



DEMOGRAPHIC TRENDS AND BURDEN OF VKC IN GARHWAL: A CROSS-SECTIONAL STUDY

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Abstract

Introduction: Vernal Keratoconjunctivitis is a chronic, recurrent allergic ocular disorders affecting predominantly children and adolescent age group. The variations seen in prevalence are influenced by environmental, socioeconomic and geographical factors. Due to the unique topography and climatic conditions, it becomes important to understand the demographics of the 'Garhwal region'.

Aim: To assess the demographic patterns and the burden of disease of VKC among the patients attending a tertiary care center in Garhwal region. **Methods:** A hospital based, prospective and observational was conducted over 24 months (September 2023 to August 2025) at ophthalmology department of Government Doon Medical College, Dehradun. Clinically diagnosed VKC cases were evaluated for demographic characteristics, clinical types, seasonal distribution and disease burden. Data was analyzed using SPSS Version 25. **Results:** A total of 164 VKC patients were enrolled with male to female ratio as 1.4:1. Mostly patients belonged to 5-10 years of age group. Most prevalent form of VKC was mixed and seasonal exuberations were seen peaking in summer season. 74 out of 164 patients belonged to rural areas and significant educational disruption was seen among school going children. **Conclusion:** VKC in Garhwal region predominantly affects young males from Urban areas and usually follows a seasonal pattern in Garhwal region.

Keywords: Vernalkeratoconjunctivitis (VKC), Garhwal region, demography, dust, allergy, discharge

INTRODUCTION

A recurring, bilateral, interstitial inflammation of the conjunctiva with a seasonal occurrence is known as vernal keratoconjunctivitis (VKC). A gelatinous enlargement of the limbal conjunctiva, flat-topped papules that resemble cobblestones on the tarsal conjunctiva, and keratitis with redness, itching, lacrimation, and mucinous or lardaceous discharge are its most characteristic symptoms^{1,2}. The condition is self-limiting in nature. In 1846, Arlt published the first description of vernal conjunctivitis. He defined limbal variant as lymphatic conjunctivitis. The limbal variation was referred to as perikeratic hypertrophy by Desmarres in 1855. In 1871, von-Graefe included conjunctival granulations that resembled pavement in the clinical picture. Because of its periodicity, Saemish termed it Spring Catarrh in 1876³.

VKC has significant regional and racial diversity. In hot, dry regions like the Mediterranean basin and the Indian subcontinent, it is most prevalent and severe. Asian or African patients are more likely to have VKC ^{4,5}. Ocular disorders have a seasonal incidence of 0.1% to 0.5% and affect quality of life. Variations in prevalence may result from environmental factors, gene-environment interactions, or the diversity of the gene pool. There has been evidence of a gender predilection, particularly in individuals younger than 20 years old, where the male to female ratio is 4:1. Geographical location and climate have an impact on the co-occurrence of eczema and asthma. Compared to 5% to 40% in tropical countries, 45% to 75% of individuals with VKC in temperate regions had a history of atopy ^{6,7,8}.

The mucous and/or serous discharge of VKC patients is characterized by ropiness and stringiness. Heat-induced fibrin buildup may occur on the large papillae. Vernal keratoconjunctivitis, also known as Maxwell-Lyons sign, is a disorder that is mediated by TH-2 lymphocytes, setting it apart from seasonal and perennial allergic conjunctivitis. With cell-mediated TH-2 participation of mast cells, lymphocytes, and eosinophils in VKC, type I IgE-mediated and type II hypersensitivity reactions are both active⁹.

VKC is linked to complications such peripheral corneal degeneration, pseudogerontoxon, shield ulcer, superficial punctate keratitis with superficial pannus, and keratoconus. Bowman's membrane remains intact despite corneal epithelial degradation caused by punctate epithelial keratitis coalescence^{10,11}.

The clinical course of VKC seems to have different geographical variations. Therefore, this study was done to know the demographic and clinical profile of the disease in the geographical area of Garhwal region.

MATERIALS AND METHODS

The prospective, observational, hospital-based study was conducted in the tertiary care hospital in department of ophthalmology in GDMC, Dehradun for the period of two years from September 2023 to August 2025. The study comprised patients from 5 years of age, who attended the Out Patient Department of Ophthalmology. This study was performed in accordance with the tenets of the Declaration of Helsinki. The study comprised 164 patients who were included in the study, mostly symptomatic and required treatment.

The following patients were included in the study:

- Children diagnosed with vernal keratoconjunctivitis aged above 5 years of age.
- Healthy children.
- Either sex.

The following patients were excluded from the study:

- History of any ocular surgery.
- Children with any corneal pathology (infective, degenerative, dystrophic).
- History of ocular trauma.

After explaining study to the parents of the patients, written informed consent was taken from them. Particulars of patients were taken; their complete ocular and systemic examination were done. Patients presenting with chief complaints of itching, redness, foreign body sensation, history of any associated allergy, or mucoid discharge were noted and then proper clinical evaluation was done. Ocular examination included uncorrected and corrected distance visual acuity of each eye with the Snellen's Chart / objective refraction, condition of the cornea, limbus, bulbar, palpebral conjunctiva, limbus and associated complications, detailed anterior segment examination using slit lamp, detailed posterior segment examination using indirect ophthalmoscopy after full dilatation of pupil using eye drops tropicamide 0.8% and phenylephrine 5%. Detailed present, past and personal history, history

regarding age of onset of disease, place of residence, any seasonal variations, and family history of associated allergic illnesses was taken. Diagnosis of VKC was made solely on the basis of their history, symptoms, and clinical findings.

The patients in eye OPD selected for the study were thoroughly assessed. Data was collected and entered on Microsoft Excel 2019 sheet and analyzed.

Statistical incidence

Statistical analysis was done by using SPSS software for windows version 25. Qualitative data was depicted as number and percentage whereas quantitative as mean $\pm$ standard deviation.

RESULTS

Out of the data collected, it was found that a total of 164 patients were diagnosed with Vernal Keratoconjunctivitis in two-year duration, out of which 96 were males and 68 were females with a male: female ratio of 1.4.

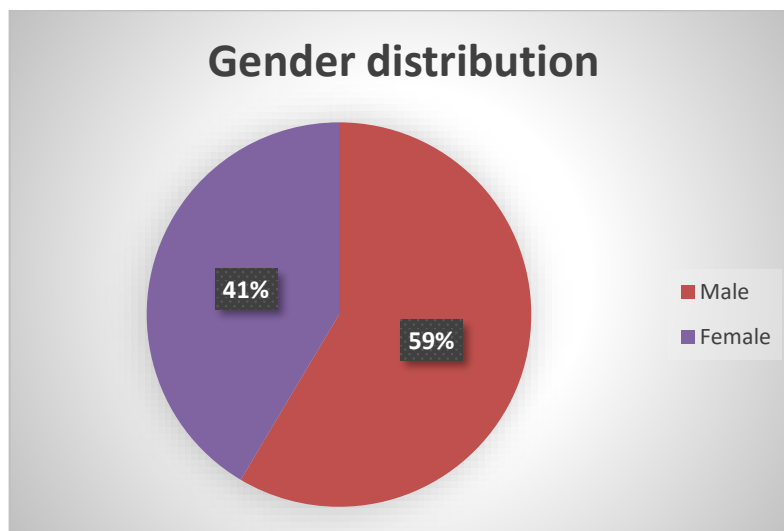


Figure 1: Gender distribution among patients

The study outcome was that maximum patients (67.07%) presented to eye OPD belonged to age group of 5 to 10 years, mostly belonging to urban areas. 104 out of 164 patients belonged to literate population. Table 1 depicts the demographic characteristics of patients diagnosed with VKC. Table 2 classifies VKC patients with 50% patients belonging to mixed type of Vernal keratoconjunctivitis among the study population and Table 3 determines the chief presenting complaints of patients.

Table 1: Demographic Characteristics of VKC Patients

Demographic Parameter	Frequency (n)	Percentage (%)
Total Sample Size	164	100%
Age Group		
5-10 years	110	67.07%
11-15 years	34	20.73%
> 15 years	20	12.3%
Gender		
Male	96	58.5%
Female	68	41.5%
Residence		
Rural	74	45.12%
Urban	90	54.88%
Education		

Literate	104	63.41%
Illiterate	60	36.59%
Dust exposure		
Yes	128	78.1%
No	36	21.9%
Family History of Systemic Allergy		
Present	65	39.6%
Absent	99	60.4%

Table 2: Types of VKC patients in the Study

Types	Frequency (n)	Percentage (%)
Mixed	82	50%
Limbal	38	23.17%
Palpebral	44	26.83%

Table 3: depicts the distribution of patients as per the chief complaints.

Chief Complaints	No. of cases	Percentage
Itching	164	100%
Redness	82	50%
Photophobia	42	25.6%
Ropy discharge	28	17.07%
Foreign body sensation	36	21.9%

DISCUSSION

IgE and cell-mediated immunity both play significant roles in the recurrent bilateral condition known as vernal keratoconjunctivitis. It usually first appears around age five and predominantly affects boys. The findings of Kawuma M's study¹², which indicated that children aged 5 to 9 had the most frequent presentation of VKC is similar to this study showing majority of patients belonged to age group of 5 to 10 years of age. In the investigation conducted by Saboo *et al.* it was found a male preponderance (M: F ratio 6.4:1)¹³ which is in line with this study, where there were 96 males and 68 females with male to female ratio is 1.4:1. Lowest percentage of patients in this study group were over the age of 15, which is consistent with Leonardi *et al.*'s findings, presenting 4% of patients were over the age of 20¹⁴. In a study by Alemayehu AM¹⁵ *et al.*, 16.9% of students had no school as educational status. The results are consistent with this study where majority of patients belonged to literate population and only 60 patients out of 164 belonged to illiterate section of study population. In a study by Gupta Y¹⁶ *et al.*, 52.6 % patients belonged to Urban areas similar to the present study where 54.88 % patients presenting to Eye OPD belonged to urban areas. Such a diverse demographic may be caused by several geographic and environmental factors.

The studies done in Gondar, Ethiopia, and Rwanda^{17,18} showed that Children exposed to dust particles were more prone to develop VKC. The findings are consistent with the present study depicting majority (78.1%) of the patients were exposed to the dusty environment and subsequently developed VKC.

Patients presenting and enrolled in this study showed onset of disease in summer season, which is consistent with the study of Jivangi *et al.*¹⁹ that found the highest incidence of VKC during the hot and dry season. Also, majority of the patients had no family history of systemic allergy which was in line with the negative association with a family history in study conducted by Gupta Y *et al* ¹⁶.

Alemayehu AM¹⁵ *et al.*, found the mixed form (53.1%) to be the most prevalent form of VKC and palpebral form (43.8%). Similarly, this study demonstrated that the most of patient were mixed (50 %) form, followed by palpebral (26.83%) and limbal (23.17%) forms. Well, in different study

settings, geographical areas, it may be possible to find one particular form to be in higher rates. It is also possible that VKC may progress through time to both tarsal and palpebral type leading to mixed form to be in higher prevalence²⁰ if timely intervention is not done.

In this study, in every patient (100%) itching was the most frequent presenting chief complaint followed by redness (50%). Other symptoms photophobia (25.6%), foreign body sensation (21.9%) and thick mucoid discharge (17.07%) were mentioned leading to educational disruption among school going children. This is similar to the study by Hakak *et al.*, where patients presented with itching (100%) and redness (99%) as most common presenting symptoms²¹.

This indicates that different regions of the world have varying prevalences of VKC subtypes and it has a major public health significance in Garhwal region. Because of the lack of multicentric approach in Garhwal region and smaller sample size, this study had some significant limitations.

CONCLUSION

VKC in Garhwal region predominantly affects young males from Urban areas, mostly literate but exposed to dusty environments and usually follows a seasonal pattern in Garhwal region. Most of the patients have negative family history of allergy. Also, Mixed form of VKC is mostly presented and most common chief presenting complaints of patients is itching followed by redness. This study implies that VKC is a major public health problem which needs regular screening and widespread awareness among people.

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Conflicts of interests: Nil

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