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# Ocular morbidity among preschool children in urban area of Chittagong in Bangladesh

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## 孟加拉吉大港区学龄前儿童眼病发生率研究

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**摘要**

**目的**:研究吉大港区学龄前儿童的眼病发生率情况。

**方法**:随机横断面抽样调查,研究孟加拉吉大港区学龄前儿童的眼病发生率。对 60 所托儿所 4~6 岁学龄前儿童进行记录,走访且检查眼睛。根据性别、年龄、视力障碍和眼部疾病的诱因,分析所获得的数据。

**结果**:对 60 所托儿所共计 900 例学龄前儿童进行检查,其中男性儿童占 52.6%,女性儿童占 47.4%。年龄范围为 4~6 岁不等。平均年龄为 5.47±0.64。在学龄前儿童中,眼病发生率为 16.89%,通常疾病为 7.66% 儿童存在屈光不正,其次 3.66% 患结膜炎,2.77% 患睑缘炎,1.66% 患鼻泪管阻塞(NDO),0.88% 患感染性结膜炎,0.33% 患麦粒肿,0.44% 患睑板腺囊肿。其中 1.11% 患弱视,0.77% 患斜视,0.11% 患发育性白内障,0.33% 患角膜混浊,是一个值得关注的问题。

**结论**:研究学龄前儿童的眼病发生率可以很容易地确定可持续视力筛查方案,如果及时采取治疗能够有效降低眼部疾病的患病率和视力障碍。目前的研究表明,未对屈光不正进行矫正是学龄前儿童视力障碍的主要原因。

**关键词**:眼睛筛查;眼睛疾病;学龄前儿童;屈光不正;视力

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## Abstract

• AIM: To determine the pattern of ocular morbidity among preschool children at urban area of Chittagong.

• METHODS: A random cross-sectional survey was conducted to determine the prevalence of ocular morbidity among preschool children in the urban area of Chittagong. Preschool children aged 4 to 6 years old in all 60 preschools were registered, interviewed and their eyes examined. All the data obtained was analyzed according to the sex, age, and causes of visual impairment and type of ocular diseases.

• RESULTS: A total of 900 preschool children from 60 preschools were examined where boys were (52.6%) more than girls (47.4%). The age range of students varied from 4 to 6 years. The mean and median ages were 5.47±0.64. About 16.89% ocular morbidity was found among preschool going children and of these abnormalities 7.66% of children have Refractive error followed by Conjunctivitis 3.66%, Blepharitis 2.77%, Nasolacrimal Duct Obstruction (NDO) 1.66%, Infective conjunctivitis was 0.88%, Stye 0.33%, Chalazion 0.44%. Amblyopia was present in 1.11%, Strabismus in 0.77%, Development Cataract 0.11%, and Corneal Opacity in 0.33% cases which was a matter of concern.

• CONCLUSION: Ocular morbidity among preschool children can be easily identified by ongoing eye screening programs and if treated timely to reduce the prevalence of ocular diereses and visual impairment. The present study shows uncorrected refractive errors as the main cause of visual disability in preschool children.

• KEYWORDS: eye screening; ocular disorders; preschool children; refractive errors; visual acuity
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## INTRODUCTION

Ocular health is a fundamental part of early child development and of overall health and wellbeing. 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[1]. These visual impairments or blindness may affect an individual's health, employment options, educational achievements and social functioning across the lifespan[2]. 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[3]. 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[4]. The prevalence of blindness ranges from 0.3/1000 children in affluent countries to 1.5/1000 children in very poor communities[4]. The scenario of paediatric ocular diseases varies worldwide. The pattern of ocular diseases in children is very important because some eye conditions cause' ocular morbidity while others invariably lead to blindness. The majority of blindness is either potentially curable or preventable[5]. The school eye health program is one through which children can be screened for diseases, such as refractive error, strabismus, amblyopia and trachoma[6]. In most of the countries school screening programs are done routinely to detect the prevalence rate and causes of ocular morbidity[7]. Refractive errors are the leading cause of ocular morbidity in school-aged children of India[8]. In Ethiopia, 51.6% of children less than 10 years of age suffer from active trachoma and 62% of school going children had a refractive error which was the leading cause of low vision[9]. Although we all know about the consequences of undetected refractive error and other ocular diseases of children we are unaware about the pattern and available treatment facilities of ocular morbidity among school going children.

Bangladesh is one of the most densely populated countries in the world and is the 7th most populous nation with 41% being children under the age of 18 years. There were approximately 75 million children between 0 to 8 years old in Bangladesh[10]. Refractive error was the major cause of childhood visual impairment in Bangladesh. It was a serious barrier to children's development and directly resulted in decreased attendance at school[11]. A recent survey provided data for adults but no reliable data on the visual status of preschool children and school children of Bangladesh. However, a substantially lower prevalence (1%) was found in a study of Japanese school children[12] which was similar to the result of our study. However, this study conducted with the objective of estimating the prevalence of ocular morbidity among preschool children in the urban area of Chittagong in Bangladesh. These findings will be useful for government in eye care planning and facilitate the incorporate of the development of a primary health care structure of the country.

## SUBJECTS AND METHODS

**Participants** The study design was a cross-sectional study of all students in the preschool children. The study was carried out from 15th Jul. 2015 to 18th Oct. 2015 to assess the ocular morbidity among preschool children in the Chittagong city area of Bangladesh aged between 4-6 years old from 15 preschool children's randomly selected each school and total of 60 preschool were selected from Chittagong city area. Exclusion criteria - preschool children who willing not participant during the study period were excluded. A total of 900 preschool students were examined. All the preschool children were examined in the school. The participants were voluntary and the identities of the participants were kept confidential by the observer. Parents of preschool children who underwent ocular health screening tests were also informed in advance through separate attachment participant information. A team of an ophthalmologist, optometrists and two other staff for collecting data from the mobile unit of visited the preschools. All the preschools were pre-informed. Information obtained included name of the school, date of examination, name, sex and age. Gross eye examination with torch light was done for finding out the presence of any ocular abnormalities among preschool children and direct ophthalmoscope was used to examine the posterior segment of the eye through dilated pupil and performed in a dark room when the vision is not normal or detected any others ocular pathology.

Hirschberg test was evaluated with corneal reflex text and cover-uncover tests. Hirschberg test was done using a flash light pen. Preschool children were required to sit facing the examiner. This test was performed with the glasses if the child wears it or without glasses if otherwise. The corneal reflexes were observed from a 33 cm working distance using a centrally located pen torch. The pen torch and a toy were held at eye level of the children. A preschool child was asked to look at the toy. Pen torch was directed at the bridge of the nose between the right eye and the left eye of the children. Visual acuity was taken by Lea Symbol chart with a measured distance of 3 meters and enough illuminated space.

The symbols on the cards response students were shown to children. The test began with the right eye. The left eye was closed using an eye patch or occluder for children who do not want to use an eye patch. The symbols on the top line chart are appointed one by one. The child was considered to pass the test if he/she was able to match all the symbols correctly. If the child failed to match the symbols or incorrect than back to the previous line for confirmed the fixed value of visual acuity. Visual acuity (VA) was recorded when a child was reading at least 3 symbols correctly on concerned line. Refractive error was diagnosed based on visual acuity less than 6/6 or worse that improved with pinhole test. Pinhole test was conducted on preschool children who do not reach the normal acuity by age to determine whether a decline in VA is due to refractive error or not. Objective retinoscopy was performed to determine the total refractive status of the eyes. After the objective retinoscopy, power was obtained and finally cycloplegic and non-cycloplegic refraction was carried out for all children to find any refractive error with help of objective retinoscopy. The drug used for cycloplegic refraction is Cyclopentolate 0.75% used two times, one drop in each eye, at an interval of 10 minutes. A diagnosis of hyperopia-a pair of +1.00DS test that are used during visual acuity test to detect the presence of latent hyperopia in preschool children who have distance visual acuity of 6/6. Similarly myopia and astigmatism is recorded if it is more than 0.50 dioptre. In refractive error cases, the necessary spectacle was prescribed and given free of cost to the students through school teachers. Amblyopia is recorded difference of two lines or best corrected

vision between the two eyes or a corrected vision less than 6/9 or worse in the affected eye. The children who were suspected of having ocular pathology were referred to the ophthalmologist in the outpatient department, academic consultation room at Chittagong Eye Infirmary and training Complex for further evaluation and management.

**Statistical Analysis** Statistical analysis was performed using the statistical software package SPSS 22.0 for Windows. Data were expressed as mean and standard deviation for continuous variables and as frequencies and percentages for categorical variables. Contingency Chi-square test was used to observe the association of the ocular morbidities. Comparison of percentages was by Chi-squared test.

**Ethical Clearance** Ethical approval for the study was obtained from the Department of Optometry, University Kebangsaan Malaysia, and Medical Centre Ethical Committee Board under the registration code ethics UKM-1.5.3.5/244/NN-060-2015 and special permission were obtained from regional Ministry of Health and Education authority at Chittagong district zone in Bangladesh. Similarly, approval was obtained from the preschool principal for preschool screening. The research was conducted in strict adherence to the Helsinki's declaration.

## RESULTS

A total of 900 preschool children from 60 preschools were examined where male were (52.6%) more than female (47.4%). The mean and median ages were 5.47± 0.64 and the number of children 4 years of age were screened 67 students (7.44%), 5 of a total of 343 students (38.11%) and 6 of a total of 490 students (54.45%). Major religion was Islam.

Overall Ocular diseases were observed in a total of 152 (16.89%) preschool children. A total of 14 diseases were diagnosed such as vernal keratoconjunctivitis (VKC) or allergic conjunctivitis, refractive error, blepharitis, nasolacrimal duct obstruction (NDO), amblyopia, strabismus, infective conjunctivitis, convergence insufficiency, stye, chalazion, corneal opacity, keratitis, developmental cataract, ptosis. The proportion of ocular diseases as shown in Table 1. The most common ocular morbidity among preschool children was refractive error 69 (7.66%). The second common ocular disorder were vernal/allergic conjunctivitis 33 (3.66%) followed by blepharitis 2.77%, NDO 1.66%, amblyopia 1.11%, strabismus 0.77%, infective conjunctivitis including bacterial and viral conjunctivitis was 0.88%, convergence insufficiency 0.55%, stye 0.33%, chalazion 0.44%, corneal opacity 0.33%, keratitis 0.22%, ptosis 0.22% and developmental cataract 0.11%.

A total of 69 preschool children were presented with refractive error, in which 36 (52.17%) patients were myopic, 26 (37.68%) were hypermetropic while 7 patients (10.14%) were presented with astigmatism (Table 2).

**Table 1 Distribution of ocular diseases**

| Diagnosis | Frequency n (%) |
|---|---|
| Refractive error | 69 (7.66%) |
| Blepharitis | 25(2.77%) |
| NDO | 15(1.66%) |
| Amblyopia | 10(1.11%) |
| Strabismus | 7(0.77%) |
| Infective conjunctivitis | 6(0.88%) |
| Stye | 3(0.33%) |
| Convergence insufficiency | 5(0.55%) |
| Chalazion | 4 (0.44%) |
| Corneal opacity | 3 (0.33%) |
| Keratitis | 2 (0.22%) |
| Ptosis | 2 (0.22%) |
| Developmental Cataract | 1 (0.11%) |

NDO: Nasolacrimal duct obstruction.

**Table 2 Proportion of refractive error**

| Refractive errors | Frequency *n* (%) |
|---|---|
| Myopia | 36 (52.17%) |
| Hypermetropia | 26 (37.68%) |
| Astigmatism | 7 (10.14%) |
| Total | 69 (100%) |

Visual acuity was recorded monocularly and binocularly. The majority of preschool children 834 (92.70%) had normal vision, 60 (6.66%) had a sub-normal vision, 5 (0.55%) had visual impairment while 1 (0.11%) were bilaterally blind according to WHO guideline (Table 3).

## DISCUSSION

The overall prevalence of ocular morbidity among preschool students in this study is similar to that found inBenin and Ibadan[6,12]. The prevalence of ocular morbidity among children was found 16.89% which was similar to most of the studies around the world of which percentages varied from 12.7% to 14.8%[6]. Compared with the prevalence of ocular diseases among school children in Malaysia have documented that 14.8% which was slightly lower than this study[13]. However, one study found that ocular morbidity 24.6% among children[7], in India which was higher than our study. 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%[14], that prevalence of ocular diseases markedly higher than in this study.

The most common ocular morbidity among preschool children was the refractive error (7.66%), which was also the most common ocular morbidity among children of different countries[8]. Myopia was the most common (51.0%) type of refractive error among the children what was consistent with some international studies[8,15]. A recent studies showed that Malaysia (14.8%), Hong Kong (36.7%) and South India higher (32%) prevalence rate of refractive errors among school children of age 3-18y as compared to the this study

**Table 3 Percentage distribution of unaided and aided visual acuity of the children**

| Parameters | Normal | Uncorrected | | | Corrected | |
|---|---|---|---|---|---|---|
| | 6/6 | 6/9-6/18 | 6/24-6/60 | <6/60 | Better than 6/9 | Less than 6/9 |
| No. | 834 | 60 | 05 | 01 | 52 | 14 |
| % | 92.7% | 6.7% | 0.55% | 0.1% | 78.79% | 21.21% |

was observed[13,16-17]. As compared to the in this study lower prevalence of refractive errors (2.7-5.8%) has been reported among school children of age range 5-15y from Finland, Africa, Nepal and Chile[15].

The second major common ocular morbidity among preschool children was 33 (3.66%) VKC/allergic conjunctivitis which was slightly higher prevalence has been reported 4.6% prevalence in urban and rural school children 5-14y[18]. However, vernal or allergic conjunctivitis is not a reason for visual impairment aside from with difficulties; it has been observed to be the main source of truancy from school and could compromise the impairing daily activities, quality of life and work. Comparatively, studies done amongst primary school children in Ethiopia showed that the prevalence of vernal conjunctivitis was very high 31.3%[9].

Lazy eye or amblyopia is the reason for a permanent loss of vision if not treated early childhood life. In this study amblyopia was found only 1.11%, whereas in the similar study at south western Nigeria 0.08% children were found[19], and in another study at South Karachi approximately 0.5% children were reported[20]. Convergence insufficiencies are the leading cause of blurred vision, eye strain, headache and double vision[18], in this study 0.55% children were presented with convergence insufficiency.

This study showed a high prevalence of infective diseases such as conjunctivitis, blepharitis, and Stye. The prevalence of conjunctivitis (0.33-2.77%) has been reported in other parts of India[6]. The prevalence of infective diseases can be explained by the difference in geographical location, seasonal variations, different socioeconomically status and personal hygiene of children. Moreover, 1.5% of school children of 1-17y in North America had prevalence of conjunctivitis[21]. The higher prevalence of strabismus was revealed 2% to 5% in European-based. The population of Asia and African American has been reported[22]. However, a substantially lower prevalence (1%) was found in a study of Japanese school children[23] which was similar to the result of our study.

Visual acuity of each student was recorded with Lea Symbol chart from 3 meters distance. Unaided visual acuity was recorded 6/6 or normal vision among 92.7% of the preschool children. About 6.7% of total children had their vision less than 6/6 or less than normal, probably being amblyopic for lack of proper management and consciousness. The threatening part was that 0.6% of the children had their visual acuity less than 6/18 or worse which means their visual ability at the category of low vision or blind. Apparently this percentage does not look threatening but if we concede 52 million[11], children who belong to primary school children's age group (15 or below years) the total numbers of children with low vision will be more than 200,000, many of them without correction may go blind in later life. Our study has few limitations. First, this study was not designed as a population-based with small number of subjects although the selection of 60 preschools and 15 subjects were randomly selected. Secondly, limited budget for preschool screening program due to a shortage of fund.

It was concluded that, this study found a prevalence of 16.55% of ocular disorders among the preschool children in Chittagong, Bangladesh. The commonest cause of visual impairment was a refractive error, which can preventable and most cases of visual impairment were either curable or preventable. School eye health program should be an ongoing process which will help to detect new cases, monitoring of visual improvement or deterioration and to assess the barriers along with knowledge, attitude and practice of students, guardian and teachers on a regular basis.

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