



Journal Homepage: -www.journalijar.com
**INTERNATIONAL JOURNAL OF
 ADVANCED RESEARCH (IJAR)**

Article DOI:10.21474/IJAR01/9359
 DOI URL: <http://dx.doi.org/10.21474/IJAR01/9359>



RESEARCH ARTICLE

CENTRAL CORNEAL THICKNESS IN PATIENTS WITH VERNAL KERATOCONJUNCTIVITIS.

Birjees Hakak and Afroz Khan.

Postgraduate Department of Ophthalmology, Govt. Medical College, Srinagar.

Manuscript Info

Manuscript History

Received: 06 May 2019
 Final Accepted: 08 June 2019
 Published: July 2019

Key words:-

Vernal Keratoconjunctivitis (VKC),
 Central corneal thickness (CCT).

Abstract

Background: The present study was conducted to evaluate the central corneal thickness in patients with vernal keratoconjunctivitis (VKC).

Material and Method: The study was conducted in Department of Ophthalmology, Government Medical College Srinagar Jammu & Kashmir, India between October 2016 and January 2018. The study group included 424 eyes of 212 patients with vernal keratoconjunctivitis and 424 eyes of 212 age and sex matched normal subjects were selected as a control group. The central corneal thickness was measured with TOPCON SP-3000(USA).

Result: In the study group, out of 212 patients, 145 were males and 67 were females. Majority were in the age group of 5-10 years. The mean central corneal thickness was $495.9 \pm 30.7 \mu\text{m}$ in the study group and $540.30 \pm 38.91 \mu\text{m}$ in the control group, and the difference was statistically significant ($p < 0.001$).

Conclusion: The central corneal thickness in patients with Vernal Keratoconjunctivitis (VKC) is low as compared to age and sex matched control population. Evaluation of corneal thickness is important in situations such as corneal refractive surgery and contact lens use, and is an essential parameter in a wide range of ocular disorders, including glaucoma and keratoconus. Therefore, ophthalmologists should be aware of the low central corneal thickness in patients with Vernal Keratoconjunctivitis.

Copy Right, IJAR, 2019.. All rights reserved.

Introduction:-

Vernal keratoconjunctivitis (VKC) is a bilateral, chronic, external ocular inflammatory disorder, mainly affecting patients in their first or second decade.¹ It is common in warm, temperate climates during spring and summer seasons. The onset of disease is generally before the age of 10 years. It lasts for 2 to 10 years and it usually resolves during 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 confluent papillary hypertrophy on the limbus and tarsal conjunctiva.⁴



Figure 1:-

Vernal keratoconjunctivitis is a condition mediated by Th2 lymphocytes and the precise roles of mast cells, eosinophils, fibroblasts and their cytokines in the inflammatory process and the remodeling of conjunctival tissue remain poorly established.⁵

Vernal keratoconjunctivitis is associated with complications like superficial punctate keratitis with superficial pannus, pseudogerontoxon, shield ulcer, peripheral corneal stromal degeneration leading to astigmatic type of refractive error, keratoconus which leads to visual impairment.

Central corneal thickness (CCT) is important as an indicator of overall corneal health⁶, and corneal thickness measurement has recently gained recognition as having implications in contact lens use and refractive surgery, as well as being an early diagnostic tool for individuals at higher risk of developing primary open-angle glaucoma^{7,8}.

In our clinical practice, we see many patients of VKC every year but measurement of central corneal thickness is not performed routinely in every case. Hence this study was conducted with the aim of detecting corneal thickness changes in VKC subjects.

Materials And Methods:-

The study was carried out in Department of Ophthalmology, Govt. Medical College Srinagar over a period of two years. The age group of the patients was 5- 20 years and both the genders were selected for the study. The study was approved by the ethical committee of the institute.

The study group consisted of 424 eyes of 212 patients with chief complaints consistent with VKC. The control group included 424 eyes of 212 eyes of age and sex matched healthy individuals without any ophthalmic or systemic pathology.

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

All the participants underwent detailed ocular examination including recording of best corrected visual acuity (BCVA), slit lamp biomicroscopy, retinoscopy, fundus examination, pachymetry and corneal topography.

Patients with KCN or suspected KCN and patients with cataract, corneal epithelial defect, or corneal punctate epithelial erosions were excluded from the study. Patients with a history of ophthalmic or systemic pathology, or those who were currently using topical medication were not included in the study.



Figure 2:-

CCT was measured with TOPCON SP-3000(USA) pachymeter. For the statistical analyses, we excluded patients with a history of corneal disease, ocular trauma, and/or ocular surgery in 1 or both eyes due to factors that impaired accurate CCT measurement (Fuchs' dystrophy, corneal edema, or stromal scarring).

Data analyses were conducted using Statgraphics[®] Plus ver. 5.1 (Statistical graphics Corp, USA) and SPSS ver. 15.0 (SPSS Inc., Chicago, IL, USA). Standardized kurtosis and standardized skewness were derived to measure spread, and data distribution was considered normal if spread values were between -2 and 2. One-way analysis of variance (ANOVA) was used when comparing groups. A 95% normal range (defined as the mean \pm 1.96 SD) summarizes the range of CCTs in 95% of the eyes. Linear regression analysis was used to detect correlation between variables. A *p* value of \leq 0.05 was accepted as statistically significant.

Results:-

The study group consists of 212 patients. The mean age 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 $495.9 \pm 30.7 \mu\text{m}$ and $540.30 \pm 38.91 \mu\text{m}$ in the control group. Analysis by ANOVA showed that the difference in mean CCT between the VKC group and the healthy control group was significant ($p < 0.001$).

Discussion:-

Vernal keratoconjunctivitis is known to be one of the most severe forms of ocular allergy with potential to cause corneal damage and permanent visual loss. Corneal involvement in VKC patients occurs in the form of superficial punctate keratitis, with superficial pannus, pseudogerontoxon, shield ulcer, astigmatism and keratoconus. Microtrauma due to eye rubbing in susceptible individuals 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 in central corneal thinning.

Matrix metalloproteinases (MMPs) have been implicated as a factor in the corneal tissue damage seen in keratoconus in VKC. These degradative enzymes normally function in epithelial turnover; elevated MMP levels due to chronic corneal epithelial trauma results in excessive extracellular matrix degradation and destruction of corneal tissue. In a study by Kumagai et al, active forms of MMP-2 and MMP-9 were found at higher levels in the tears of VKC patients compared to healthy controls and patients with other forms of AC, indicating that these 2 MMPs may play a role in the corneal thinning frequently seen in VKC patients^{9,10,11}.

Maintenance of corneal thickness depends on a healthy endothelium with an intact barrier function, making the central corneal thickness an important indicator of overall corneal health⁶. Significant alterations in CCT may interfere with accurate measurement of intraocular pressure (IOP), and underestimation of IOP due to corneal thinning has the potential to delay diagnosis and treatment of glaucoma. Corneal thickness provides valuable information about possible changes in the cornea due to disease, trauma, or hypoxia¹². Therefore, evaluation of corneal thickness is essential in a wide range of ocular disorders such as glaucoma, keratoconus, corneal refractive surgery, dry eye, and vernal keratoconjunctivitis^{7,8}.

In patients with vernal keratoconjunctivitis, evaluation of corneal thickness provides clinically useful information on the physiological status of the cornea. Although there have been many studies on the relationship between VKC and keratoconus, to the best of our knowledge, CCT values in VKC patients have not been previously reported in the literature. Therefore, it was not possible to compare our data to those of other studies. Further studies with larger patient numbers are needed to more clearly define the relationship between corneal thickness, the mechanisms that regulate corneal regeneration, and inflammation and VKC.

Conclusion:-

This study revealed that mean CCT in patients with VKC was significantly lower than in normal eyes ($p < 0.001$). Ophthalmologists should be aware of this relationship when following VKC patients in order to gauge the severity

of the disease and provide early diagnosis and management of corneal thickness-related complications such as KCN or delayed recognition of glaucoma.

References:-

1. Khan MD, Kundi N, Saeed N, Gulab A, Nazeer A F. A study of 530 cases of vernal conjunctivitis from the North West Frontier Province of Pakistan. *Pak J Ophthalmol* 1986; 2: 11114.
2. Bonini S, Coassin M, Aronni S, Lambiase A. Vernal keratoconjunctivitis. *Eye (Lond)* 2004; 18(4): 345-51.
3. Leonardi A, Busca F, Motterle L, Cavarzeran F, Fregona IA, Plebani M, et al. Case series of 406 vernal keratoconjunctivitis patients: a demographic and epidemiological study. *Acta Ophthalmol Scand* 2006; 84: 406–10.
4. Müller GG, José NK, De Castro RS. Topical tacrolimus 0.03% as sole therapy in vernal keratoconjunctivitis: a randomized double-masked study. *Eye & Contact Lens* 2014; 40(2): 79-83.
5. Kumagai N, Fukuda K, Fujitsu Y, Yamamoto K, Nishida T. Role of structural cells of the cornea and conjunctiva in the pathogenesis of vernal keratoconjunctivitis. *Prog Retin Eye Res* 2006;25(2):165-87.
6. Hahn S, Azen S, Ying-Lai M, Varma R, Los Angeles Latino Eye study group (2003): Central corneal thickness in Latinos. *Invest Ophthalmol Vis Sci*, 2003; 44: 1508–12
7. Doughty MJ, Zaman ML: Human corneal thickness and its impact on intraocular pressure measures: a review and meta-analysis approach. *Surv Ophthalmol*, 2000; 44: 367–408.
8. Van Bijsterveld OP, Baardman J: Measurements of corneal thickness in patients with keratoconjunctivitis sicca. *Klin Monbl Augenheilkd*, 1990; 197: 240–43
9. Leonardi A: The central role of conjunctival mast cells in the pathogenesis of ocular allergy. *Curr Allergy Asthma Rep*, 2002; 2: 325–31.
10. Jun J, Bielory L, Raizman MB: Vernal conjunctivitis. *Immunol All Clin North Am*, 2008; 28: 59–82.
11. Kumagai N, Yamamoto K, Fukuda K et al: Active matrix metalloproteinases in the tear fluid of individuals with vernal keratoconjunctivitis. *J Allergy Clin Immunol*, 2002; 110: 489–91.
12. Iyamu E, Ez NM. The relationship between central corneal thickness and corneal curvature in adult Nigerians. *S Afr Optom*, 2011; 70: 44–50.