524 (83.4%) presented to the hospital while 16.6% failed to visit the hospital.

Table 1: shows the age and gender distribution of study participants screened in the school, where more students being screened in the groups having a higher age number. The age group of 5-8 years showed females were 821 (12%) and males were 920 (13.4%), while the 13-16 year age group showed more number of students screened with 1287 (18.7%) females and 1474 (21.5%) males.

Table 2: shows age and gender distribution of study participants who visited the hospital where we noted a bigger representation of students in higher age groups.

Table 3: Association of non-modifiable disorders with age and gender shows that Non-Modifiable Ocular Morbidity (NMOM) found in the study were coloboma, pthisis bulbi and retinal disorders, and was statistically insignificant (pValue>0.5)

Table 4: Association of Refractive error with age and gender

Table 5: Distribution of study participants with refractive error wearing spectacles showed that more than 50% of students were not wearing glasses despite the need for it

Table 6: Association of types of amblyopia with age and gender that out of total 314 students with amblyopia, ametropia was found in 132 (42%), anisometropia in 73 (23.3%) and meridional in 109 (34.7%) children.

Graph 1 depicts the spectrum of different types of ocular morbidity wherein Refractive Errors (RE) were present in 53.4% children, followed by allergic conjunctivitis in 25.2% and non-modifiable disorders amounted to 0.5%.

Discussion

Our methodology of screening in school was found to be similar to a study done in west Uttar Pradesh by Veer Singh et al. (2017) where initially all children were screened by trained field workers and ophthalmologists, and only those suspected to have some sort of morbidity were referred to hospital. (9) This was different from a study done in Shimla, by Gupta et al. (2009) where all children (1561) were screened in the schools while in a study done in Maharashtra by Desai et al. (2017) screening of children was done in hospital. (10,11)

Our study shows the high prevalence of overall ocular morbidity of 61.5% in school children of Dehradun in 5-16 years of age. This could be attributed to a changing demography and increase in population due to migration from hilly as well as surrounding cities. This is similar to a study conducted in Aurangabad, by Desai et al. (2017) and in Surendranagar district, by Parmar et al. (2014) with a prevalence of 57% and 45.5% respectively. (12,13) Higher prevalence of ocular morbidity has been reported in a study done in Shillong, Meghalaya (2019) of 76.3% (14) This high prevalence may be because of small sample size, short duration of study, seasonal variation and children upto age of 18 years were included. Similar studies done in the same

state Uttarakhand showed variable prevalence. A study done in Haldwani (2016) showed prevalence of 23.3% and in Dehradun (2017) showed a prevalence of 4.92%. (15,16) This is due to difference in number of study participants, area involved former is in Kumaon region while later is in Garhwal region and duration of the study.

The present study has reported that there was a gender wise difference in the ocular morbidities i.e. males had 55.7% and females 44.3% ocular morbidity and was comparable to the study done in northern Maharashtra (2011) with 55.9% males and 44.4% females. (17)

In a study done in Ghaziabad (2015), ocular morbidity was more prevalent in males (6.22%) as compared to females (5.36%). (18) It was because in this study, males (53.73%) were over-numbered than females (46.27%). This similar finding where ocular morbidity was more in males (56.69%) was also seen in a study done by Prajapati et al. (2010) in Gujarat, by Desai et al (2017) (males-37.4%, females-20%) and by Sethi S et al (2008) with males 60.6% and females 39.1%. (19,12,20) On looking at the prevalence of refractive errors sex wise, boys had 53.67% prevalence in comparison to girls (46.33%) in a study done in Surendranagar. (13)

The findings of the study done in Solapur, Maharashtra (2019), reported marginal difference in the prevalence of ocular diseases among boys and girls (14.18% and 12.92%), with study done in Kolar, South India (2012) with 13.5% boys and 13.1% girls and same with a study conducted in Shimla (2009) with 32.5% and 30.6% prevalence in male. In this study, we observed that majority of children in the study were in age group 13-16 years (40.2%), followed by 9-12 years (34.4%) and 5-8 years (25.3%). It was comparable to a study done in Maharashtra (2017) where maximum children were in age group 10-12 (36%) and 13-15 years (23.43%) and a higher frequency of consultation was seen in older age group of 10-15 years (59.42%). (17) Ocular morbidities were more common in 13-16 year age group (37.9%), followed by 9-12 year (32%) and least common in 5-8 year age group (30.1%), in this study. It was comparable to a study done in Shillong (2019) where the age-wise distribution of ocular morbidity showed that maximum prevalence of eye diseases was present in higher age group (85.3%) than in the lower age group (77.8%). (14) Similar findings were observed by Panwar et al. in Haldwani district of Nainital. (15) could be due to increase in awareness among children with age, which enables them to talk about their problems more openly with the doctor, resulting in higher reporting of ocular problems among older children. This could also be attributed to cumulative effect of diseases such as refractive errors and convergence insufficiency, which were more in the older children. There is also a possibly greater exposure in older children to outdoor activities, leading to higher incidence of conjunctivitis. The Non-Modifiable Ocular Morbidity was found in 0.45% of the children screened in our study and their prevalence decreased with rise in age.

In our study, refractive errors (53.4%) were found to be the most common of all the ocular morbidities noted. Its high prevalence in our study was comparable to a study done in Shillong, Meghalaya where a prevalence of 57.4% was observed and to a study in Ghaziabad with a prevalence of 53.73%. (14,18) Ghaziabad being in close location to Uttarakhand, shares same demographic profile and similar type of study participants and similar natural history.

Some studies like Bishwas et al. (2012) in Kolkata reported a prevalence of 23.67% and a study done in Shimla by Gupta et al. with a prevalence of 22%. (21,10). Some studies show very low prevalence of refractive errors. These include a study done in Chennai 19.3%, Uttar Pradesh with a prevalence of 17.36%, Kolar district, Batra et al. (2020) in study done in Ludhiana, Punjab showed a prevalence of 12.67%, Akarkar et al. (2019) in Goa with 9.55%, Delhi 5.4%. (22,9,23,24,25). The wide variability may be due to the sampling frame and non representative population. Our study has reported the prevalence of amblyopia at 8.9%.

A study done in Andhra Pradesh by K Anjaneyulu et al. (2015) showed a prevalence of 6.6%. Low prevalence has been reported in Punjab 3.45%, Chennai 0.9%, Solapur 0.72% and Uttar Pradesh 0.41%, respectively. (23,22,17,9) Suggested reasons could be small sample size, short duration of study and lack of awareness, leading to under reporting of illness. This study found that 1.2% children in our study had vitamin A deficiency either in the form of night blindness or bitot spots. Maharashtra based studies showed 2% and 0.28% prevalence, respectively while Singh et al. in its study in Uttar Pradesh showed 1.15% prevalence. (17,9)

Conclusion

Our study shows the profile of Ocular Morbidity among school children in a place like Dehradun which has mixed demography comprising of distinct cultures and different strata of society. The study is a reflection of not only statistics, but also highlights the role of education, awareness, lifestyle, and motivation to change things for better. The limitation of the study is that it was conducted in a chosen number of schools run by Sri Guru Ram Rai Trust. Given the variety of schools in the city, the results can not be generalized to other schools. However, such screening has created a ripple effect for other studies to follow.

Table 1: Age and Gender-wise distribution of study participants screened in the school.

Age (Years)	Gender					
	Female		Male		Total	
	Numbers	%	Numbers	%	Numbers	%
5-8	821	12.0%	920	13.4%	1741	25.3%
9-12	1035	15.1%	1331	19.4%	2366	34.4%
13-16	1287	18.7%	1474	21.5%	2761	40.2%
Total	3143	45.8%	3725	54.2%	6868	100.0%

Table 2: Age and gender-wise distribution of study participants visited the hospital with Ocular Morbidities.

Age (Years)	Gender					
	Female		Male		Total	
	Numbers	%	Numbers	%	Numbers	%
5-8	450	12.8%	609	17.3%	1059	30.1%
9-12	475	13.5%	652	18.5%	1127	32.0%
13-16	635	18.0%	703	19.9%	1338	37.9%
Total	1560	44.3%	1964	55.7%	3524	100.0%

Table 3: Association of non-modifiable disorders with age and gender

Age (Years)	Gender	Coloboma		Pthisis		Retinal disorders		Total (no.)	%	p Value
		(no.)	(%)	(no.)	(%)	(no.)	(%)			
5-8	Female	1	6.3%	1	6.3%	1	6.3%	3	18.8%	>0.05
	Male	1	6.3%	1	6.3%	4	25.0%	6	37.5%	
9-12	Female	0	0.0%	0	0.0%	0	0.0%	0	0.0%	>0.05
	Male	1	6.3%	0	0.0%	0	0.0%	1	6.3%	
13-16	Female	2	12.5%	0	0.0%	2	12.5%	4	25.0%	>0.05
	Male	0	0.0%	0	0.0%	2	12.5%	2	12.5%	
Total	Female	3	18.8%	1	6.3%	3	18.8%	7	43.8%	>0.05
	Male	2	12.5%	1	6.3%	6	37.5%	9	56.3%	

Table 4: Association of Refractive error with age and gender.

Age (Years)	Gender	Type of Refractive error						Total (no.)	%	p Value
		Astigmatism (no.)	%	Hypermetropia (no.)	%	Myopia (no.)	%			
5-8	Female	72	3.8%	108	5.7%	78	4.1%	258	13.7%	0.019
	Male	113	6.0%	98	5.2%	107	5.7%	318	16.9%	
9-12	Female	90	4.8%	96	5.1%	110	5.8%	296	15.7%	0.042
	Male	129	6.9%	83	4.4%	118	6.3%	330	17.5%	
13-16	Female	90	4.8%	68	3.6%	116	6.2%	274	14.6%	0.127
	Male	133	7.1%	76	4.0%	196	10.4%	405	21.5%	
Total	Female	252	13.4%	272	14.5%	304	16.2%	828	44.0%	0.019
	Male	375	19.9%	257	13.7%	421	22.4%	1053	56.0%	

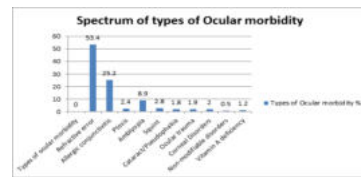
Table 5: Distribution of study participants with refractive error wearing spectacles

Spectacles	No.	%
Wearing	828	44
Not wearing	1053	56
Total	1881	100

Table 6: Association of types of amblyopia with age and gender

Age (Years)	Gender	Types of amblyopia						Total (no.)	%	P Value
		Ametropia (no.)	%	Anisometropia (no.)	%	Meridional (no.)	%			
5-8	Female	14	4.5%	5	1.6%	5	1.6%	24	7.6%	0.177
	Male	13	4.1%	15	4.8%	8	2.5%	36	11.5%	
9-12	Female	29	9.2%	7	2.2%	24	7.6%	60	19.1%	0.666
	Male	10	3.2%	3	1.0%	13	4.1%	26	8.3%	
13-16	Female	35	11.1%	23	7.3%	42	13.4%	100	31.8%	0.077
	Male	31	9.9%	20	6.4%	17	5.4%	68	21.7%	
Total	Female	78	24.8%	35	11.1%	71	22.6%	184	58.6%	0.077
	Male	54	17.2%	38	12.1%	38	12.1%	130	41.4%	

Graph1: Spectrum of Ocular Morbidity



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