REFRACTIVE ERRORS;
PROFILE IN SCHOOL AGE CHILDREN

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ABSTRACT… Objective: To know the profile of refractive errors in school age children in DHQ Hospital Karak and group of teaching Hospitals Bannu. **Setting:** DHQ Hospital Karak and group of Teaching hospitals Bannu. **Period:** Two years study from August 2007 to August 2009. **Design:** Descriptive study. **Materials & Methods:** A work up proforma was prepared for record of children. School age children with age range from 5 to 15 years who attended the eye OPD were documented and informed consents were taken from children and their parents. They were screened for refractive errors with retinoscopy. In some children cycloplegic refraction was done.Fundoscopy was also done to exclude any lesion causing visual impairment in some children .Refractive errors was noted as spherical equivalent of myopia and hypermetropia in children who had both spherical and cylindrical error while in those children who had only cylindrical error were assigned as astigmatism .Children with any organic lesion in cornea lens and fundi were excluded from study. **Results:** Total 2680 school age children with age range from 5 to 15 years were examined out of which 1560(58.20%) were male and 1120(41.8%) were female.1688(62.98%) children were emmetropic while 992(37.01%) had refractive error .Spherical equivalent of myopia was present in 541(54.53%) while that of hypermetropia in 360 (36.29%)children. Astigmatism was present in 91(9.17%) children. **Conclusions:** Refractive error is a common ocular disorder affecting school age children. Myopia is more common followed by hypermetropia. Therefore routine careful visual check up in school age children should be carried out.

Key words: Visual Acuity (V.A). Dioptre – D. Dioptre Cylider (D.cyl).

INTRODUCTION

Refractive error is one of the most common cause of visual impairment world wide and the second leading cause of treatable blindness[1]. Worldwide near about 161 million people have some type of visual impairment[2] out of which refractive error has magnificant proportion in the developed and developing countries with uncorrected refractive error causing blindness[3].

The world health organization has launched the global initiative Vision 2020 in 1999 “The right to sight” with priority foci. The priority foci have been chosen on the basis of magnitude and burden of blindness represented and the affordability and feasibility of interventions to prevent and treat them. One of the important focus is the refractive error[4]. Refractive error in most of the cases is present in childhood and continues in adult life[5,6].

According to a study about 11.4% of blindness is due to uncorrected refractive error in our country. This figure also includes aphakia[7].

Refractive error has been recognized as public health problem[8] in many countries as will as by WHO in its Global initiative vision 2020.

Uncorrected refractive errors are important cause of visual impairment in many developing and developed countries. Many studies have been carried out to find out the magnitude and prevalence of this ocular morbidity in the world[9]. Refractive errors can be rectified with appropriate optical correction, while people with low vision may be helped with low vision services. Large number of people including school age children require refractive correction and low vision aids, and the availability of these services help to ensure better future for people suffering from these diseases.

School age children have three types of refractive error i.e myopia, hypermetropia and astigmatism depending upon their refractive media power and axial lenght of eyes. There are multiple factors affecting refraction of children.

Jeremy AG et al study shows that amount of time children spend engaged in near work and outdoor activities has close co-relation with refractive status[10].

Chan WY, Chia KS et al documented children with a greater reading exposure were more likely to be myopic.

Undetected or undercorrected refractive error particularly myopia is major problem in school age children. This ocular morbidity can have a serious impact on a child participation and learning in class and this can adversely affects children education, occupation and socio-economic status[11]. The prevalence of vision problem in USA is estimated to be 5 – 10 % while in India study has shown this ratio to be 5.1 %.

Survey of school age children of 5 – 15 years in Botswana shows V.A of < 6/12 in 1.5% children[12]. In spite of such grave consequences, there were few data available on the prevalence and type of refractive error in children in developing countries. The impact of refractive error on the individual and on the community can not be ignored. Refractive error is the third commonest cause of blindness in Pakistan[13].

This study is focused on profile of refractive errors in school age children of 5 – 15 years.

MATERIALS AND METHODS

This two years descriptive study was conducted in DHQ hospital Karak and group of Teaching Hospital Bannu from August 2007 to August 2009 with the objective to know the profile of refractive error in school age children with age range from 5 – 15 years. Proper proforma was made for record of the children. Informed consents from children and their parents were taken. Visual acuity without pinhole and with pinhole was checked. Refractive errors were checked with retinoscope.

In some children who were uncooperative particularly young, cycloplegic refraction was done Slit lamp examination of anterior and posterior segment was done to exclude organic lesions. All those children who were with age range from 5 – 15 years attended Eye OPD were included in the study. Children with organic lesions in cornea, lens and posterior segment impairing vision were excluded from the study. Refractive error was categorised into three groups.Those children who had both spherical and cylindrical errors were documented as spherical equivalent of myopia and hypermetropia accordingly while those who had only cylindrical errors were assigned as astigmatism.

RESULTS

2680 children with age range from 5 – 15 years were examined in OPD for refractive error out of which 1560(58.2%) were male and 1120(41.79%) were female (Table-I).

Table-I. Showing gender distribution NO 2680

Gender	Number	%age
Male	1560	58.2%
Female	1120	41.8%

On retinoscopy 1688(62.98%) children were emmetropic and 992(37.01%) children had refractive error (Table-II).

Table-II. Showing error ratio

Category	Number	%age
Emmetropia	1688	62.98%
Ametropia	992	37.01%

Regarding refractive error spherical equivalent of myopia was present in 541(54.53%) and that of hypermetropia in 360(36.29%) children. Astigmatism was found in 91(9.17%) children.

In myopic group of 541 children 369(68.20%) were male and 172(31.79%) were female. In hypermetropic, 187(51.94%) were male and 173(48.05%) were female. Astigmatism was present in 62(68.13%) male and 29(31.86%) female (Table-III).

Table-III. Different types of errors

Refractive error	Male	Female	Total 992
Myopia	369 (68.20%)	172 (31.79%)	541 (54.53%)
Hypermetropia	187 (51.94%)	173 (48.05%)	360 (36.29%)
Astigmatism	62 (68.13%)	29 (31.86%)	91 (9.17%)

In myopic group 129(23.84%) children had refractive error upto 1 D, 265(48.98%) from 1.1 to2 D, 86 (15.89%) 2.1-3D, 36(6.65%) 3.1-4D, 17(3.14%) 4.1-5D and

8(1.47%) children had >5D. (Table IV).

Table-IV. Showing spherical equivalent ofs myopia No 541

Diopters	Male (369)	Female (172)	Total 541
Up to 1 D	71 (55.03%)	58 (44.96%)	129 (23.84%)
1.1 - 2 D	184 (69.43%)	81 (30.56%)	265 (48.98%)
2.1 - 3 D	59 (68.60%)	27 (31.39%)	86 (15.89%)
3.1 - 4 D	30 (83.33%)	6 (16.66%)	36 (6.65%)
4.1 - 5D	17 (100%)	-	17 (3.14%)
> 5D	8 (100%)	-	8 (1.47%)

In hypermetropic group111 (30.83%) children had refractive error upto1D,170 (47.22%) 1.1-2D,64 (17.77%) 2.1-3D,9 (2.55%) 3.1-4D,2 (0.55%) 4.1-5D and 4 (1.11%) children had>5D (Table V).

Table-V. Showing spherical equivalent of hypermetropia No 360

Diopters	Male (187)	Female (173)	Total 360
Up to 1 D	70 (63.06%)	41 (36.93%)	111 (30.83%)
1.1 - 2 D	93 (54.70%)	77 (45.29%)	170 (47.22%)
2.1 - 3 D	24 (37.5%)	40 (62.5%)	64 (17.77%)
3.1 - 4 D	-	9 (100%)	9 (2.55%)
4.1 - 5D	-	2 (100%)	2 (0.55%)
> 5D	-	4 (100%)	4 (1.11%)

Astigmatism was present in 91 (9.17%) children out of which in 69 (75.82%) it was myopic and in 22 (24.17%) children it was hypermetropic (Table VI).

Table-VI. Showing astigmatism No 91

Astigmatism	Male (60)	Female (31)	Total 91
Myopic astigmatism	47 (68.11%)	22 (31.88%)	69 (75.82%)
Hypermetropic astigmatism	13 (59.09%)	09 (40.90%)	22 (24.17%)

In myopic astigmatism 45 (65.21%) had upto 1 DCyl, 17 (24.63%) 1.1- 2 DCyl, 6 (8.69%) 2.1-3 DCyl and 1 (1.44%) had 3.1-4 DCyl. (Table VII).

Table-VII. Showing myopic astigmatism

Diopter Cylinder	Male (47)	Female (22)	Total (69)
Up to 1 Dcyl	29 (64.44%)	16 (35.55%)	45 (65.21%)
1.1 - 2 Dcyl	11 (64.70%)	6 (35.29%)	17 (24.63%)
2.1 - 3 Dcyl	6 (100%)	-	6 (8.69%)
3.1 - 4 Dcyl	1 (100%)	-	1 (1.44%)

In hypermetropic astigmatism 10 (45.45%) children had upto 1 DCyl, 7 (31.81%) 1.1-2 DCyl and 5 (22.72%) children had 2.1- 3 DCyl (Table VIII).

Table-VIII. Showing hypermetropic astigmatism

Diopter Cylinder	Male (13)	Female (9)	Total (22)
Upto 1 Dcyl	7 (70%)	3 (30%)	10 (45.45%)
1.1 - 2 Dcyl	2 (28.57%)	5 (71.42%)	7 (31.81%)
2.1 - 3 Dcyl	4 (80%)	1 (20%)	5 (22.72%)

DISCUSSION

School age children with age range from 5 – 15 years are at greater risk of developing refractive errors because they are in the phase of actively growth. Moreover these children are subjected to the strain of near work due to demanding academic schedules.

Refractive error in school age children is an important public health problem. Refractive error have a substantial impact on learning capabilities and educational potentials in children.

We have focused our study objective on profile of this ocular morbidity in particular group of population ie, school age children with age range from 5 – 15 years. Our study would have variation with other national and international study because we have included those school age children who have attended the OPD rather than mass screening the children in schools or camps etc. Our study reveals refractive errors in 37.01% children and male seem to be more affected than female

probably due to less number of female attended the OPD. Spherical equivalent of myopia was present in 541(54.53%) children while spherical equivalent of hypermetropia in 360(36.29%) children. Astigmatism was present in 91(9.17%) children.

Maximum children had myopia upto 3 D, while in maximum children hypermetropic error was upto 2 D.

Hussain A Bataineh, Ahmed E Khatatbeh reported in their cross sectional study refractive error in 25.32% school age children. They also reported myopia in 63.5%, hypermetropia in 11.2% and astigmatism in 20.4% children[14]. The difference may be due to age because they focused children with age range 12 – 17 years but in our study the age range is for 5 – 15 years.Study of M. Junaid Sethi et al, reveals overall 10% refractive error in which 63%were male and 37% female. Hypermetropia was present in 58% while myopia in 36% children. Astigmatism accounted in 6% children[15]. However their study reported high prevalence of hypermetropia than myopia which is contradictory to our study.

There are multiple national and international studies with similarities and dissimilarities in the reported results in some variables. Study of Tibebu Kassa, Getu Degu Alene shows myopia in 9.3% and hypermetropia in 2.2% children. They also reported that age regarding refractive error is important and there is no effect of gender over the refractive error[16]. This study also shows that maximum children had refractive error of up 2 Diopter as in our study. In a study conducted by Negrel A.D et al. it has been reported that myopia is the main refractive error in school age children causing visual impairment[17]. This study results are in consonance to our study.

Study of Tahir Masaud Arbab et al demonstrates myopia in 39.3% children, hypermetropia in 11% children and maximum children had myopia upto 3D[18] which is comparable to our study. Refractive status of school age children has been studied on multiple aspects like duration of playing, video games etc and have revealed no significant relation of refractive error with the habit of playing different games. This has been reported by Faisal Rasheed, Asad Aslam Khan, Raza ullah Khan. Their study revealed myopia in 72.22% hypermetropia in 16.7% and astigmatism in 11.1% children[19]. In contradiction to this the study carried out by Ayub et al demonstrated myopia in 43%, hypermetropia in 21.5% and astigmatism in 35.5% children. This study also supports strong correlation of refractive error in positive family history, watching TV closely, studying in low illumination, reading with near distance and spending most of time with computer and video games[20].

Refractive error is the major problem of school age children affecting the intellectual capabilities in this particular age when all concentrated energy has to be materialized.

Study of G.V.S Murthy, Sanjeev K Gupta, et al has reported that 81.7% visual impairment in school age children had been due to refractive error. They also demonstrated age related shift in refractive error from hypermetropia in young children towards myopia in older children[21]. In most of national and international studies it has been reported that myopia makes the major fragment of refractive errors in school age children like in our study. Penpimol Yingyong MD has reported in his study prevalence of myopia more than other types of refractive error .He has also documented that children with myopia spend more time at near activities[22].

CONCLUSIONS

Refractive error is the major cause of visual impairment. Prevalence of myopia is more than hypermetropia and astigmatism. Majority of the children had been never examined for visual acuity. It is strongly recommended that periodic screening for refractive errors should be carried out in school age children. Parents and school teachers should participate properly in this expedition.

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