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Original Research Article

Prevalence of astigmatism in school going children: a hospital-based study at Majeedia Hospital, New Delhi

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ABSTRACT

Background: Generally, astigmatism is type of refractive error due to distorted and irregular of the cornea. It's generally related to the cornea and lens.
Methods: This is cross-sectional study conducted over a period from January 2017 till April 2017 among the patients in HAHC hospital. A comprehensive eye examination was used to analyse the refractive error (astigmatism). And the research was approved by the institutional review board and the ethics committee for at department of paramedical sciences, Jamia Hamdard New Delhi India.
Results: A total of 90 patients were included in the study. Out of which 37 were boys and 52 were girls. The rate of myopic astigmatism increased with age. In contrast, the rate of hyperopic and mixed astigmatism decreased with age. In addition, the rate of with-the-rule astigmatism increased and the rate of against-the-rule decreased with respect to age, but oblique astigmatism was rather stable with age.
Conclusions: There was more myopic astigmatism and with-the-rule astigmatism in total of 90 patients. Our hospital-based study shows there are high percentage of astigmatism (47.8%) in school aged children in south Delhi region. It is important to study in future, to further evaluate the causes and magnitude of astigmatism and increase awareness among school going children in South Delhi.

Keywords: Refractive error, Astigmatism, With-the rule astigmatism (WTR), Against the rule astigmatism (ATR)

INTRODUCTION

In childhood visual impairment due to uncorrected refractive error, is one of the most common problems in school children, and is the second leading cause of treatable blindness.[1] Approximately 12.8 million children in the age group of 5–13 years are visually impaired from uncorrected, inadequately corrected error, estimating a global prevalence of 0.96%.[2] Astigmatism is clinically important condition and account for about 13% of the refractive errors of the eye[3]. Its prevalence has been reported to vary with ethnicity, age and sex.[4,5] Astigmatism influences the normal visual development and may cause amblyopia in children.[6,7] Presence of early astigmatism relates to the early development of myopia, possibly through the signal driven by astigmatic blur, which either aids or disrupts the emmetropization of the spherical

power.[8] Many family studies have supported the role of genetics in astigmatism. Clementi et al defined the genetics model of corneal astigmatism and provide evidence for single major locus inheritance.[9]

In a study by Dobson et al, against the rule (ATR) astigmatism was 2.5 times more common than with the rule (WTR) in children younger than 3.5 years of age. In contrast, WTR astigmatism was 3 times more common in children older than 5.5 years.[10]

We conducted this study to evaluate the prevalence of astigmatism in school going children at south Delhi HAHC hospital in New Delhi. The purpose of the study was to gather information on variation of astigmatism and they were compared to similar studies in India and other Asian countries.

METHODS

This is a cross-sectional hospital-based study. 90 subjects were included in the study by simple random sampling. Children aged between 5–18 years of age attending the outpatient department (OPD) during three-month period from January 2017 to March 2017 and having complaints of decreased vision and asthenopic symptoms were subjected to routine history and eye examination. Visual acuity with Snellen chart, slit lamp examination, retinoscopy under cycloplegia and fundoscopy was done.

Patients were then called for post mydriatic test (PMT) for final acceptance and corrective glasses were prescribed to them. Best corrected visual acuity (BCVA), power of glasses (POG) and types of refractive error were recorded. Astigmatism was classified as with the rule (WTR) and against the rule (ATR).

WTR was defined as if the vertical meridian is more curved than the horizontal meridian. That was corrected minus (-) cylinder at 180* or plus cylinder at 90*.

ATR was defined as if horizontal meridian is more curved than the vertical meridian. That was corrected minus (-) cylinder at 90* or plus cylinder at 180*.

Inclusion criteria

Aged group between 5-18 years old with complain of decreased visual acuity and asthenopic symptoms.

Patients with decreased VA having pathological cause were excluded from the study.

All participants are guaranteed anonymity and confidentiality of the information obtained. The approval took before the study from the patients participating in the study. Informed consent was taken by all the participants included in the study.

Subjects were informed about the duration and procedures of the study. And the research was approved by the institutional review board and the ethics committee for at department of paramedical sciences, Jamia Hamdard New Delhi India.

The statistical package for social sciences (SPSS) version 16 was used, data collected from the clinical test were analyzed by using Microsoft excel (2017) and SPSS software (version 16.0 for Windows, SPSS Inc., Chicago, IL, USA). All data were segregated in different excel sheets such as clinical data. Normality of data were estimated from A p value <0.05 was regarded as statistically significant.

RESULTS

The total number of students taken for study with decreased vision due to refractive error were 90. Out of which 37 were boys and 52 were girls (Table 1). The children were divided into 3 groups according to their age (Table 2). Overall, in total 90 cases pattern of refractive error and percentage (%) in different age group (Table 3).

Table 1: Total number of cases.

Total no. of cases	Boys	Girls
90	37	53

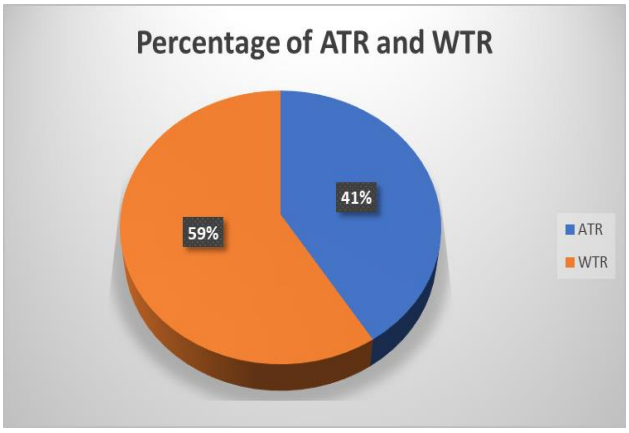

Figure 1: Percentage of ATR and WTR.

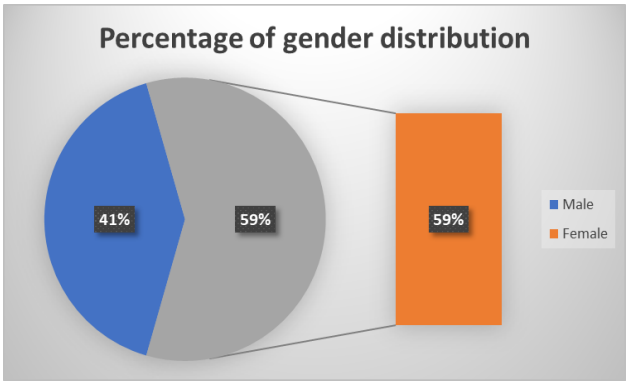

Figure 2: Percentage of gender distribution.

Table 2: Children age group.

S. no.	Age in year	Total no. of student
1	5-9	20
2	10-14	29
3	15-18	41

Table 3: Percentage of refractive error.

Age in year	Myopia (%)	Hypermetropia (%)	Astigmatism (%)
5-9	4 (4.5)	6 (6.6)	11 (12.2)
10-14	8 (8.8)	10 (11.11)	10 (11.11)
15-18	15 (16.6)	4 (4.44)	22 (24.4)
Total	27 (30)	20 (22.22)	43 (47.8)

Overall, 43 cases in the astigmatism group, WTR was present in 33 cases and ATR was present in 10 cases (Table 4).

Table 4: Type of astigmatism.

Age in year	WTR astigmatism (%)	ATR astigmatism (%)
5-9	11 (25.58)	0 (0.00)
10-14	6 (13.95)	4 (9.3)
15-18	16 (37.20)	6 (13.95)
Total	33 (76.75)	10 (23.25)

Overall, in 43 total astigmatism cases the pattern of astigmatism in different age group (Table 5).

Table 5: Total astigmatism.

Age in year	Myopic WTR	Myopic ATR	Hypermetropic WTR	Hypermetropic ATR
	N (%)	**N (%)**	**N (%)**	**N (%)**
5-9	8 (18.60)	0 (0.00)	3 (6.97)	0 (0.00)
10-14	3 (6.97)	3 (6.97)	3 (6.97)	1 (2.32)
15-18	15 (34.88)	6 (13.95)	1 (2.32)	0 (0.00)
Total	26 (60.46)	9 (20.93)	7 (16.27)	1 (2.32)

DISCUSSION

This was the cross-sectional hospital-based study. Total 90 cases suffering from asthenopic symptom and decreased visual acuity due to refractive errors were subjected to routine eye examination and best corrective glasses were prescribed.

In our study most common refractive error seen among the children was astigmatism (47.8%) and Hypermetropia (22.22%) was least common. The prevalence of astigmatism, myopia and hypermetropia in children were 47.8%, 30.00% and 22.2% respectively. The prevalence of WTR and ATR astigmatism in school aged children were 76.75% and 23.25% respectively.

The causes of WTR astigmatism are usually genetic factors, lid pressure, eye lid slant and tension and accommodation. Whereas the causes of ATR astigmatism are age related factors, muscle tension in near task and reduce tear film.[11]

Similarly, prevalence of myopic WTR astigmatism and Hypermetropic WTR astigmatism were 60.46% and 16.27% respectively.

Myopic ATR astigmatism and hypermetropic ATR astigmatism were 20.93% and 2.32% respectively.

The similar result was also seen in a study done by candidates Gupta et al in 2015 showed that the astigmatism (54.27%) was more common in school going children.[12] In Indian studies the rate of astigmatism varies from approximately 3% in Andhra Pradesh to 7% in New Delhi.[13] In another study done by Warm; He; Ellwein; RESC study group in 2014 on Indian children in Delhi showed higher prevalence of astigmatism (9.24%) than in other states of India (5.78%).[14]

There was prevalence of WTR astigmatism was more common (76.75%) in our study. The study done by Gwen et al which showed prevalence of WTR astigmatism was more common (4.33%) as compared to ATR (1%) astigmatism in non-Hispanic white (NHW) children.[15]

The result in our study shows that most astigmatism was WTR (76.25%) this was also seen in study by Yung which showed that most astigmatism was WTR (83.3%) in 1995 and (89.9%) in 2000.[16]

The rate of myopic astigmatism increases with age in contrast, the rate of hypermetropic and mix astigmatism decrease with age. In additional the rate of WTR astigmatism increase and rate of ATR astigmatism decrease with respect to age.[16]

Human infant exhibit both high prevalence and high degree of astigmatism then school children and also vary with ethnicity.[13]

Limitations

The main limitations are lack of resources and in many poor urban populations, there is a dramatic lack of eye-care services, and, even where they are available, their quality is not always satisfactory. Lack of awareness among

parents and the community about astigmatism and that the vision of children.

CONCLUSION

Our hospital-based study shows there are high percentage of astigmatism (47.8%) in school aged children in south Delhi region. It is important to study in future, to further evaluate the causes and magnitude of astigmatism. Awareness, regular eye screening, good availability and affordability of refractive services helps in prevention of astigmatism in school going children.

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