



EVALUATION OF CORNEAL TOPOGRAPHIC PATTERN & DEMOGRAPHIC PROFILE WITH REFRACTIVE ERROR IN PAEDIATRIC AMETROPIA.

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ABSTRACT

Aims- Evaluation of corneal topographic pattern & demographic profile with refractive error in paediatric ametropia.

Material & Method- we conducted a prospective observational study in 644 eyes of 322 patients, who were presented with refractive error in tertiary centre in central India from a period of January 2018 to June 2019. They were included after taking consent from guardians. To rule out anterior segment pathology, slit lamp examination was carried out and best corrected visual acuity is recorded. Auto-refractometry and retinoscopy was performed to know refractive status of eye. Corneal topography was performed by CORNEAL TOPOGRAPHER Shin- Nippon's CT-1000 & fundus examination was rule out any posterior segment pathology. All procedures and investigation were done by the same surgeon.

Result- Most common corneal topographic pattern with hypermetropia and myopia was symmetric and oval in majority of patients, whereas the pattern observed with astigmatism was symmetric and ABS-IS.

Conclusion- Corneal topographic pattern might be related to the refractive status of the eye, it also helpful in observe early change and management of corneal disease.

KEYWORDS : corneal topographic pattern, myopia, hypermetropia, astigmatism.

INTRODUCTION-

Most powerful refractive element of eye is cornea, which contributes about +43D (70%) of refractive power of eyes. Study of normal anterior and posterior surface of cornea helps in many diagnostic and therapeutic conditions such as evaluation of patients for refractive surgery, contact lens fitting, and management of ectatic disorders^(1,2,3). Corneal topography based on Placido disc that analyse rings that are reflected off the anterior corneal surface... With the advancement of newer techniques, it became a mandatory tool to assess dioptric status and condition of cornea for correction of ametropia by spectacles, contact lenses/ refractive surgeries. The common topographic patterns have been discussed widely, and different patterns have been proposed for differentiating diseases and normal cornea. In this study, we determine the distribution of normal topographic patterns of studied population with refractive status.

METHODOLOGY-

In this prospective observational study 644 eyes of 322 patients who were presented with refractive error were included after taking consent and detailed family and socioeconomic history has been taken from patients and guardians All procedures and investigation were done by the same surgeon. All the patients were recruited from tertiary centre in central India from a period of Jan 2018 to June 2019. To rule out anterior segment pathology, slit lamp examination was carried out and visual acuity was recorded on Snellen's test type chart with unaided & best correction. Auto-refractometry and retinoscopy was performed to know refractive status of eye (Dioptric power of ametropia) under cycloplegic drugs (cyclopentolate/ Tropicamide plus) and along with this fundus examination was done by Direct and Indirect Ophthalmoscope to rule out any posterior segment pathology. Then after 3 days, post mydriatic test (PMT) was performed and best corrected spectacles were provided. Corneal topography was performed by CORNEAL TOPOGRAPHER Shin- Nippon's CT-1000 based on the principle where multiple light concentric rings are projected on the cornea. The reflected image is captured on a charge-coupled device (CCD) camera. Computer software analysed

the data and displayed the results in various formats. During the procedure, patients were asked to sit in front of the bowl with his or her head pressed against a bar while a series of data points are generated. Computer software digitized these data points to produce a printout of the corneal shape, using different colours to identify different elevations, much like a topographic map of the earth displaying changes in the land surface. It is a painless and brief test.

RESULT-

The age of patient ranged from 5 to 16 years with an average age of 11.78 ± 2.77 years. Maximum patients in the study were male 189(58.7%) and rest 133 (41.3%) were female. Family history of refractive error was present in 263 (81.7%) patients. Majority of patients belong to 133 (41.3%) upper middle socio-economic class. In this study, myopia was present in 211(65.5%) patients followed by hypermetropia 46(14.3%) and myopic astigmatism 27(8.4%) patients respectively whereas hypermetropic astigmatism and mixed astigmatism both were observed in 19 (5.9%) patients separately. In this study, corneal topographic pattern was symmetric in majority of eyes i.e., 32.91% eyes followed by oval and ABS-IS in 25.77% and 14.59% eyes respectively. Irregular pattern was observed in 3.72% eyes. Out of 422 myopic eyes, maximum i.e., 142 eyes followed by 102 and 60 eyes were observed to have symmetric, oval and ABS-IS pattern respectively on corneal topography. Similarly, of the 92 hypermetropic eyes, 26 eyes each had symmetric and 24 eyes had oval pattern on corneal topography, while in astigmatism most common pattern observed is ABS-IS followed by symmetric and oval pattern respectively. Our study observed that refractive error is not statistically significant with corneal topographic pattern ($p > 0.05$).

Table 1: Showing Distribution Of Eyes According To Types Of Refractive Error (n=644).

Types of refractive error	Frequency	Percentage (%)
Myopia	211	65.5%
Hypermetropia	49	14.3%
Myopic astigmatism	27	8.4%
Hypermetropic astigmatism	19	5.9%

Mixed astigmatism	19	5.9%
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Table 2: Showing Distribution Of Eyes According To Corneal Topographic Pattern (Axial Power Map) Of Anterior Corneal Surface(n=644).

Type of pattern	No of patients	Percentage (%)
Symmetric	212	32.91
Oval	166	25.77
ABS -IS	94	14.59
ABS - SS	80	12.42
Round	68	9.93
Irregular	24	3.72
Total	644	100

Table 3 - Association Of Corneal Topographic Pattern With Refractive Status Of Eyes In Paediatrics Ametropia (n = 644).

Refractive status	Corneal Topographic pattern						Total
	ABS -IS	ABS-SS	Irregular	Oval	Round	Symmetric	
Hypermetropia	20	14	4	24	4	26	92
Hypermetropic astigmatism	8	4	4	14	2	6	38
Myopia	60	48	16	102	54	142	422
Myopic Astigmatism	18	8	0	6	2	10	54
Mixed Astigmatism	16	4	0	10	6	2	38
Total	96	78	24	166	68	212	644

Chi square = 7.38; P=0.12 (NS)

DISCUSSION-

Our study aimed to observe the corneal topographic pattern in paediatrics Ametropia. New improved technologies and devices can help in studying the pattern of both the anterior and posterior corneal surfaces, creating a three-dimensional map. As the age increases, there is flattening of cornea.^[4] This study included the patients of paediatrics age group belonging to 5 to 16 years of age with mean age of 11.78±2.77 years. Maximum patients in presents study were males 189(58.7%) and rest 133(41.3%) were females. Similarly, **Reddy SP et al (2013)** in their study on 100 eyes of 100 patients included patients with a mean ± standard deviation age of 10.6 ± 2.7 years (range: 5 to 15 years).^[5] **Lam CA et al (1999)** in their study included 142 school children between 6 to 17 years of age. Of them 75 children were males and 67 children were females.^[6] The ocular refractive status refers to the locus within the eye conjugate with optical infinity during minimal accommodation. Present study shows prevalence of refractive error in 211(65.5%) myopia, followed by 65(20.2%) astigmatism and 46(14.3%) hypermetropic eyes. Similarly, **Mita Saha et al (2017)**^[7] in their shows prevalence of refractive error mostly found in (59.4%) myopia, followed by 40.4% Astigmatism (25.8% myopic and 14.4% hyperopic astigmatism), and hypermetropia is seen in 14.8% of the cases. The debate of hereditary versus environmental influences on the development of myopia has persisted for more than 400 years and is still unresolved. Family history of ametropia in present study is present in 263(81.7%) patients while it was absent in only 59(18.3%) patients. Similarly, **Saw et al (1996)** in their study to elicit epidemiology of myopia claimed a greater prevalence of myopia in children of myopic parents than in children of non-myopic parents.^[8] Family studies by **Sorsby et al (1996)**^[12a] and **Keller et al (1973)**^[8] demonstrated significant association of myopia with family history. The earliest survey conducted in India in the 1970's by **Jain et al**^[10], has shown a prevalence of myopia of 4.79% among the school children in Chandigarh. It was higher in urban population (6.9%) in comparison to rural population (2.77%). **Murthy et al.,**^[11] assessed the prevalence of refractive error and related visual impairment in school going children 5-15 years of age, in an urban population in New Delhi and reported a prevalence of 7.4% of myopia. while in present study, majority of patients belonged to upper middle socio-

economic class followed by lower (32.6%) and upper (26.1%) class as per modified Kuppuswamy classification. In present study, corneal topography pattern was symmetric in majority of eyes i.e., 32.91% eyes followed by oval and ABS-IS in 25.77% and 14.59% eyes respectively. Irregular pattern was observed in 3.72% eyes respectively. Similarly, **Zuguo Liu et al (1999)** observed that symmetric bow tie was the most common axial power pattern in the anterior cornea (39.13%), followed by oval (26.07%), asymmetric bow tie (23.91%), round (6.52%), and irregular (4.53%) patterns respectively.^[12] Out of 422 myopic eyes, maximum i.e., 142 eyes followed by 102 and 60 eyes were observed to have symmetric, oval and ABS-IS pattern respectively on corneal topography. Similarly, of the 92 hypermetropic eyes, 26 eyes each had symmetric and 24 eyes had oval pattern on corneal topography, while in astigmatism most common pattern observed is ABS-IS followed by symmetric and oval pattern respectively. Our study observed that refractive error is not statistically significant with corneal topographic pattern (p>0.05) may be because of limited duration. while in **Alipour F et al (2020)** show, the most frequent pattern in all subgroups (emmetropia, myopia, and hyperopia) was still SB with frequencies 32.7%, 35.8%, and 22.5%, respectively. Although the second order was still AB-IS in the emmetropic and myopic subgroups (14.7% and 16.1%, respectively), in the hyperopic subgroup, round pattern had the second place (17.9%). The third place was different in all groups, with round pattern in emmetropia (12%), oval pattern in myopia (10.1%), and irregular pattern in the hyperopic group (13.9%)^[13].

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