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Original Research Paper

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PREVALENCE OF KERATOCONUS IN KASHMIR IN NORTH INDIA: A VIDEOKERATOGRAPHIC STUDY

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ABSTRACT

Purpose: To detect the incidence of keratoconus by videokeratography in patients in Kashmir in North India and to describe the clinical characteristics associated with it. **Design:** Cross sectional study **Methodology:** This study was carried out on eyes of 212 patients between 5 to 20 years of age presenting to tertiary care hospital of Kashmir in north India over a period of two years. Best Corrected Visual Acuity (BCVA), slit lamp examination, pachymetry, refraction, fundus examination, and corneal topography was done in all the patients and clinical findings recorded. To detect keratoconus, corneal topography maps were analysed using Rabinowitz-McDonnel criteria. Maps with central corneal power(Kmax) greater than 47.2 diopters and the inferosuperior asymmetry value greater than 1.4 were considered to have a keratoconus pattern. **Results:** Out of 212 patients, 145 were males and 67 were females. Majority were in the age group of 5- 10 years. Among the study eyes, Kmax> 47.2 D was seen in 10.1 %, Sim K astigmatism > 1.5D in 29%, I-S difference > 1.4 D in 11.79 % , SRAX > 21° in 20% and K max>47.2 D + I-S Difference >1.4 i.e keratoconus pattern was seen in 93 eyes i.e 21.9% **Conclusion:** Incidence of keratoconus in allergic patients is more when compared to general population of the same age group from previous studies. The videokeratographic examination of patients leads to early detection of mild keratoconus by interpretation of color-coded maps.

KEYWORDS : Keratoconus, Videokeratography

1. INTRODUCTION

Vernal keratoconjunctivitis (VKC) is a chronic, bilateral, ocular inflammatory disorder, mainly affecting patients in their first or second decade,[1] and is common in warm, temperate climates during spring and summer seasons. The onset is generally before the age of ten years, lasts for two to ten years and it usually resolves by late puberty.[2] A male preponderance has been observed, especially in patients under 20 years of age, among whom the male:female ratio is 4:1–3:1.[3] VKC is characterized by symptoms like itching, photophobia, watering, foreign body sensation ,thick ropy mucoid discharge, blepharospasm and signs like papillary hypertrophy on the limbus and tarsal conjunctiva.[4]

VKC is associated with complications like superficial punctate keratitis with superficial pannus, pseudogerontoxon, shield ulcer, peripheral corneal stromal degeneration leading to astigmatim and keratoconus which leads to visual impairment.

Keratoconus is a bilateral noninflammatory corneal ectasia with an incidence of approximately 1/2000 in the general population.[5] The association of keratoconus with vernal keratoconjunctivitis (VKC) had been published previously.[6][7] The early forms of keratoconus may go undetected despite its well defined clinical signs.

Corneal topography is playing an increasing role in defining the genetics of keratoconus, because early forms of the disease can be more accurately picked.

In our clinical practice, we see many patients of VKC every year but corneal topography is not performed routinely in every case. Hence this study was conducted with the aim of detecting the incidence of corneal surface changes like astigmatism and keratoconus in VKC subjects by analyzing topographic maps.

2. MATERIALS AND METHODS

This was a cross sectional study carried out in Department of Ophthalmology in tertiary care hospital in Kashmir in North India on 424 eyes of 212 patients over a period of two years. The age group of the patients was 5- 20 years and both the genders were included in the study.

The patients or their parents were interviewed for history including age of onset, duration of illness, frequency of eye rubbing, visual difficulties and presence of allergic disease.

All the patients underwent detailed ocular examination including recording of best corrected visual acuity (BCVA), slit lamp examination, retinoscopy, fundus examination, pachymetry and corneal topography. Patients with typical clinical history of severe itching with characteristic signs like papillae on the upper palpebral conjunctiva, limbal infiltrates, and eosinophilic concretions (Horner-Trantas' dots) were diagnosed as VKC. Additional corneal signs, including arcus vernalis (pseudogerontoxon), shield ulcer, and punctate epithelial keratitis were noted.

Corneal Topography was done using Atlas Model 9000 Corneal Topography System. Three keratographic images of the eyes ensuring proper fixation were taken. One keratograph of each eye was chosen for analysis.

To detect keratoconus with placido disc-based videokeratograph, the corneal topographic data were analyzed using the modified Rabinowitz-McDonnell test. Rabinowitz and McDonnell originally used central corneal power and inferosuperior asymmetry (I-S) value, as well as the difference in central corneal power between the two eyes to detect the degree of topographic abnormality in corneas with keratoconus.[8] However in this study, we used the modified Rabinowitz- McDonnell criteria of Maeda et al[9] instead, in which only central corneal power and the I-S value were used to detect keratoconus in VKC patients by using data analysis software. For normal corneas, central corneal power is set at 47.2 diopter (D), and I-S value is set at 1.4 D. Therefore, maps with central corneal power greater than 47.2 D and an I-S value greater than 1.4 D were considered to have the keratoconus pattern according to modified Rabinowitz-McDonnell criteria.[9]

Also the VKC patients with keratoconus were classified into categories of mild (47.2-48 D), moderate (48-54) and severe(>54D).

3. RESULTS

The mean age of the patients was 10.8±4.19 years (range 5-20 years) and maximum patients were clustered between 5-10 years of age. Out of 212 patients, 145 were males and 67 were females. The mean age of onset of the disease was 7.6±3.43 years with maximum (51.9%) patients having age of onset between 5-9 years of age. The mean duration of illness was 3.2± 2.69 years. The most common symptoms present were itching (100%), redness (99.1%) and ropy discharge (56.1%). About 88 % of the patients rubbed their eyes frequently (> 8 times) and 12% rubbed their eyes occasionally (< 4 times).The mean central corneal thickness (CCT) among the study eyes was 495.9±30.7 m. The incidence of keratoconus in our series of VKC subjects(424 eyes of 212 patients) according to the modified Rabinowitz-Mc- Donnell criteria was 21.9%(93 eyes) i.e Kmax >47.2 D and I-S Difference >1.4 D on corneal topography. Summary of VKC cases with keratoconus is provided in Table 1.

4. DISCUSSION

Vernal keratoconjunctivitis has potential to cause corneal damage and permanent visual loss, with corneal involvement occurring in the form of superficial punctate keratitis, superficial pannus, pseudogerontoxon, shield ulcer, astigmatism and keratoconus. Children with VKC have a high incidence of keratoconus and astigmatism and have more abnormal corneal topography patterns compared with normal eyes.[10][11][12] Chronic ocular trauma and rubbing of eyes due to pruritis could be the triggering factor associated with keratoconus development.[13][14] Microtrauma due to eye rubbing injures the epithelium, leading to cytokine release, myofibroblast differentiation, a change in biomechanical forces and thinning of corneal tissue and this has been proposed as the possible mechanism. The cornea is elastic and, therefore, susceptible to changes in shape. The force and frequency of rubbing are key factors associated with corneal eye rubbing related changes. Both vigorous knuckle-grinding rubbing and repetitive gentle rubbing have been linked to the development of keratoconus.[15]

The purpose of this study was to evaluate the incidence of keratoconus in VKC patients who present to tertiary carehospital by quantitative analysis of topographic maps and to detect clinical characteristics of VKC associated keratoconus.

The mean age of the patients was 10.8±4.19 years with an age range of 5 to 20 years. Majority (52.4 %) were clustered between 5 to 10 years of age. In a study conducted by Totan Y et al, [11] majority of the patients were clustered between 8 -22 years of age and the mean age of the patients was 15.04±6.11 years which is comparable to our study and indicates that vernal keratoconjunctivitis is common in this age group. Among the study population, out of total 212 patients, 145 were male (68.4%) and 67 were female (31.6%). In a study conducted by Leonardi A et al, [3] 76.6% were males and 23.4% were females which is comparable to our study hence indicating that VKC is common in males than females.

The most common presenting symptom were itching, redness and ropy discharge seen in 100%, 99.1 % and 56.1 % of study eyes. About 88 % of the patients rubbed their eyes frequently(> 8 times) and 12% rubbed their eyes occasionally(< 4 times). In a study conducted by Gupta A et al itching was the most common presenting symptom in 92% of the subjects.[16] We reported the comparable frequency of eye rubbing and percentage of itching in our study patients. In VKC, eye rubbing is common, because of intense itching. The role of chronic eye rubbing has been described in the pathogenesis of keratoconus.[16]

Corneal videokeratography is very important investigative tool in detecting keratoconus and helps in detecting early or subclinical forms of keratoconus. In our study, corneal topography using Atlas Model 9000 Carl Zeiss was done in all the patients and various corneal topographic indices were found to be altered in VKC patients. To detect keratoconus, the corneal topographic data were quantitatively analysed by using Rabinowitz-Mc- Donnell criteria which included 2 indices. Therefore, maps with Kmax >47.2 D and I-S Difference >1.4 D on corneal topography were considered to have keratoconus pattern.

Keratoconus is a bilateral asymmetrical disease and there is a strong association between VKC and KCN. Our aim was to detect the anterior corneal surface changes in patients with VKC using quantitative and descriptive methods of corneal topography. In a study conducted by Khan et al, they reported a 7% incidence of keratoconus.[1] In a study conducted by Gautam V et al, 11.3% were found to have keratoconus-like topography.[17] In a study conducted by Gupta A on 100 patients, the incidence of keratoconus in VKC was 8%.[16] In our study, the incidence of keratoconus detected by topography in VKC using modified Rabinowitz-Mc- Donnell criteria was 21.9%. We attribute the high incidence of keratoconus in our study population due to higher sensitivity of our quantitative method used for the assessment of topography maps for screening keratoconus compared with the traditional methods (i.e., biomicroscopy and keratometry) applied in other studies. Quantitative analysis of corneal videokeratographic maps with modified Rabinowitz-McDonnell test is an objective clinical method with sufficient sensitivity and specificity for early detection of keratoconus when compared with the traditional methods, including biomicroscopy, keratometry and keratoscopy.[9]

In our study we divided the study eyes of patients with keratoconus like pattern on topography into mild (Kmax 47.2 - 48D) seen in 5.4%, moderate (48-54D) in 2.8% and severe (>54D) in 1.9% and the mean duration of illness of each group was 5.2 years, 7.5 years and 8.5 years respectively. Also the mean duration of illness was 6.7 years in patients with KCN like topography which was higher as compared to non KCN like topography.

5. CONCLUSION

There is increased incidence of keratoconus in Vernal Keratoconjunctivitis and longer duration of disease is associated with more topographic corneal changes in patients of VKC. Eye rubbing due itching plays an important role in inducing the anterior corneal surface changes in patients of VKC.

Corneal topography should be done in all the patients of VKC since it is possible to detect early, mild form of keratoconus by qualitative and quantitative assessment of video keratographic maps thus allowing early detection and management of KCN and related complications.

Table1. Summary of Vernal Keratoconjunctivitis Subjects in our study

Clinical Characteristics	Data
Age at presentation(yrs)	
Mean± SD(range	10.8± 4.19 (5-20 yrs)
Sex (M/F)	145 /67
Age of onset (yrs)	
Mean± SD(range)	7.6 ± 3.43(2-17)
Duration of symptoms (yrs)	3.2 ± 2.69
Symptoms	Percentage of eyes
Itching	100%
Redness	99.1%
Ropy discharge	56.1%
Lid Signs	Percentage of eyes
Papillae	11.3 %
Cobblestone papillae	3.3%

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