ISSN: 2581 – 3633
PubMed - National Library of Medicine - ID: 101745081

International Journal of Medical Science and Advanced Clinical Research (IJMACR)

Available Online at: www.ijmacr.com

Volume – 3, Issue – 3, May – June - 2020, Page No. : 124 - 132

Evaluation of Ocular Morbidity among School Children in an Urban Area of Western Odisha

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Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Aim: To determine the prevalence and risk factors of ocular morbidity among school children in an urban area of western Odisha (Burla Town).

Material Method: The School-based cross-sectional study was carried out in the 15 clusters of Burla Town from October 2017 to October 2019. A total of 350 children (6 – 16 years) were examined. The students were categorized into different socioeconomic classes using Kuppuswamy's scale.

Results: A total of 350 students(6–16 years) were examined to evaluate the ocular morbidities among them, taking the schools and students in random clusters. Out of 350 students, ocular morbidity was found in 70 students making 20% prevalence rate. 32 (17.59%) were males and 38 (22.59%) were females in the study group. The prevalences were higher in 6–8years(21.07%) and 14–16 years(21.54%) age groups. The prevalence was more in rural/slum areas(21.67%) than urban area(19.13%). The highest morbidity was found in class-I category of students (33.33%) and the lowest in class-III (17.24%).

Conclusion: Most of the ocular morbidities were either preventable or treatable. If these morbidities are not detected at proper time they may cause severe disabilities or irreversible blindness.

Keywords: Ocular morbidity, School children, prevalence.

Introduction

To prevent and to treat the childhood ocular morbidity has been the motto of 'Vision 2020 – The right to sight' – the global mission set up by WHO (WHO, 1999 – 2000)[1,2]. It deserves attention owing to the fact that "In every five seconds one person in the world goes blind and one child goes blind in every one minute[3]. 80% of blindness is avoidable"[4]. In the pediatric age group, the prevalence of blindness in India is estimated to be 0.8 per 1000 in the 0 - 15 years age group with around 280,000 blind children[5]. The strategy of early detection and treatment of ocular diseases in School children is thus obvious. Due to the insidious nature of many ocular diseases most children are unaware of it and uneducated parents overlook them. Low socioeconomic status, alcoholism, overcrowded housing, and battered baby syndrome, etc. aggravate the situation.

Low vision gradually ostracise the child from society. It is the cause of truancy, weak physical and mental health, learning difficulties, reluctancy to play, and even unemployment, etc. Low vision has a profound impact on growth and development and will make the child visual handicap. Normal vision is crucial for the expression of a child's charisma. Children offset the poor sight by sitting near the blackboard, holding books closer to the eyes, squeezing the eyes and avoiding works requiring keen vision. These signs warrant urgent medical check-up. Good vision is more important for children than older individuals as it has a pivotal role in their mental and physical development and also, if the visual morbidity is not timely treated leads to permanent disability. Moreover, a developing country like India cannot afford to bear the social and economic burden of such visually impaired children. In this scenario, an efficient screening system in school might give all children an equal opportunity for good eyesight irrespective of underprivileged. An epidemiological survey is easier in a school than in a community as, where a large sample size is needed. 75% of all school age children are school-going in India. Schools are one of the best centres for effectively implementing the comprehensive eye health care program. Data on the prevalence of ocular morbidity, causes of blindness and severe visual impairment in children are needed for proper planning as well as evaluating preventive and curative services, viz., special education, low vision services, etc. Several studies have conducted in different parts of the world and India to assess the ocular morbidity pattern. There are many discrepancies among the data of different regions, so it should not be extrapolated to our western Odisha. We have to calculate our own prevalence data with a holistic approach. Burla town has a significant slum population. There are many underprivileged children fail to avail healthcare due to various reasons. To achieve the goal of vision 2020 and other such programmes, it is mandatory to find out the magnitude of ocular morbidity in such children. Keeping in view of the above reasons, we decided to undertake a study to evaluate ocular disorders in this urban area. The study was a school based cross-sectional one where selected schools from different areas were visited on a pre-fixed date.

The aim of the study is to observe the ocular morbidity among school children in an urban area of western Odisha.

Material Method

The School-based cross-sectional study was carried out in the 15 clusters of Burla Town from October 2017 to October 2019. A total of 350 children (6 – 16 years) were examined.

Study Area

The Population of Burla Town was 46698 and the children population was 4837 (10.36% of total population) as per 2011 Census. Now the projected population is 71480. The total number of normal schools (from class I to X) in Burla Town is 23 with 5624 enrollment. The town consists of 5 wards. The schools were divided into 5 clusters according to the wards and the schools were selected by random sampling. A multistage systematic sampling procedure was adopted to select schools from these wards. Exclusion Criteria were children unwilling to participate in the survey or absent at the time of visit were excluded. Prior permission was taken from the school authorities about the visit with date and time. Appropriate arrangements were made for examination of children with help of the school staff.

All the study subjects were interviewed, clinically examined with torch-light and detailed socio-demographic profile were collected. The students were categorized into different socioeconomic classes using Kuppuswamy's status scale [6]. The examinations done were -

Visual acuity measurement with Snellen's chart or Landolt's chart (for children who were unable to read) both unaided and with pinhole,Colour vision was tested with Ishihara plates,Ocular motility test, Binocular alignment assessment by Hirschberg test using a pen torch light, Anterior Segment examination with a torch light and Funduscopy was done with direct ophthalmoscope.

All the children were given appropriate treatment and Whenever necessary the children were referred to the Department of Ophthalmology, VSSIMSAR, Burla for further management. The documented results were analysed by Chi-square test and statistically significant differences were taken at 5% error ($P < 0.05$).

Observation

The cross-sectional study was carried out in the 15 clusters of Burla Town from October 2017 to October 2019. A total of 350 children (6 – 16 years) were examined. There were 182 male students (52%) and 168 female students (48%). 230 (65.71%) children were from urban background and 120 (34.29%) children were from urban slums or rural areas. The students were categorized into different socioeconomic classes using Kuppuswamy's scale. Ocular morbidities were found in 70 students out of total 350 students examined. So, the prevalence is 20%.

Table 1: demographic data of the students

Points of evaluation	Category	No. of children	Percentage
Sex	Male	182	52.00%
	Female	168	48.00%
Age	6-8yrs.	76	21.71%
	8-10yrs.	73	20.86%
	10-12yrs.	69	19.71%
	12-14yrs.	67	19.14%
	14-16yrs.	65	18.57%
Residence	Rural/slum	120	34.29%
	Urban	230	65.71%
Socio-economic status	Class I	21	06.00%
	Class II	43	12.28%
	Class III	87	24.86%
	Class IV	175	50.00%
	Class V	24	06.86%

The table 1 depicts; there were 182 male students(52%) and 168 female students(48%) with 76(21.71%) of 6-8yrs., 73(20.86%) of 8-10 yrs., 69(19.71%) of 10-12 yrs., 67(19.14%) of 12-14yrs. and 65(18.57%) of 14-16 yrs.; as well as 120(34.29%) rural/slum children and 230(65.71%) urban children with 21(6%) from class I, 43(12.28%) from class II, 87(24.86%) from class III, 175(50%) from class IV and 24(6.86%) from class V categories.

Table 2: Prevalence of Disease Specific Ocular Morbidity

Ocular disorders	No. of children affected	Overall prevalence	Percentage of total prevalence
Refractive error	41	11.71	58.57
Vit.A deficiency	4	1.14	5.71
Conjunctivitis	5	1.43	7.14
Squint	2	0.57	2.86
Congenital disorders	4	1.14	5.71
Diseases of lids	4	1.14	5.71
Fundus abnormalities	2	0.57	2.86
Pterygium/Pinguecula	1	0.29	1.43
Injuries	2	0.57	2.86
Colour vision abnormalities	2	0.57	2.86
Others	3	0.86	4.28
Total	70	20	100

In Table 2, it was shown that 70 children had different ocular morbidities out of 350(i.e., 20% overall prevalence). The most common ocular morbidity found was refractive error in 41 students with 58.57% of total prevalence and 11.71% overall prevalence.

In this study male and female students having ocular morbidities were refractive error 18(9.89%) &

23(13.69%), VAD 1 (0.55%) & 3(1.78%), conjunctivitis 3(1.65%) & 2(1.19%), squint 1(0.55%) & 1(0.59%), congenital disorders 1(0.55%) & 3(1.78%) , diseases of lids 2(1.10%) & 2(1.19%), fundus abnormalities 1(0.55%) & 1(0.59%), pterygium/pinguecula, injuries0 & 1(0.59%) & 0, colour vision abnormalities 2(1.10%) & 0 and others 1(0.55%) & 2(1.19%) respectively. A total of 32 males and 38 females students were affected with 17.59% and 22.59% prevalences respectively.In this study group refractive error was the most common cause of ocular morbidity found i.e, 41(11.71%) students.

Table 3: Rural / Slum – Urban Prevalence Of Morbidities

Ocular morbidity	Rural/Slum	% age (N=120)	Urban	% age (N=230)
Ref. error	12	10.00	29	12.61
Vit.A deficiency	2	1.67	2	0.87
Conjunctivitis	2	1.67	3	1.30
Squint	1	0.83	1	0.43
Congenital disorders	2	1.67	2	0.87
Diseases of lids	2	1.67	2	0.87
Fundus abnormalities	0	0	2	0.87
Pterygium/Pinguecula	1	0.83	0	0
Injuries	1	0.83	1	0.43
Colour vision abnormalities	1	0.83	1	0.43
Others	2	1.67	1	0.43
Total	26	21.67	44	19.13

Table 3 shows that; a total 26(21.67%) students from rural/slum areas and 44(19.13%) students from urban area were found to have ocular morbidities.

Table 4: Distribution of Ocular Morbidities as Persocio-Economic Status

Ocular Morbidities	Class I N = 21	Class II N = 43	Class III N = 87	Class IV N = 175	Class V N = 24
Ref. error	6 (28.57%)	8 (18.60%)	9 (10.34%)	16 (9.14%)	2 (8.33%)
Vit-A deficiency	0	0	1 (1.15%)	2 (1.14%)	1 (4.17%)
Conjunctivitis	0	0	1 (1.15%)	3 (1.71%)	1 (4.17%)
Squint	1 (4.76%)	0	0	1 (0.57%)	0
Congenital Disorders	0	1 (2.32%)	1 (1.15%)	2 (1.14%)	0
Diseases of lids	0	0	1 (1.15%)	2 (1.14%)	1 (4.17%)
Fundus abnormalities	0	1 (2.32%)	0	1 (0.57%)	0
Pterygium/ Pinguecula	0	0	0	1 (0.57%)	0
Injuries	0	0	1 (1.15%)	1 (0.57%)	0
Colour vision abnormalities	0	0	0	2 (1.14%)	0
Others	0	1 (2.32%)	1 (1.15%)	1 (0.57%)	0
Total	7 (33.33%)	11 (25.58%)	15 (17.24%)	32 (18.29%)	5 (20.83%)

Table 4 shows that; a total of 7(33.33%), 11(25.58%), 15(17.24%), 32(18.29%) and 5(20.83%) students from class-I, class-II, class-III, class-IV and class-V categories had got the ocular abnormalities respectively.

Discussion

Finding of ocular morbidity in children is like the tip of an iceberg. School survey is the best avenue to do the same. Two surveys should be done for a child, viz., (a) one at entering the primary school and (b) other at entering the secondary school, during their admission. It should be the government protocol, because many children remain undiagnosed in their early life. Rampant use of computers, mobile phones, TV and video games, etc. call for these screening surveys with proper logistics and cost effectiveness.

In this cross-sectional observational study, the overall prevalence was 20% (70 out of 350 children). The result is consistent with the other studies, e.g., by Kumar, et al.(2007)[7] in Delhi(22.7%); Lu, et al.(2008)[8] from Tibet (18.36%); Ayanniyi A, et al.(2010)[9] from Nigeria (19.9%); Veer Singh, et al.(2017)[10] in Utter Pradesh (29.35%) and Nirmalan, et al.(2003)[11] in South India

(13.6%), etc.. Higher and lower reports were shown in, e.g., a study by Chaturvedi and Aggarwal[12] (1999) in rural Delhi (40%), another study by Shrestha, et al.[13](2006) in Kathmandu(34.2%), and a Gandhinagar-based study (13%) by Prajapati, et al.[14](2010), etc. The cause of the discrepancies may be the age factor of a child, geographical differences and socio-economic status of children. The prevalence was more in females(22.59% vs.17.59%) and in rural/slum students(21.67% vs. 19.13%). The students of the class–I socioeconomic status have got the higher prevalence(33.33%; due to more ref. error cases) in this study. Different age groups showed similar prevalences (from 18.84% to 21.54%). In this study, the overall refractive error prevalence was 11.71% and the percentage of total prevalence was 58.57% — the most common ocular morbidity.

Similar results were found in the studies by Saif H, et al.(2016)[15] in Sudan(57%) and Dandaona R, et al.(2002; 63.6%)[16] for the percentage from total prevalence but Mingguang, et al.(2007)[17] in southern China(97%) and Pik-Pin Goh, et al[18].(2005) in Malaysia (87%) found higher percentages. The overall prevalence of ref. error in our study(11.71%) matches with that of Saif H, et al.[15](2016) in Sudan(11.2%), Rashid Baig, et al.[19](2008) from Karachi (12.8%), Veer Singh, et al.[10](2017) in Uttar Pradesh(17.36%) and Gupta, et al.[20](2009) in Delhi (22%). But, low prevalences were reported from Tanzania(0.7%) by Susan H Wedner, et al.[21](2000) and Kolkata(2%) by Anutosh Datta, et al.[22](1983). The cause of these disparities was multifactorial, viz., genetic variations, different screening criteria used in different studies, different lifestyles, socioeconomic conditions and nutrition, etc. Higher prevalences of overall refractive error, myopia, hypermetropia and astigmatism in females were found in this study. The studies by Saif H, et al.(2016)[15], Peng Lu, et al.[8](2008), Dandona R, et al.(2002)[23], etc. corroborate the finding with similar trends. The gender difference (particularly myopia) may be due to more indoor activities requiring near vision performed by female students. The overall prevalence of refractive error and prevalence of myopia increased with increasing age in this study. Similar results were found in the studies by Siofra Christine Harrington, et al.(2019)[24], BP Nepal, et al.(2003)[25] and Naidoo KS, et al.(2003)[26], etc. But, the prevalence of hypermetropia decreased with increasing age and astigmatism prevalence was independent of age variation. Siofra Cristine Harrington(2019)[24] and Pik-Pin Goh, et al.(2005)[18] had similar finding in their study. In this study, the overall prevalence of ref. error and prevalence of myopia were more in the urban area. The studies by Amruta S Padhye, et al.(2009)[27] and Pik-Pin Goh, et al.(2005)[18] revealed the similar findings.

The cause may be resulted from the more near-works done by the urban children. The prevalence of refractive error and myopia were more in the upper socioeconomic classes. This finding is similar to that of Pik-Pin Goh, et al.(2005)[18] and Mingguang He, et al.(2007)[17]. The cause is same as that for urban children.

The prevalence of VAD (1.14%) in our study was similar to the findings of Veer Singh, et al.(2017)[10], (2.09%) and Gupta, et al.(2009)[20], (1.8%). It was more prevalent in low socioeconomic classes and rural/slum areas. Higher prevalences were reported by Amrita Sarkar, et al.(2019)[28] in Meghalaya(38.1%) and Anutosh Dutta, et al.(1983)[22] from Kolkata(8.94%). Similarly, lower prevalences were reported by Aditi Sharma, et al.(2017)[29] in Uttarkhand (0.03%) and B P Nepal, et al.(2003)[25], (0.34%). In our study the overall prevalence of conjunctivitis was 1.43%. The prevalences were higher in boys, in lower age groups, in rural/slum areas and in lower socioeconomic classes. The differences were attributed to the hygienic conditions.

These relationships were also endorsed by Rashid Baig, et al.(2008)[19] in their study. The overall prevalence was similar to the findings of Okoyeo, et al.(2013)[30] in Nigeria(2.9%) and Gupta, et al.(2009)[20] in Shimla(0.8%). Higher prevalences were reported in the studies by Eve Rani Tirkey and Neha Adlakha(2018)[31] in central India(18.5%) and Lian-Hong pi, et al.[32] in China (11.76%). Lu, et al.[8] from Tibet (0.65%) and Gupta, et al.[20]from Shimla (0.8%) reported low prevalences. The standard of living conditions, cleanliness, might affect the outcomes. Squint was seen in 0.57% of children in our study. Our finding was supported by Tarakeswara Rao Attada, et al.[33]

at Visakhapatnam(0.6%) and Aditi Sharma, et al.[29] (2017) at Uttarakhand (0.4%) in their study report. Gupta, et al.[20], (2.5%) and He, et al[17], 2007 (1.63%) found higher prevalences. Congenital disorders were found in 1.14% of children in our study. Rehan Tomairek, et al[34].(2017) in Egypt (2.4%) (among children with genetic disorder), Gupta, et al.[20]2009 (0.8%) and Lu, et al[8]. (2008) (0.83%) found similar results. Our study reported 0.57% prevalence with male preponderance. Gupta, et al[20]. (2009) also reported similar results. 1.14% of children were amblyopic in our study and anisometropic type was the most common (75%) variety. These findings were endorsed by the findings of He, et al[17](2007), Lu, et al.[8](2008) and Goh, et al.(2005), etc. However, Veer Singh, et al.[10](2017) reported a low prevalence (0.41%). The prevalence of bleplaritis in our study was 0.29%. But, Veer Singh, et al.[10](2017) in west Uttar Pradesh and G. Nageswar Rao, et al.[35](2018) at KIMS, Bhubaneswar reported 2.11% and 5.05% of prevalence respectively in their study. The majority of children in our study have had urban background with improved hygiene—this fact could explain the above reports. The prevalence of fundus abnormalities (0.57%) in our study was comparable to that of He, et al[36].(0.96%). The prevalence of RP changes(0.29%) in our study was also in agreement with that of Anutosh Dutta, et al.[22](1983), (0.16%). Shortcomings of our study – (a) our study was on the normal schools; blind schools were excluded and schools with < 6 years of age students were also excluded from the study; (b) handicapped children(in a greater degree) were also excluded, because they did not reach at the school level; (c) all children in the area might not go to the school; and (d) the logistics of the study was not equivalent with that of our referral centre (VSSIMSAR, Burla).

So, false positive or false negative diagnoses might be there.

Merits of the study – (a) we emphasized the eye health education along with screening and (b) charts, posters and audio-visual means were used for the health education.

Regular eye screening of school children should be done in the Government School health programmes. Notwithstanding the above facts, we hope that the highlights of our study may be helpful in implementing school health programmes.

Conclusion

Most of the ocular morbidities were either preventable or treatable. If these morbidities are not detected at proper time they may cause severe disabilities or blindness. The school children are the best target group for combating visual impairment, creating awareness and initiative in both children as well as parents through health education.

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How to citation this article: Dr. Kanhei Charan Tudu, Dr. Satyasundar Biswal, Prof. Jayashree Dora, "Evaluation of Ocular Morbidity among School Children in An Urban Area of Western Odisha", IJMACR- May-June - 2020, Vol – 3, Issue -3, P. No. 124 – 132.