Frequency of Eye Diseases in School Age Children

Yasir Iqbal, Fuad Khan Niazi, M. Afzal Khan Niazi

Purpose: To determine the frequency of refractive errors and types of eye diseases in the school age presenting to the tertiary care unit.

Material and Methods: The study was conducted in department of ophthalmology, holy family hospital Rawalpindi, from January 2005 to July 2005 was consecutive children presenting to the OPD within the duration. School age group (5 - 15 yrs) children suffering from eye complaint. Exclusion criteria: children with other associated systemic illness and nonspecific complaint of watering.

Results: Examination of 413 children in 6 months revealed the frequency of eye diseases as follows: refractive errors 260 (62.9%), eye lid diseases 48 (11.62%), vernal keratoconjunctivitis 34 (8.23%), bacterial conjunctivitis 13 (3.15%), strabismus 19 (4.6%), cataract 11 (2.66%), traumatic eye injury 19 (4.6%), 7 (1.69%) retinal disorders, 1 (0.24%) glaucoma and 1 (0.24%) ptosis.

Conclusions: We found that in school age (5-15yrs) children; refractive error was present in 62.9% of patients out of which 51.33% had myopia and 11.62% had hyperopia. 37.1% of children had different eye diseases in which eye lid diseases was the most frequent.

There are an estimated 45 million blind people in the world of which there are estimated only 3% are children1. This dramatic difference in numbers of blind adults compared with children accounts in part for the relatively minor importance that has been attributed to the problem surrounding childhood blindness. Certainly, comparable ones for children do not match the well organized advocacy groups for the elderly in many developed countries. The result of this can be seen in the difference in resources made available for health services and research for adult blindness versus childhood blindness. One hopes that, now that the World Health Organization (WHO) and International Agency for Prevention of Blindness have developed a global initiative to eliminate avoidable blindness and have included childhood blindness as one of its five key areas, this will change.

In developed countries, screening for eye diseases in preschool and school children is done routinely. Eye services are easily accessible, and the majority of children with eye problems consult them without requiring referral by other health professionals. Refractive errors are a known cause of visual impairment and may cause blindness worldwide2.

Information is lacking on the magnitude and the prevalence as well as the frequency of the eye diseases in children in Pakistan. No national preschool or school eye-screening programme exists in Pakistan such that those with early onset of such errors will have many years of poor vision and will later on develop amblyopia.

A study was designed to find the frequency of refractive errors and the frequency of the eye diseases in the school age children presenting to a tertiary care unit (Holy Family Hospital) in Rawalpindi.

MATERIALS AND METHODS
The study was conducted in the department of Ophthalmology, Holy Family Hospital from Jan 2005 to July 2005.
All consecutive children presenting to the OPD within the duration were selected in the study.

Children falling into the school age group (5-15 yrs) suffering from eye complains were included in the sample.

The following children was excluded:
1. Children suffering from other associated systemic illness
2. Mentally handicapped children
3. Diagnosed cases of delayed miles stones
4. Children with nonspecific complains of watering and decreased vision

The study was conducted in the out patient department of Holy family hospital. All the children presenting to the out patient department were referred to the author. The patients were first allotted the hospital registration number before proceeding to the examination. The patients falling into the selection criteria were scrutinized and rest were treated and excluded.

The study procedure and its aim were explained to all the children and their parents before beginning the examination. The examination started with the chief complaints and the history relevant to complaint was taken thereafter. Systemic history and postnatal history was also taken and general physical examination was done again to filter out the patients. Again the patients falling into the inclusion criteria were selected while rest was excluded. Those patients who were referred by the pediatric department the referring doctor was inquired regarding any systemic involvement.

The materials used in the examination were Snellen chart, E chart, torch lights, slit lamp, direct ophthalmoscope, indirect ophthalmoscope, retinoscope, trial set, universal trail frame and proforma.

The students under went the following examination:
1. Visual acuity of both eyes was tested separately at 6 meters in a well lighted room. Visual acuity was assessed using an illiterate Snellen E chart and with the literate Snellen chart with (if any) and without the current spectacle correction. A pinhole test was performed.
2. Non-cycloplegic and cycloplegic objective and subjective refraction was done on all participants.
3. Objective refraction was done by static retinoscopy in a slightly darkened room. Results were confirmed by subjective refraction.
4. The pupillary reactions were noted. Both direct and consensual light reflexes were documented.
5. Using a torch and direct ophthalmoscope, the eyes were inspected for abnormalities of position and motility. Hirschberg test and assessment of ocular motility was done.
6. A thorough eye examination including biomicroscopy with a slit lamp.
7. Fundus evaluation by direct and indirect ophthalmoscope with dilated pupil was done.
8. Schiøtz tonometry performed where as required where as applanation tonometry was done in cooperative children.
9. The data was recorded on the proforma.

DIAGNOSTIC CRITERIA
A diagnosis of myopia was made if the refractive error was more than -0.5 diopter. Similarly hyperopia was recorded if it is more than + 1.0 diopter after cycloplegic refraction. The drug used for cycloplegic refraction was cyclopentolate used twice, one drop in each eye, at interval of 15 minutes. The hyperopic astigmatism, myopic astigmatism and mixed astigmatism were not taken in account separately and were categorically assigned either myopic or hyperopic. Strabismus was diagnosed by recording corneal reflex combined with the cover tests.

All other diagnosis was made by slit lamp examination and by direct and indirect ophthalmscopy where and when required.

RESULTS
A total number of 463 children were examined in the period of 6 months between the ages of 5 and 15 yrs. Two hundred fifty of the children were referred by the pediatric department with complaint of headache and decreased vision where as 213 presented with their parents complaining of decreased vision and other eye problems. Fifty of them were excluded due to either systemic illness or delayed miles stones.

A total of 413 children were included in the study. Two hundred and twenty six (55.4%) were males whereas 187 (44.6%) were females.
FREQUENCY OF REFRACTIVE ERRORS:
A total of 260 (62.9%) children had refractive error. Astigmatism was not taken as a different entity rather it was included either in myopia (myopic astigmatism) or hyperopia (hyperopia astigmatism). The frequency is shown in Table 1.

1 **Myopia:** The numbers of myopes were 212 in which the males were 128 and the females were 84.

2 **Hyperopia:** The numbers of hyperopic were 48 in which the males were 20 and the females were 28.

FREQUENCY OF EYE DISEASES
After refractive errors eye lid diseases were the most frequent eye disease followed by vernal keratoconjunctivitis and bacterial conjunctivitis. The frequency of eye diseases is shown in Table 2.

- **Lid diseases:** Forty eight (11.62%) children were found to be suffering from lid diseases. Blepharitis was the most common lid infection a total number of 32 (7.74%). Nine presented with stye either of upper eyelid or the lower lid. Nine presented with chalazion. The frequency in lid diseases is given in the Table 3.

- **Strabismus:** Strabismus was categorized according to esotropia and exotropia. A total of 19 (4.6%) children were diagnosed of strabismus in which 7 were having esotropia and 12 exotropia. The frequency is given in Table 4.

- **Vernal keratoconjunctivitis:** A significant number of children presented with vernal keratoconjunctivitis a total of 34 (8.23%) with 17 (4.11%) males and 17 (4.11%) females.

- **Trauma:** A total of 19 (4.6%) children came to the out patient department with traumatic eye diseases. The presentation of male children was more 14 as compared to the female 5 children which is evident from the Table 5 which also shows the nature of trauma along with frequency.

- **Bacterial conjunctivitis:** Total of 13 (3.15%) children were diagnosed of having conjunctivitis, 3 (0.72%) males and 10 (2.42%) females.

- **Traumatic cataract:** Nine (2.17%) males and 2 (0.48%) females constituted of 11 (2.66%) cataractous children presenting to the out patient department.

- **Ptosis:** There was only 1 (0.24%) male child having ptosis.

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### Table 1: Frequency of refractive errors (n=413)

<table>
<thead>
<tr>
<th>Gender</th>
<th>Myopia n (%)</th>
<th>Hyperopia n (%)</th>
<th>Total n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td>128 (30.99)</td>
<td>20 (4.84)</td>
<td>148 (35.83)</td>
</tr>
<tr>
<td>Females</td>
<td>84 (20.33)</td>
<td>28 (6.77)</td>
<td>112 (27.11)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>212 (51.33)</td>
<td>48 (11.62)</td>
<td>260 (62.9)</td>
</tr>
</tbody>
</table>

### Table 2: Frequency and type of eye diseases in children (n=413)

<table>
<thead>
<tr>
<th>Diseases</th>
<th>Total n (%)</th>
<th>Male n (%)</th>
<th>Female n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refractive errors</td>
<td>260 (62.95)</td>
<td>148 (35.83)</td>
<td>112 (27.11)</td>
</tr>
<tr>
<td>Lid diseases</td>
<td>48 (11.62)</td>
<td>20 (4.84)</td>
<td>28 (6.77)</td>
</tr>
<tr>
<td>Vernal keratoconjunctivitis</td>
<td>34 (8.23)</td>
<td>17 (4.11)</td>
<td>17 (4.11)</td>
</tr>
<tr>
<td>Strabismus</td>
<td>19 (4.6)</td>
<td>11 (2.66)</td>
<td>8 (1.93)</td>
</tr>
<tr>
<td>Trauma</td>
<td>19 (4.6)</td>
<td>13 (3.14)</td>
<td>6 (1.45)</td>
</tr>
<tr>
<td>Bacterial conjunctivitis</td>
<td>13 (3.15)</td>
<td>3 (0.72)</td>
<td>10 (2.42)</td>
</tr>
<tr>
<td>Cataract</td>
<td>11 (2.66)</td>
<td>9 (2.17)</td>
<td>2 (0.48)</td>
</tr>
<tr>
<td>Ptosis</td>
<td>1 (0.24)</td>
<td>1 (0.24)</td>
<td>0</td>
</tr>
<tr>
<td>Glaucoma</td>
<td>1 (0.24)</td>
<td>0</td>
<td>1 (0.24)</td>
</tr>
<tr>
<td>Retinal problem</td>
<td>7 (1.69)</td>
<td>4 (0.96)</td>
<td>3 (0.72)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>413 (100)</td>
<td>226 (54.72)</td>
<td>187 (45.27)</td>
</tr>
</tbody>
</table>

### Table 3: Frequency of lid disease (n=413)

<table>
<thead>
<tr>
<th>Lid diseases</th>
<th>Male n (%)</th>
<th>Female n (%)</th>
<th>Total n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blepharitis</td>
<td>10 (2.4)</td>
<td>22 (5.32)</td>
<td>32 (7.74)</td>
</tr>
<tr>
<td>Chalazion</td>
<td>5 (1.21)</td>
<td>4 (0.96)</td>
<td>9 (2.17)</td>
</tr>
<tr>
<td>Stye</td>
<td>5 (1.21)</td>
<td>4 (0.96)</td>
<td>9 (2.17)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>20 (4.84)</td>
<td>28 (6.77)</td>
<td>48 (11.62)</td>
</tr>
</tbody>
</table>
- **Glaucoma**: Only 1 (0.24%) female was diagnosed of congenital glaucoma.

- **Retinal dystrophies**: A total of 7 (1.6%) children had retinal disease. One male and 2 females had Retinitis pigmentosa and 3 males and 1 female had Fundus flavimaculatus.

<table>
<thead>
<tr>
<th>Table 4. Frequency in strabismus (n=413)</th>
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<tbody>
<tr>
<td><strong>Strabismus</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Esotropia</td>
</tr>
<tr>
<td>Exotropia</td>
</tr>
<tr>
<td>Total</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 5. Frequency of trauma in children (n=413)</th>
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</thead>
<tbody>
<tr>
<td><strong>Disease</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Subconjunctival haemorrhage</td>
</tr>
<tr>
<td>Lid tear</td>
</tr>
<tr>
<td>Hyphema</td>
</tr>
<tr>
<td>Perforation</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

**DISCUSSION**

The objective of the study was to find out the frequency of various eye diseases and frequency of refractive errors in school age children. This study was conducted on 413 consecutive school going children, aged 5-15 yrs, presenting for various complaints (exclusion criteria for the study applied) in the eye out door patient department of Holy Family Hospital a teaching tertiary care hospital in Rawalpindi associated with Rawalpindi Medical College.

Their data was collected on a proforma and later on analyzed by the author for the study.

Out of the 413 patients that were included in the study 260 (62.9%) patients were having significant refractive errors causing a decrease in visual acuity to 6/12 or less in one or both eyes. The remaining 107 (37.1%) had other ocular diseases.

The 62.9% of children presenting with refractive errors probably suggests parents concern about their vision problems especially while attending school hence necessitating medical consultation. The data in fact matches the information gathered from other local and international sources as evident below.

260 (62.9%) children with the refractive errors were further subdivided into those with myopia (including myopic astigmatism) and hypermetropia (including hyperopic astigmatism).

212 (51.33%) patients had myopia. This is in accordance with contemporary literature. Afghani carried out village-to-village screening of 16,592 preschool children in a rural area of Rawalpindi. The results showed that 22% of these children had some sort of ocular problem and estimated the frequency of myopia 39%. Comparative analysis showed that there is significant under detection of amblyopia and refractive error in this group.

According to Wedner in Tanzania 91.6% of students with refractive errors were myopic. Similarly Mohamed found prevalence of myopia as 44% whereas bilateral myopia was present in 37% of the children. In the total sample, high myopia was found in 1.4%.

Forty eight (11.62%) patients had hypermetropia. This result is slightly on the higher side. This finding might not be statistically significant due to the small study sample but points toward a possible problem of children having amblyopia as hypermetropia and esotropia are known to be the commonest causative factors for a lazy eye. Shah, Khan, and Mohammad conducted a study on Presentation of childhood Squint in Peshawar found hypermetropia in 74% of the patients. This therefore needs a thought for initiating a comprehensive screening program during preschool and early school years.

Male to female distribution of the refractive errors shows a slightly higher frequency among male children but according to Mohamed the prevalence of myopia was significantly higher in girls. This might be due to our social setup of neglecting girls and giving preference to boys in all aspects whether health or education and also due to the lack of emphasis given to female education in Pakistan in general and social taboos attached to females having problems with vision. On the other hand our results could also have been different if we had gone to schools instead of relying on hospital presentation.
Forty eight (11.62%) patients out of the total had various lid disorders that included styes, chalazion and chronic blepharitis. This seems to be a high number of patients and probably could be explained by small population group and the poor lid hygiene among the children as for the patients presenting to a Government hospital usually belong to low socioeconomic group. A study of ocular infections amongst primary school children in Delhi by Kumar also found 11.74% ocular infections. Stye, blepharitis and chalazion were the common infections among the patients. A significant association was found between ocular infections and religion as those being Muslims were less prone to the diseases maybe because of good hygiene.

Eleven (2.66%) patients had cataract. All were traumatic in nature and unilateral. The higher number of boys, 9 (2.17%), is also explained as they are more likely to indulge in outdoor activities and sustain injuries. None of the cataracts were congenital which may be coincidental or due to the fact that our study sample comprised of school going children rather than all children. Sethi and Khan conducted a study on all pediatric patients admitted with ophthalmic disorders in Peshawar and found cataract in 30% of the patients. This is a relatively high figure as compared to the finding in the study but it can be explained by the fact that Sethi and Khan’s findings included all types of cataract whether congenital, traumatic or associated with systemic involvement. Thirteen (3.15%) children had bacterial conjunctivitis. Diagnosis was established through clinical and culture correlation and suggested involvement of normal conjunctival flora as culprit in all these cases. Cases with negative cultures were regarded as having nonspecific conjunctivitis and excluded from the study. Hussain, Awan and Khan found 3.5% bacterial conjunctivitis in Chakwal district which is in accordance to the study findings. None of the patient had trachoma. On the other hand we had a significant number 34 (8.23%) of cases with vernal keratoconjunctivitis. The study shows an alarmingly 4.6% number of patients who had strabismus. Sethi and Khan found 13.5% strabismus in North West Frontier Province. This actually means that a high number of patients are threatened not only by the development of amblyopia and the non development of binocular single vision but also by social condemnation which may have damaging effects on the psychological development of the children that could be more harmful than the visual problem itself.

A total of 19 (4.6%) children had squint. Seven had esotropia while 12 had exotropia.

Three of the children with esotropia were male and 4 were female. In all 4 (2 male and 2 female) had accommodative refractive type of squint with moderate to high hypermetropia. Remaining had infantile esotropia. Esotropia is a very common cause of amblyopia especially the accommodative type. This mandates early intervention with refractive correction and patching. Infantile type on the other hand requires very early surgical intervention after correction of amblyopia so as to leave some chances of binocular single vision. The fact that none of the patients with esotropia had any treatment prior to coming to us and that all of them were above 5 years of age is major risk factor in development of serious condition of amblyopia. This suggests lack of education among the masses and the need to make early diagnosis of such problems to prevent any drastic sequel.

A total of 19 (4.6%) children had squint. Seven had esotropia while 12 had exotropia.

Twelve (2.9%) patients had exotropia out of which 8 were male and 4 female. Six of the male patients had secondary exotropia. Two boys and 2 girls had an intermittent alternating exotropia and the remaining had a constant alternating exotropia. The secondary exotropia show that there has been a variable delay in correction of the vision obstructing cataracts and that these patients can potentially develop vision deprivation amblyopia. Amblyopia is not a usual sequel of alternating exotropia but they are a cosmetic blemish and can cause problems with the development of binocular single vision especially the constant type. Some of these patients had refractive errors mainly mild degrees of myopia which also needed correction. Too much delay in surgery for the correction of exotropia may also result in the post operative problems of diplopia and difficulty in adaptation. Proper counseling of patients and teachers was required to convince them about the need for surgical correction. Most of the patients and their parents were found to be unaware that the squint could be corrected.
Only one (0.24%) girl had glaucoma which was of the primary congenital type. She had bilateral involvement with noticeable buphthalmos in one eye. She had satisfactory surgery done in the eye with obvious buphthalmos at the age of 1 and pressure in the other eye was high mandating necessary treatment. Only one case with glaucoma shows that it is a relatively rare condition.

One (0.24%) patient had ptosis which was of the congenital type. Ptosis was severe with an absent lid crease and poor levator function. The patient was a 6 year old boy and had already developed amblyopia. The patient needed urgent surgical correction to salvage any chances of amblyopia reversal. Again it was noticed that the patient’s relatives were unaware that he had a treatable problem therefore the delay in presentation.

Seven (1.69%) patients had retinal dystrophy. Three had classical retinitis pigmentosa and 4 had fundus flavimaculatus. Patients with fundus flavimaculatus 3 boys and 1 girl were siblings whereas ones with retinitis pigmentosa one boy and 2 girls were unrelated. The parents of children with fundus flavimaculatus did not have the disease that suggested an autosomal recessive link. Hereditary pattern for Retinitis pigmentosa patients could not be established. All these patients had a specific complaint of decreased vision at night. The 1.7 % of children having retinitis pigmentosa can be explained due to intercousin marriages very common in our society. The hereditary nature of the dystrophies makes it extremely important to evaluate the near relative of such patients. Also genetic counseling must form part of their management.

Nineteen (4.6%) patients presented with various forms of trauma, 3 with lid tear, 10 with subconjunctival hemorrhage, 3 with hyphema and 3 with the corneal scleral perforation. It is difficult to establish a link with other studies as regard to number of patients presenting with trauma as this is vastly dependent on cultural and political background of the region. el-Gilany, el-Fedawy and Tharwat9 highlighted that blindness occurred before 10 years of age in Egypt. Almost three-quarters of causes were avoidable such as trauma. Therefore domestic setup, sporting habits and parental supervision have a role to play in the frequency of different kinds of trauma. Those with agricultural background are likely to receive ocular injuries during the harvesting season. Those at risk of terrorism or who live in war struck regions are more likely to receive various injuries. Children can also sometimes be a victim of abuse and domestic violence. Statistics of the study cannot establish a specific pattern or trend of ocular injuries apart from the fact that male children (3.38% as compared to female 1.2%) are more commonly involved. This may partly be explained by their more frequent outdoor activities as compared to the females.

CONCLUSIONS
We found that in school age (5-15yrs) children refractive error was present in 62.9% of patients out of which 51.33% myopia and 11.62% hyperopia. 37.1% of children had different eye diseases in which eye lid diseases was the most frequent.

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REFERENCE