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RESEARCH ARTICLE

RISK PROFILE OF KERATOCONUS: A TERTIARY CARE HOSPITAL BASED STUDY

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Key words:-
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Abstract

Background: The study aimed to assess the risk factors implicated in the causation of keratoconus and the demographic profile of the patients diagnosed as keratoconus.

Materials and Methods: This retrospective, observational, hospital-based study included 376 patients presenting to the ophthalmology outpatient department of a tertiary care hospital in Kashmir from January 2022 to December 2022. Written informed consent was obtained from all participants after explaining the nature of the study.A well-designed questionnaire was used to collect the data of the recruited patients.The demographic characteristics like age, gender, residence were noted and the role of certain risk factors associated with causation of keratoconus was noted.

Results: The mean age of participants was 21.8 ± 4.7 years (range, 9-32). The study participants were 58.6% (n = 220/376) males and 41.4% (n = 156/376) females. Majority of the participants belonged to urban areas(55.60%) than rural areas(44.4%). The maximum association of keratoconus was found with eye rubbing(61.2%) followed by male gender (58.6%) and age group 21-30 years (51%).

Conclusion: We conclude that eye rubbing is the most significant risk factor, followed by exposure to sunlight and ocular allergy. The findings of our study corroborate that the etiology of keratoconus is multifactorial.

Introduction:-

Keratoconus (KC) is a progressive, bilateral, non-inflammatory disorder of the cornea, characterized by central or paracentral, asymmetrical thinning and protrusion of the cornea [1,2].Keratoconus was first described by Nottingham in 1854 [3]. KC is caused by the interplay of many factors and is an eye disease seen in association with hereditary and environmental risks factors such as genetics, ethnicity, ultraviolet (UV) and or sun exposure, eye rubbing, gender, hormones, age, atopy, floppy eyelids syndrome, poverty, malnutrition and body-weight loss [1,2]. Keratoconus has a peak occurence at around puberty,it then progresses and continues till third or fourth decade [4,5]. The risk factors of KC could be genetic or environmental. The environmental predictors or risk factors function as activators in genetically predisposed persons. Some examples of risk factors for KC are atopy or allergic experience, eye rubbing, ultraviolet (UV) or sunlight exposure, refractive error, positive family history of KC, parental consanguinity, low levels of parental education, age, gender and socio-economic status [6].In some studies gender is also seen to be linked in the causation of keratoconus[7,8]. Most commonly, highest prevalence of KC is seen in second and third decades of life, thereafter drastically reducing in subsequent decades of life[6].

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Pathologically there is modification of corneal collagen due to repeated mechanical pressure on cornea[9]. Certain systemic conditions like Down's syndrome, Ehlers-Danlos syndrome, and connective tissue disorders predispose and are seen in association with keratoconus[10].Though frequently symmetric between eyes in same patient, cases of unilateral keratoconus have been reported [11,12].Various corneal signs are seen in keratoconus which include:
• Oil droplet reflex • Charleaux's sign • Scissoring reflex on retinoscopy • Rizzuti's sign • Vogt striae
• Munson's sign • Fleischer ring • Hydrops in advanced keratoconus.

Corneal pachymetry, tomography and topography are the mainstay diagnostic tools to establish diagnosis of keratoconus [13]. Keratoconus has significant impact on quality of life and treatment modalities usually aim to halt its progression (such as corneal collagen cross linking) or improve vision by contact lenses, intracorneal ring implantation or keratoplasty which have shown promising results.

Materials And Methods:-

This retrospective, observational, hospital-based study included 9674 patients presenting to the ophthalmology outpatient department of a tertiary care hospital in Kashmir from January 2022 to December 2022 out of which 376 were diagnosed as having keratoconus.Written informed consent was obtained from all participants after explaining the nature of the study.

Study Design:
Retrospective, observational study.

Study Location:
This was a tertiary care teaching hospital-based study conducted in the Department of Ophthalmology, Government Medical College, Srinagar, J&K.

Study Duration:
This study was conducted in the Outpatient Department of Ophthalmology from January 2022 to December 2022.

Sample Size:
The study included 376 patients presenting in the Outpatient Department of Ophthalmology during January 2022 to December 2022.

Sample Size Calculation:
The sample size was estimated based on a single proportion design.

Subjects & selection method:
The study population was randomly selected in the Outpatient Department ofOphthalmology, and it included 376 patients diagnosed with keratoconus.

Inclusion Criteria:
1. Diagnosed cases of keratoconus, confirmed by clinical evaluation & on topography.
2. Patients of any age group.
3. Either sex.
4. Patients giving wilful consent to participate in the study.

Exclusion Criteria:
1. Ocular trauma.
2. Patients not giving consent to be included in the study.

Procedure Methodology:-

The study included the patients diagnosed as having keratoconus in one or both the eyes. After written informed consent was obtained, a well-designed questionnaire was used to collect the data of the recruited patients.The questionnaire included socio-demographic characteristics like age, gender, residence.

Statistical analysis:
The data was recorded on a predesigned proforma and managed on a spreadsheet (Excel; Microsoft Corp, Redmond, WA). Qualitative data were compared using $\chi 2$ square and Fischer exact tests and quantitative data by ANOVA 1-way test. Nonparametric tests were applied wherever the sample size was less. A P-value less than 0.05 was considered statistically significant.

Results:-

The study included 376 participants. The mean age of participants was 21.8 ± 4.7 years (range, 9-32). The study participants were 41.4% (n = 156/376) females and 58.6 % (n = 220/376) males. 44.4% (n= 167/376) belonged to rural areas and 55.6% (n=209/376) belonged to urban areas. Overall, 25.5 % (n = 96 / 376) of participants had a positive family history of keratoconus.

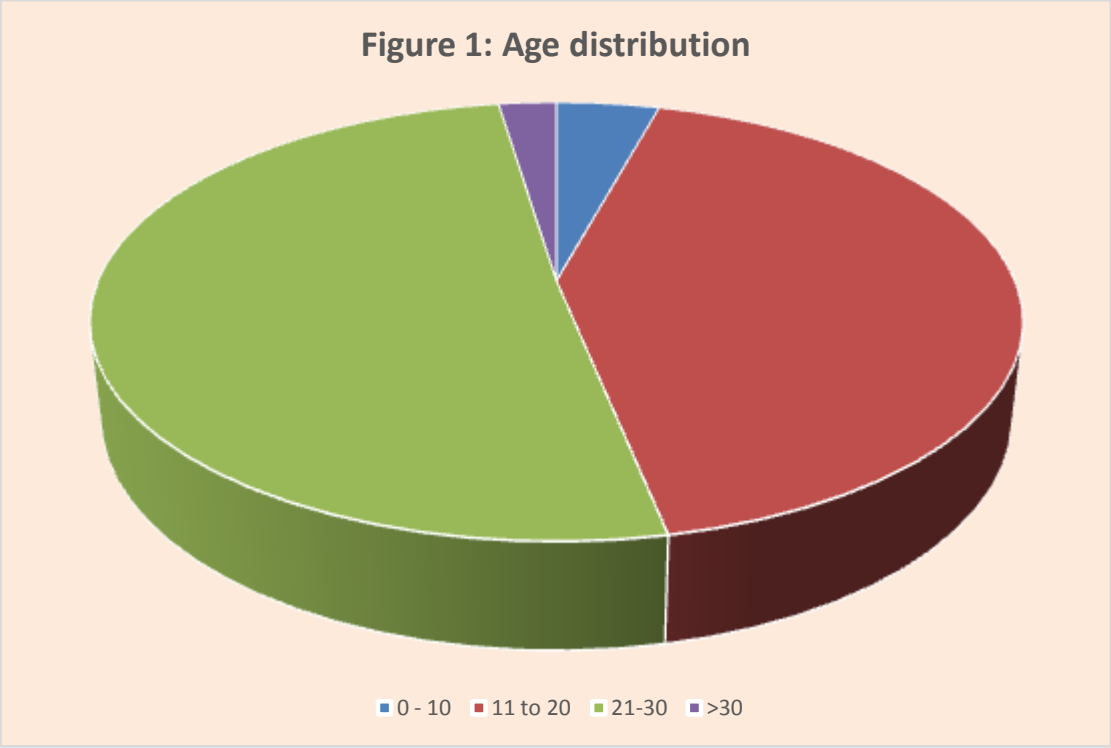

Table 1:- Age distribution of the participants.

Age Group	No. of patients	Percentage
0-10	16	4%
11-20	160	43%
21-30	191	51%
>30	9	2%

The majority of the patients were in the age range of 21-30 years of age.

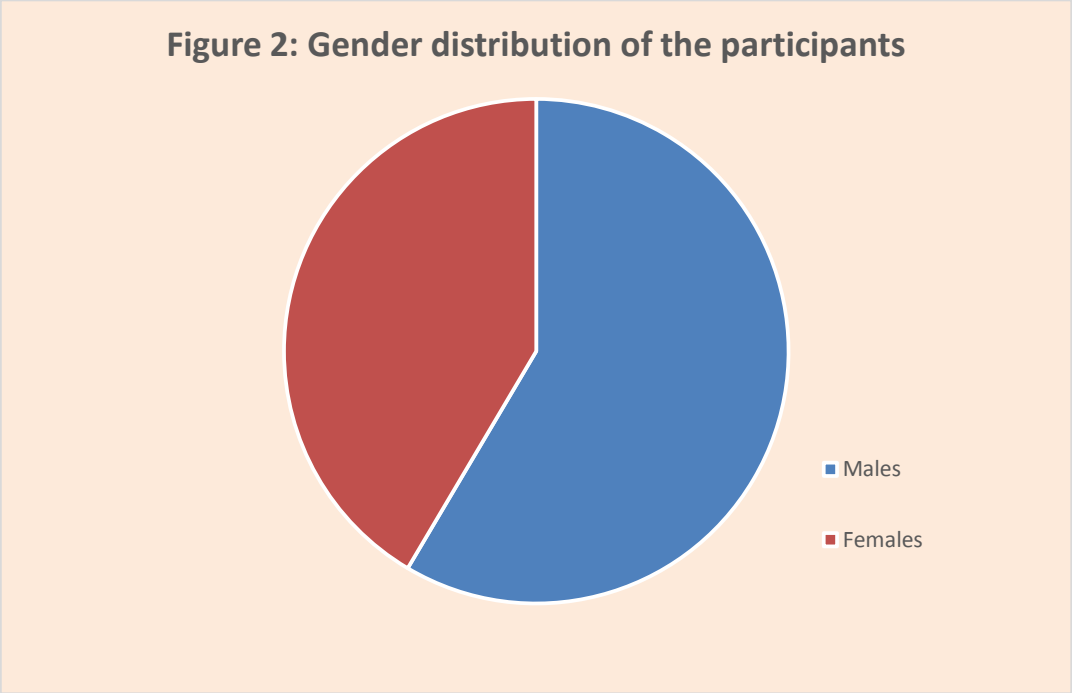

Table 2:- Gender distribution of the participants.

Gender	Frequency	Percentage
Males	220	58.6%
Females	156	41.4%
Total	376	100%

It was seen that there was a preponderance of Males in our study, 58.6% subjects.

Table 3:- Residence distribution of participants.

Residence	Frequency	Percentage
Urban	209	55.60
Rural	167	44.40
Total	376	100%

It was seen that majority of the participants belonged to urban areas (55.6%) than rural areas (44.4%).

Table 4:-Significance of risk factors in causation of keratoconus.

Risk factor		**Frequency**	**Percentage**	**p-value**
Gender	Males	220	58.6%	<0.05
Age	21-30 years	191	51%	<0.05%
Eye rubbing	Present	230	61.2%	<0.05%
Exposure to sunlight	Present	179	47.6%	<0.05%
Family history	Present	96	25.5%	<0.05%
Allergic episodes	Present	122	32.4%	<0.05%
Parental consanguinity	Present	37	9.8%	<0.05

It was seen that maximum association of keratoconus was found with eye rubbing(61.2%) followed by male gender(58.6%) and age group 21-30 years(51%).

Discussion:-

Keratoconus is a non-inflammatory disease characterised by degeneration of cornea, presenting at puberty and associated with corneal steepening and thinning particulary inferior to the cornea.

Our study aimed at the study of risk factors causing keratoconus and their association with the causation of keratoconus.

The mean age of occurrence or diagnosis of keratoconus in our study was 21.8± 4.7 years which was similar to the studies conducted by Agrawal VB et al [14]and Saini JS, Saroha V, Singh P, et al. [15]

Our study showed the gender preponderance of males (58.6%) over females (41.4%), similar to the study conducted by Sharma R, Titiyal JS, Prakash G, et al .[16] in 2009 and . Fatima T, Acharya MC, Mathur U, et al [17] in 2010.

In our study eye rubbing was found to be the predominant risk factor of keratoconus with highest occurrence of 61.2%, being the most important among the other risk factors that were statistically significant. The mechanism of action is postulated to becorneal epithelial trauma and the release of interleukin-6 and or 8 (IL-6 and or IL-8) and other cytokines compromising the corneal integrity, thereby leading to the causation of keratoconus[18].

Another common association of keratoconus was exposure to sunlight and UV-rays, we found a 47.6% participants had been exposed to sunlight.This is similar to other studies conducted in countries with high exposure to sunshine such as Saudi Arabia, India, Israel and Lebanon[19,20,21,22]. Being exposed to a hot and sunny environment has been reported to cause cytotoxicity and thinning of the cornea leading to the pathogenesis of KC due to oxidative stress and damage of highly reactive oxygen derivatives [23].

Occurrence of ocular allergies was a significant factor contributing to keratoconus in our study(32.4%) which was similar to the study conducted by Nemet et al [24].

Conclusion:-

Eye rubbing was the most significant risk factor, followed by exposure to sunlight and ocular allergy. Thefindings of our studycorroborate that the etiology of keratoconus is multifactorial with eye rubbing being the most significant factor in causation of keratoconus.There is a need to address eye rubbing among students to minimize the risk of KC. We need to improvise proper investigative tools like topography in diagnosing keratoconus early.

The major limitation of this study is that it is a singlecenter study involving participants coming to an eye care facility and thus may not represent the entire population.

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