

# PATTERN OF OCULAR MORBIDITIES AMONG PRESCHOOL CHILDREN OF BIRATNAGAR METROPOLIS OF NEPAL

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## ABSTRACT

### Introduction

Children use their vision to enhance motor skills, develop parent-child bonds, build picture perception, and gain balance. Children may enter school with vision problems. Sub-optimal vision can lead to poor academic performance, a lack of interest in school, and even dropping out.

### Objective

To evaluate the pattern of various ocular morbidities among preschool children of Biratnagar metropolis.

### Methodology

A cross sectional study was conducted from October 2020 - Jan 2021 among 393 study participants at 5 different preschools of Biratnagar using total enumeration sampling. Vision was assessed with Snellen's visual acuity charts and Kay Picture chart. Anterior and posterior segment examination was done using a hand-held portable slit lamp and a direct ophthalmoscope respectively. Binocularity was assessed with a cover test at a distance and near targets and the Hirschberg corneal reflex. The refractive status of the eyes was assessed by performing static retinoscopy. All the data was analyzed according to sex, age, causes of visual impairment and types of ocular morbidity.

### Result

Among the total 393 preschool children screened, 169 children were boys and 224 were girls. The prevalence of ocular morbidity was found to be 20.1 %. Refractive error was the most common cause of visual impairment which was seen in 14.7% of children. The overall prevalence of myopia, hyperopia, and astigmatism was 7.9%, 4.8%, and 2.1% respectively. The other types of ocular morbidities were strabismus in 1.3%, congenital cataract in 1%, conjunctivitis in 1 %, chalazion in 1.3%, vernal kerato conjunctivitis in 1% and congenital ptosis in 0.6%.

### Conclusion

The relatively high prevalence of refractive error and occurrence of other ocular morbidities in our studied population suggests that there is a need for a large-scale community-based preschool screening program in Nepal so that affected preschool children can be identified early and appropriate treatment can be promptly started.

## KEY WORDS

preschool children, refractive error, visual impairment



## INTRODUCTION

Ocular health is a fundamental part of early child development and of overall health and well-being. Early childhood is a sensitive period for the development of the visual system and any ocular disorders that occur during this period and if untreated can lead to visual impairment or blindness.<sup>1</sup> These visual impairments or blindness may affect an individual's health, employment options, educational achievements and social functioning across the lifespan.<sup>2</sup> Furthermore the visual impairment not only will affect the individual and their family but also for the community and country resulting in a great loss of productivity for the country.<sup>3</sup> The prevalence of childhood blindness is especially high in low-resource areas; among the blind children worldwide, 70-90% of them are in the poorest countries of Asia and Africa and the prevalence of blindness ranges from 0.3 / 1000 children in affluent countries to 1.5 / 1000 children in very poor communities.<sup>4</sup> The majority of blindness is either potentially curable or preventable.<sup>5</sup>

It is estimated that there are 1.5 million blind children in the world, and that nearly 1 in 1,000 children are blind.<sup>6</sup> Visual impairment has a significant impact on the affected child with regard to education, future employment, and social welfare throughout life.<sup>7</sup> Although eye examinations in early infancy are important, they cannot predict the occurrence of conditions that often appear after infancy, such as accommodative esotropia. Additional vision impairments may have emerged by then, and 3-year-olds are starting to gain the communicative abilities that allow them to be evaluated using methods similar to those used with adults. A particular advantage of examining vision in the age group of 3 years is that it allows intervention at a time when the problems are highly amenable to treatment.<sup>8</sup>

The goals of preschool vision screening are to identify children who have a vision impairment that may prevent them from obtaining maximum benefit from their educational opportunities and may have an unidentified serious vision problem (i.e., amblyopia). The lack of universal and age-appropriate preschool vision screening contributes to an unacceptable prevalence of permanent vision loss due to disorders like amblyopia, the majority of which are preventable if detected and treated early.<sup>9</sup> Ocular and/or visual defects are one of the most common reasons for the referral of young children to a hospital. Preschool vision screening, with treatment referrals as indicated, provides a unique opportunity to promote both vision health and the educational experience of the child.

Significant refractive errors should be detected early in life. Conditions like amblyopia, strabismus, and nystagmus are found to be prevalent in large numbers in the various records of the school screening done in different parts of our country. Preschool vision screening also reveals a significant number of children with impaired visual acuity due to refractive problems who do not have amblyopia. This group of children must be included in any analysis of the cost effectiveness of a preschool vision screening.<sup>10</sup> Ocular problems create a negative impact on the child's learning

and academic achievements in the future, leading to a decreased quality of life. Moreover, children cannot complain of symptoms related to their eyes and may not realize the fact that they cannot see well, so early detection of ocular abnormalities will aid in an early intervention. We aimed to find ocular morbidities among preschool children of Biratnagar metropolis in this study.

## METHODOLOGY

This was a cross sectional study conducted among 393 preschool children in the age group between 3 to 6 years at 5 different preschools of Biratnagar Metropolis from 21 Oct 2020 to 2021 Jan 30. We excluded children with some other comorbidities and children who were mentally retarded. As per the data given by Biratnagar Metropolitan Council, there are 30 preschools in Biratnagar with approximately 2200 children. Out of this, 5 schools were selected by simple random sampling in the first phase and later on, children were again selected by total enumeration sampling method. The schools were inspected for the suitability of the screening process in terms of length of the screening room which had to be more than 4 metres, had adequate light (at least 300 lux in the room and test chart illumination of about 500 lux) and was free from any distractions. After these preliminary adjustments, the children were examined under the supervision of the teachers in their respective schools. An informed consent was taken from the teachers / guardians prior to the examination. Demographics (gender, age, and ethnicity), family eye history, preterm history, medical history, and history of any ocular symptoms were all included in the questionnaire. All preschool children in the study were examined for distant visual acuity test and depth perception test using the Snellens distance visual acuity charts / kay pictures charts and Langsstereotest respectively. These tests were performed by an optometrist and a trained staff nurse. Binocularity was assessed by cover test at a distance and near targets and the Hirschberg corneal reflex test. Distance static retinoscopy at a working distance of 50 cm was used to determine refractive status. Anterior and posterior segment examination was done by a hand held slit lamp and direct ophthalmoscope respectively. Visual impairment (VI) was graded into mild, moderate and severe according to WHO criteria, i.e, visual acuity <6/18 was mild VI, visual acuity between 6/18 to 6/60 was moderate VI and visual acuity <6/60 was severe VI. Children whose visual acuity was less than 6/12 in one or both the eyes and those who failed in the depth perception test were referred to the ophthalmology department at Birat Medical College Teaching Hospital for a detailed eye examination.

## STATISTICAL ANALYSIS

The results of the study were statistically analyzed using SPSS version 22, using chi-square test. Results on continuous measurements are presented on mean  $\pm$  SD (min-max) and results on categorical measurement are presented in numbers (%). A P-value of <0.05 was considered statistically significant.

## RESULT

Among 393 preschool children, the majority (56.99%) were female. The mean age of children was 5 years (table 1).

**Table 1: Sex distribution**

Sex	Frequency	Percentage
Male	169	43.01%
Female	224	56.99

The prevalence of ocular morbidity in this study was found to be 20.1 % (79 children).The proportion of ocular morbidity is shown in table 2.

**Table 2: Types of ocular Morbidity**

Types	Ffrequency	Percentage
Chalazion	5	1.2
Congenital cataract	4	1
Conjunctivitis	4	1
Refractive error with mild visual impairment	33	8.4
Refractive error with moderate visual impairment	21	5.3
Congenital ptosis with mild visual impairment	1	0.3
Congenital ptosis with no visual impairment	1	0.3
Strabismus(Intermittent exotropia) with no visual impairment	4	1
Strabismus(exotropia) with mild visual impairment	1	0.3
Bilateral pseudophakia	1	0.3
None	314	79.9
Vernal Keratoconjunctivitis	4	1

Refractive error was the most common type of ocular morbidity which was seen in 14.7% of children (58). The overall prevalence of myopia, hyperopia, and astigmatism was 31(7.9%), 19(4.8%), and 8 (2.1%), respectively (table 3).

**Table 3: Refractive status of the patients**

Refractive status		
	Frequency	Percentage
Astigmatism	8	2.1
Emmetropia	335	85.2
Hypermetropia	19	4.8
Myopia	31	7.9

The distribution of refractive error in both sex groups is mentioned in Table 5.

**Table 5**

	Refractive error	No Refractive error	p-value
Male	23 (13.6%)	146 (86.4%)	0.948
Female	31 (13.8%)	193 (86.2%)	

The prevalence of refractive error in male is 23 (13.6%) as compared to female, 31(13.8%) which is not statistically significant ( $p=0.948$ ). The other types of ocular morbidities were strabismus in 1.3%, congenital cataract in 1%, conjunctivitis in 1 %, chalazion in 1.3%, Vkc in 1% and congenital ptosis in 0.6%

Visual acuity was assessed both monocularly and binocularly. Majority of preschool children had normal vision (337). Out of the children having visual impairment, 8.7% had mild visual impairment and 5.6% had moderate visual impairment. The cause of visual impairment in all children was refractive error except for 2 children in whom the causes were congenital ptosis and strabismus respectively.

## DISCUSSION

The prevalence of ocular morbidity among preschool children in our study was found to be 20.1% which was similar to most of the studies around the world where percentages varied from 12. 7% to 22. 8%.<sup>11</sup> The prevalence of ocular diseases among preschool children in Malaysia was documented to be 14. 8% which was lower than our study.<sup>12</sup> However, one study found that ocular morbidity was 24. 6% among children in India which was higher than our study.<sup>13</sup> In the USA, a prevalence of ocular diseases and significant cusses among school children was found to be 28. 8% and previously undetected eye conditions being 19. 8%<sup>14</sup>,that prevalence of ocular diseases markedly higher than in this study. This variation may be because of different sample sizes and the effect of mandatory school eye screening programs in their part of the world compared to ours where there is no any certified government policies which includes these sort of screening programs.

The most common ocular morbidity among preschool children was the refractive error (14.7 %), which was also the most common ocular morbidity among children of different countries.<sup>15</sup> Myopia was the most common (7.9%) type of refractive error among the children which was consistent with some international studies.<sup>15,16</sup> In our study, the prevalence of myopia was 7.9%, which is more prevalent than in studies done in India<sup>17</sup>,Great Britain<sup>18</sup> and the United States<sup>19</sup>. The more recent studies showed that Hong Kong (36. 7%) and South India ( 32% ) had a higher prevalence rate of refractive errors among school children of age 3year -18year as compared to this study.<sup>20,21</sup> These differences may be explained by the different diagnostic criteria, the racial or ethnic variations, different age groups and different sample sizes in different studies.

However, the lower prevalence of refractive errors (2.7 - 5.8%) has been reported among school children of age range 5 - 15 years from Finland, Africa, Nepal and Chile.<sup>22</sup>

The prevalence of Vernal Kerato conjunctivitis in this study is 1% which is much less than studies done amongst primary school children in Ethiopia which showed that the prevalence of vernal conjunctivitis was very high (31.3%).<sup>23</sup> This difference may be because of fewer participants in our study group compared to them and also the fact that the number of females are more in this study and Vernal conjunctivitis is a disease commonly affecting the males.<sup>24</sup>

The prevalence of conjunctivitis in our study is 1%. The prevalence of conjunctivitis and other infectious diseases has been reported to be 0.33 - 2.77% in some parts of India.<sup>25</sup> This variation can be explained by the difference in geographical location, seasonal variations, different socioeconomic status and personal hygiene of children.

Children are a precious asset of the nation. Most of the ocular diseases observed in our study were either preventable or treatable but if neglected may lead to severe disabilities or blindness. As the burden of blindness is already high in our country, we have to go through a blindness prevention approach, beginning right from the early childhood and preschool and school eye-screening programmes should be an integral part of it.

## CONCLUSION

The relatively high prevalence of refractive error and presence of other ocular morbidities in our studied population suggests that there is a need for a large-scale community-based preschool screening program in Nepal so that affected children can be identified early and appropriate treatment can be started promptly. We will also recommend follow up study for this issue.

## RECOMMENDATIONS

We recommend the screening of preschool children for early evaluation of ocular morbidities.

## LIMITATION OF STUDY

The study could have been better if follow up was done further for assessment of long term visual outcome. Also, the multicentral study would have been better for this study.

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## CONFLICT OF INTEREST

None

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