Pattern of refractive errors among patients at a tertiary hospital in Kathmandu

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ABSTRACT

A hospital based cross sectional study was carried out to determine the pattern of refractive errors among patients attending the out patient department, Department of Ophthalmology, Nepal Medical College Teaching Hospital. A total of 1100 patients were evaluated, (male 43.67%; female 56.33%). Simple myopic astigmatism was the most prevalent type of refractive error accounting for 27.18% followed by simple myopia (21.66%) and compound myopic astigmatism (19.48%). Simple hypermetropia (15.03%) and mixed astigmatism (4.3%) were also noted. Simple myopia was prevalent among the younger age group in the first to third decades, whereas hypermetropia was seen in the older patients in the third to fifth decades.

Keywords: Myopia, hypermetropia, astigmatism, age, blindness.

INTRODUCTION

Refractive error is an optical condition of the eye in which parallel rays of light from infinity do not come to focus on the sensory part of the retina. The distribution of refractive error varies greatly with age. Refraction has been found to be normally distributed at birth, but early in infancy the majority of children are found to be somewhat hyperopic. During the school years children begin to become myopic in increasing numbers. Little change in refraction occurs in the early adult year and by age of 45 latent hyperopia begins to manifest. Beyond the age of 55 or 60 years some people become myopic as a result of nuclear lens changes.[1]

Refractive error is the most common ocular morbidity in the world, with an estimated 2.3 billion people having this problem globally.[2] According to WHO there are 153 million people worldwide who are either blind or have visual impairment due to uncorrected refractive error.[3] Uncorrected refractive error leads to visual impairment in all age groups, which in turn leads to huge impact on the economic development and quality of life. In 1997, the world Health Organization set itself an ambitious goal of vision 2020 to eliminate avoidable blindness in the world by 2020 with one of the five main priorities being refractive errors.[4] Since then it has worked very hard to put uncorrected refractive error on the blindness prevention agenda and to develop strategies for the elimination of this simplest avoidable cause of vision loss.

In Nepal like elsewhere in the globe, refractive error is one of the main causes of avoidable blindness. The Nepal Blindness Survey done in 1981 showed that refractive error was a primary ocular disorder in 1.3% of 39,887 patients in all age groups.[5] A population based study conducted in 1998 among school children in Mechi in eastern Nepal showed that 2.9% cases had some visual morbidity with refractive error accounting for 56% of that visual morbidity.[6] A study on ocular morbidity in school children in Kathmandu showed refractive error as the commonest ocular morbidity in children accounting for 8.1%.[7] A similar study on the ocular morbidity among private school children in the valley showed that refractive error was the most common ocular morbidity accounting for 21.9%.[8] Another study on refractive error in urban and rural children showed a overall prevalence of refractive error as 19.8%.[9] In Nepal most of the population based studies on refractive errors were carried out amongst the school children.[7-9] This study was attempted to note the pattern of refractive error and its demographic pattern in a hospital set up. It is expected that this study will lay guidelines for future research work and also help to plan further services at the refraction unit.

MATERIALS AND METHODS

This was a hospital based cross sectional study. All cases sent for refraction from the Department of Ophthalmology, Nepal Medical College Teaching Hospital from March 2007 to February 2009 was the

Table-1: Pattern of refractive error

Type of Error	n (%)
Simple myopic astigmatism	537 (27.18)
Simple myopia	428 (21.66)
Compound myopic astigmatism	385 (19.48)
Simple hypermetropia	297 (15.03)
Simple hypermetropic astigmatism	146 (7.39)
Compound hypermetropic astigmatism	98 (4.96)
Mixed astigmatism	85 (4.30)
Total	1976 (100)

Table-2: Gender distribution of different types of refractive error

Type of Refractive Error	n (Males) (%)	n (Females) (%)
Simple myopic astigmatism	236 (27.35)	301 (27.04)
Simple myopia	211 (24.45)	217 (19.50)
Compound myopic astigmatism	192 (22.25)	193 (17.34)
Simple hypermetropia	114 (13.21)	183 (16.44)
Simple hypermetropic astigmatism	40 (4.63)	106 (9.52)
Compound hypermetropic astigmatism	39 (4.52)	59 (5.30)
Mixed astigmatism	31 (3.59)	54 (4.85)
Total	863 (100)	1113 (100)

target population. Computerized simple random sampling was done to calculate the sample size.

All those patients referred to refraction room were included. All post-operative cases, un-cooperative cases and cases with dim retinoscopy reflex were excluded.

A detailed history was taken from the patient including history of any surgery in the past. Visual acuity was recorded monocularly on internally illuminated standard Snellen's chart or E chart of illiterates and children in a dimly illuminated room at 6m. Retinoscopy was performed at working distance of 50cm in a dark room with the patients fixing on a target at 6 meter distance. Streak Retinoscope was used for this purpose. Movement of the streak was neutralized in both horizontal and vertical meridian and the lens power was noted in the optic cross in the respective meridian. Cyclo- retinoscopy was done in some cases where it was necessary. Cycloplegia was achieved by instillation of 1.0% cyclopentolate. In children atropine ointment was given three times daily for three day prior to refraction. Subjective refraction was done in each and every case to achieve best possible visual acuity. The cross cylinder was used over the power which gives the maximum vision with the patient fixing on a circular letter present in the chart above the best seeing line and final axis and power of cylinder was calculated.

Diagnosis of refractive error was made only when the magnitude of error was equal to or more than -0.5 dioptre.

Table-3: Age distribution of refractive error

AGE	Types of refractive error							TOTAL
	SMA	SM	CMA	SH	SHA	CHA	MA	
6 - 15	75	147	84	47	15	7	8	383
16 - 25	155	161	114	49	23	4	11	517
26 - 35	127	47	78	34	16	4	20	326
36 - 45	92	29	33	42	33	8	10	247
46 - 55	34	24	27	60	16	24	11	196
56 - 65	29	10	24	48	16	35	10	172
66 - 75	16	9	14	17	22	15	11	104
76 - 85	9	1	11	0	5	1	4	31
Total	537	428	385	297	146	98	85	1976

Oblique astigmatism was diagnosed when the principle meridian was tilted by more than 30^0.

RESULTS

A total of 1100 patients (2200 eyes) were enrolled for this study. However since 224 patients had refractive error only in one eye, a total number of 1976 eyes with refractive error were studied. Females and males accounted for 56.33% and 43.67% respectively. The patients were in the age group between 4 to 94 years with the mean age being 32.82 years. Myopia was the most common refractive error seen in this study accounting for 68.22%, while hypermetropia accounted for 27.38%. The various types of myopia were simple myopic astigmatism (27.18%), simple Myopia, (21.66%), and compound myopic astigmatism (19.48%), respectively. Simple Hypermetropia (15.03%), simple hypermetropic astigmatism (7.39%), and compound hypermetropic astigmatism (4.96%) were the various types of hypermetropia. Mixed Astigmatism accounted for 4.30% of all cases (Table-1).

Table-2 shows the distribution of different types of refractive error according to the gender. Among the 1976 eyes having refractive error, 863 (43.67%) eyes were of males and 1113 (56.33%) eyes were of females. It was observed that simple myopic astigmatism was the most prevalent refractive error in both genders accounting for 27.37% of males and 27.04% of females respectively.

Table-3 shows the age distribution of different types of refractive error. Simple myopia was most frequently seen in the younger age group between 1st to 3rd decades. Simple myopic astigmatism was found most frequently in age group of 20-29, compound myopic astigmatism in age between 10-29. Simple Hypermetropia, simple hypermetropia astigmatism and compound hypermetropic astigmatism were mostly seen in 4th to 6th decade, whereas mixed astigmatism was seen in the 3rd to 5th decade.

Fig. 1. shows the different ethnic groups with refractive error, where the *Magars* accounted for 32.7%, *Brahmins* 26.2%, *Newars* 21.1% and others 5.1%

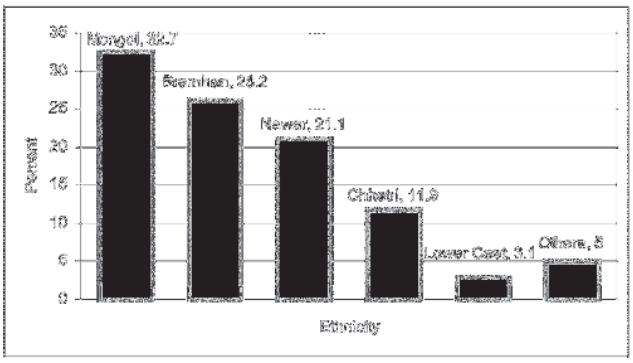

Fig. 1. Ethnicity and Refractive error

DISCUSSION

Present study unlike other population based studies in Nepal, showed predominance of females than the males.[9,10] This may be due to the close proximity of this hospital to the neighborhood which has a greater female population. However studies in foreign countries noted a female predominance.

Myopia was the most common refractive error seen in all age groups and in both the genders, accounting for 68.22%, while hypermetropia accounted for 27.38%. A similar study done in Pokhara, Nepal; documented myopia as the commonest refractive error among all age groups, but in females hypermetropia was more predominant.[10] A study conducted in school children in eastern Nepal also showed predominance of myopia at any age.[6] Simlar studies on school children done in the valley showed a preponderance of myopia.[7-9] However one study done in an area of Kathmandu Valley showed the predominance of hypermetropia over myopia.[11]

A study in South India, also showed a similar result of the predominance of myopia over hypermetropia.[12] Similar findings was reported from a study in Singapore.[13] A similar type of study done in a specialist hospital in Western Nigeria also showed the predominance of myopia over other refractive errors.[14] Other studies on refractive errors in Nigeria also showed similar result.[15-19]

It has been reported that myopia is found predominantly in females after 15 years of age.[10,11] In our study too myopia was seen most frequently in the first to the third decade of life, but however unlike other studies, more males were found to be myopic than females. This may be due to lower literacy rate of females than males in our country.

In this study, among the different ethnic groups with refractive errors, the *Magars* accounted for 32.7%, followed by *Brahmins* (26.2%), *Newars* (21.1%) and others (5.1%). This is different from other studies in Nepal where the prevalence of refractive errors was more in *Brahmins* and *Newars* than the other ethnic groups.[10,11] The difference in findings could be due to the fact that the area where the hospital is situated, has a larger number of *Magar* population than the *Brahmins* or *Newars*. The findings of this study is a hospital based one and cannot represent the entire community.

Study noted myopia as the commonest refractive error seen in all ages. Simple myopia is most commonly found in age group of 10 to 40 years. Hypermetropia is mostly found after 30 years of age. More than 50% of cases of refractive error are associated with astigmatism. Females are more prone to have refractive error than males. To the best of our knowledge, population based studies on refractive errors have not been reported in the country. Such kind of studies done across the entire nation would help to reflect the true scenario of refractive errors in the community in general and help to reduce the avoidable blindness/visual impairment in particular, thereby helping to achieve the target of vision 2020.

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