

Demographic and Clinical Profile of Vernal Keratoconjunctivitis at a Tertiary Care Hospital

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ABSTRACT

Background: Vernal keratoconjunctivitis is a chronic, recurrent allergic ocular disease predominantly affecting children and young adults in tropical climates. Its demographic and clinical characteristics in Bangladeshi populations remain inadequately characterized. **Objective:** To evaluate the demographic profile and clinical manifestations of patients with vernal keratoconjunctivitis. **Methods & Materials:** This prospective cohort study enrolled 47 patients with vernal keratoconjunctivitis via purposive sampling at the Department of Ophthalmology, Chattogram Maa-O-Shishu Hospital Medical College, Chattogram, Bangladesh, from January to December 2025. Comprehensive ophthalmic examination, including slit-lamp biomicroscopy, was performed. Demographic data, clinical signs, and symptom severity were recorded. Data were analyzed using SPSS version 23.0. **Results:** Among 47 patients, 34 (72.3%) were male, and 13 (27.7%) were female, with a mean age of 11.4 ± 5.2 years. The majority (83.0%) presented during the spring and summer months. Palpebral form was the most common clinical type (46.8%), followed by mixed (29.8%) and limbal (23.4%). Itching was the predominant symptom (100%), followed by photophobia (76.6%) and foreign body sensation (68.1%). Giant papillae were observed in 68.1% of cases. **Conclusion:** Vernal keratoconjunctivitis predominantly affects young males in the first two decades of life, with palpebral involvement being the most frequent clinical presentation. Seasonal variation with spring-summer predominance is notable, emphasizing the need for timely diagnosis and management.

Keywords: Clinical profile, Corneal involvement, Giant papillae, Seasonal allergy, Vernal keratoconjunctivitis

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INTRODUCTION

Vernal keratoconjunctivitis is a chronic, bilateral, and recurrent allergic inflammatory disease of the ocular surface that primarily affects children and young adults, with a predilection for males in the first two decades of life [1]. The condition is characterized by intense ocular itching, photophobia, foreign body sensation, mucous discharge, and conjunctival hyperemia, often leading to substantial morbidity and impaired quality of life if inadequately managed [2]. Unlike other forms of allergic conjunctivitis, vernal keratoconjunctivitis carries a significant risk of corneal complications, including shield ulcers, keratoconus, and limbal stem cell deficiency, which may culminate in permanent visual impairment [3]. The global epidemiology of vernal keratoconjunctivitis demonstrates marked geographic variation, with higher prevalence rates observed in warm, dry, and subtropical climates [1]. In colder regions of Europe and North America, the condition is relatively rare, with prevalence estimates ranging from 0.13 to 3.34 per 10,000 population [4]. However, in tropical and subtropical regions of Africa, Asia, the Middle East, and Latin America, prevalence rates are substantially higher [5]. A recent review from sub-Saharan Africa reported a variable prevalence of vernal

keratoconjunctivitis up to 32.9% among children, particularly affecting males under five years of age [6]. In Asia, the disease is more prevalent in warm, dry, and windy climates, with limited epidemiological data available across the continent [7]. The clinical classification of vernal keratoconjunctivitis encompasses three distinct forms based on the predominant anatomical site of involvement: palpebral (tarsal), limbal, and mixed [1]. The palpebral form is characterized by the presence of giant papillae, typically exceeding 1 mm in diameter, on the upper tarsal conjunctiva, giving a characteristic cobblestone appearance [8]. The limbal form manifests as gelatinous thickening and hyperemia of the limbus, often accompanied by Horner-Trantas dots, which represent focal collections of eosinophils [9]. The mixed form exhibits features of both palpebral and limbal involvement [2]. Regional variations in the predominant clinical form have been documented; while some studies from India report limbal involvement as the most common presentation, others from Bangladesh have identified the palpebral form as the predominant type [10]. The immunopathogenesis of vernal keratoconjunctivitis is complex and multifactorial, involving both immunoglobulin E-mediated and T-helper

2 cell-mediated immune mechanisms [11]. The disease process is driven by the overexpression of interleukins such as interleukin-4, interleukin-5, and interleukin-13, which promote eosinophilic infiltration, mast cell degranulation, and subsequent release of inflammatory mediators including histamine, leukotrienes, and prostaglandins [12]. This chronic inflammatory cascade results in conjunctival and corneal tissue remodeling, which may lead to progressive corneal scarring and visual compromise if left untreated [3]. In the South Asian context, vernal keratoconjunctivitis represents a significant public health concern, particularly among pediatric populations. Studies from neighboring countries have reported varying prevalence and clinical patterns, with male predominance consistently noted across all series [13]. In Bangladesh, limited data exist regarding the demographic and clinical characteristics of vernal keratoconjunctivitis. A retrospective study conducted at a peripheral combined military hospital in Bangladesh reported that the highest incidence occurred in the 11–15 years age group, with the palpebral form being the most common clinical presentation [14]. However, comprehensive prospective data from tertiary care settings in Bangladesh remain scarce, representing

a significant knowledge gap in the regional ophthalmic literature. Given the substantial burden of vernal keratoconjunctivitis in tropical climates and the paucity of prospective data from Bangladeshi tertiary care settings, this study was designed to evaluate the demographic profile and clinical manifestations of vernal keratoconjunctivitis among patients presenting to a tertiary care hospital in Dhaka. By systematically characterizing the age and sex distribution, clinical forms, and symptom patterns, this investigation aims to provide valuable baseline data to inform clinical practice and guide future research in the region.

METHODS & MATERIALS

This prospective cohort study was conducted at the Department of Ophthalmology, Chattogram Maa-O-Shishu Hospital Medical College, Chattogram, Bangladesh, over 12 months from January 2025 to December 2025. A total of 47 patients presenting with clinical features suggestive of vernal keratoconjunctivitis were enrolled using purposive sampling.

Inclusion criteria: Patients of any age and either sex who presented with signs and

symptoms consistent with vernal keratoconjunctivitis, including intense ocular itching, conjunctival hyperemia, mucous discharge, and characteristic conjunctival or limbal findings on slit-lamp examination, were included in the study. Written informed consent was obtained from all participants or their legal guardians.

Exclusion criteria: Patients with other forms of allergic conjunctivitis (seasonal, perennial, or giant papillary conjunctivitis), infective conjunctivitis, or ocular surface disorders unrelated to vernal keratoconjunctivitis were excluded. Additionally, patients with a history of ocular surgery, trauma, or use of contact lenses were not enrolled.

Study procedure: All participants underwent a comprehensive ophthalmic evaluation including slit-lamp biomicroscopy. Clinical findings were documented using a standardized proforma. Disease severity was graded according to the Bonini grading system for vernal keratoconjunctivitis [15]. Based on the predominant site of involvement, patients were classified into palpebral,

limbal, or mixed forms according to established clinical criteria.

Data analysis: Statistical analyses were performed using SPSS software version 23.0 (IBM Corp., Armonk, NY, USA). Categorical variables were expressed as frequencies and percentages. Continuous variables were presented as means with standard deviations. Comparisons between groups were performed using the chi-square test for categorical variables. A p-value of less than 0.05 was considered statistically significant.

RESULT

A total of 47 patients with vernal keratoconjunctivitis were enrolled in this prospective study. All participants completed the clinical evaluation protocol, with no losses to follow-up. The mean age of the cohort was 11.4 ± 5.2 years, with a range of 4 to 28 years. Male patients predominated, comprising 34 (72.3%) of the study population, while females accounted for 13 (27.7%). The majority of patients (83.0%) presented during the spring and summer months (March to August). Baseline demographic characteristics are summarized in (Table I).

Table I
Demographic characteristics of study participants.

Characteristic	Value
Total patients, n	47
Age (years), mean ± SD	11.4 ± 5.2
Age range (years)	4 – 28
Male, n (%)	34 (72.3)
Female, n (%)	13 (27.7)
Male-to-female ratio	2.6:1
Spring-summer presentation, n (%)	39 (83.0)

SD, standard deviation.

The distribution of clinical forms of vernal keratoconjunctivitis is presented in Table II and illustrated in Figure 1. Palpebral form was the most common clinical type, observed in 22 patients (46.8%), followed

by mixed form in 14 patients (29.8%), and limbal form in 11 patients (23.4%). The mean age of patients with palpebral form was 10.8 ± 4.6 years, limbal form was 12.5 ± 5.8 years, and mixed form was 11.2 ± 5.1

years. The difference in age distribution across the three clinical forms was not statistically significant (p = 0.286).

Table II
Distribution of clinical forms of vernal keratoconjunctivitis.

Clinical form	n (%)	Age (years)
		Mean± SD
Palpebral	22 (46.8)	10.8 ± 4.6
Limbal	11 (23.4)	12.5 ± 5.8
Mixed	14 (29.8)	11.2 ± 5.1

Data were analyzed using one-way ANOVA for age comparison across groups. SD, standard deviation.

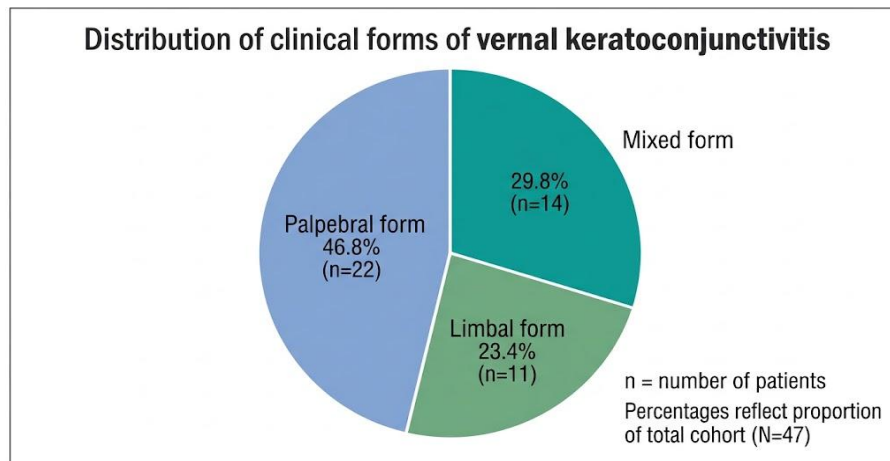


Figure 1 Distribution of clinical forms of vernal keratoconjunctivitis.

Figure 1 shows the distribution of clinical forms among 47 patients with vernal keratoconjunctivitis. Palpebral form was the most common (46.8%), followed by mixed (29.8%) and limbal (23.4%) forms.

The frequency of various symptoms reported by patients is detailed in Table III. Itching was the universal presenting symptom, reported by all 47 patients

(100%). Photophobia was the second most common symptom, observed in 36 patients (76.6%), followed by foreign body sensation in 32 patients (68.1%), and

tearing in 28 patients (59.6%). Mucoïd discharge was reported by 25 patients (53.2%).

Table III

Symptom profile of patients with vernal keratoconjunctivitis (n=47).

Symptom	n (%)
Itching	47 (100.0)
Photophobia	36 (76.6)
Foreign body sensation	32 (68.1)
Tearing	28 (59.6)
Mucoïd discharge	25 (53.2)

The clinical signs observed on slit-lamp examination are presented in Table IV. Giant papillae (>1 mm) on the upper tarsal conjunctiva were the most frequent finding, observed in 32 patients (68.1%). Conjunctival hyperemia was present in 30 patients (63.8%), while limbal gelatinous

thickening was noted in 22 patients (46.8%). Horner-Trantas dots were observed in 12 patients (25.5%). Corneal involvement, including punctate epithelial erosions, shield ulcers, or corneal scarring, was documented in 10 patients (21.3%). The severity grading according to the

Bonini grading system revealed that 24 patients (51.1%) had moderate disease, 14 patients (29.8%) had mild disease, and 9 patients (19.1%) had severe disease.

Table IV

Clinical signs observed in patients with vernal keratoconjunctivitis (n=47).

Clinical sign	n (%)
Giant papillae (>1 mm)	32 (68.1)
Conjunctival hyperemia	30 (63.8)
Limbal gelatinous thickening	22 (46.8)
Horner-Trantas dots	12 (25.5)
Corneal involvement	10 (21.3)

The association between clinical forms and the presence of giant papillae and corneal involvement is presented in Table V. Giant papillae were significantly more common in the palpebral form (90.9%) compared

with the limbal (27.3%) and mixed (78.6%) forms ($p < 0.001$). Corneal involvement was more frequently observed in the limbal form (36.4%) and mixed form (28.6%) compared with the palpebral form (9.1%),

though this difference did not reach statistical significance ($p = 0.128$).

Table V

Association of clinical forms with giant papillae and corneal involvement.

Clinical sign, n (%)	Palpebral (n=22)	Limbal (n=11)	Mixed (n=14)	p-value
Giant papillae	20 (90.9)	3 (27.3)	11 (78.6)	<0.001
Corneal involvement	2 (9.1)	4 (36.4)	4 (28.6)	0.128

Data were analyzed using the chi-square test.

DISCUSSION

This prospective study of 47 patients with vernal keratoconjunctivitis at a tertiary care hospital in Dhaka provides comprehensive demographic and clinical data from a Bangladeshi cohort. The findings demonstrate a male predominance (72.3%), a mean age of 11.4 years, spring-summer seasonality (83.0%), and palpebral form as the most common clinical type (46.8%), with itching being the universal presenting symptom. The male predominance observed in this study (male-to-female ratio of 2.6:1) is consistent with the well-established epidemiological pattern of vernal keratoconjunctivitis, which disproportionately affects young males [16]. Similar findings have been reported across multiple South Asian studies. A prospective study from North India reported that 84.4% of VKC patients were male, while a clinicodemographic study from a tertiary care center in North India documented palpebral form as predominant in 72% of cases, followed by mixed (21.6%) and limbal (6.4%) forms [17]. The mean age of 11.4 years in this cohort aligns with previous observations that VKC typically presents in the first decade of life, with the highest incidence in the 11–15 years age group [18]. The spring-summer predominance observed in 83.0% of patients corroborates the well-recognized seasonal exacerbation pattern of VKC, with peak incidence during warm and dry months when environmental allergens such as pollen are most abundant [19]. The distribution of clinical forms in this study (palpebral 46.8%, mixed 29.8%, and limbal 23.4%) demonstrates some regional variation compared with other South Asian series. A retrospective study from Bangladesh reported palpebral form in 63.63% of cases, followed by mixed (22.72%) and bulbar (13.63%) forms [18]. The higher proportion of limbal involvement (23.4%) observed in the present study may reflect the well-documented higher prevalence of limbal VKC in Black and Asian populations [20]. This variation underscores the importance of region-specific epidemiological data to guide clinical practice. The universal presence of itching (100%) as the predominant symptom in this cohort is consistent with the established clinical hallmark of VKC [21]. Photophobia (76.6%) and foreign body sensation (68.1%) were also frequently reported, reflecting the significant ocular surface inflammation and corneal involvement characteristic of this condition. The high prevalence of giant papillae (68.1%) observed in this study aligns with the pathognomonic feature of palpebral VKC, where chronic inflammation leads to the formation of large (>1 mm) papillae on the upper tarsal conjunctiva [22]. The finding that giant papillae were significantly more common

in the palpebral form (90.9%) compared with the limbal (27.3%) and mixed (78.6%) forms ($p < 0.001$) confirms the expected anatomical distribution of this clinical sign. Corneal involvement was documented in 21.3% of patients, with higher rates observed in limbal (36.4%) and mixed (28.6%) forms compared with palpebral (9.1%) forms, though this difference did not reach statistical significance ($p = 0.128$). This finding is clinically significant, as corneal complications including punctate epithelial erosions, shield ulcers, and corneal scarring represent the most vision-threatening manifestations of VKC [23]. The presence of corneal involvement in approximately one-fifth of patients underscores the need for vigilant slit-lamp examination and prompt initiation of appropriate anti-inflammatory therapy to prevent permanent visual impairment. The severity distribution according to the Bonini grading system revealed that the majority of patients (51.1%) had moderate disease, followed by mild (29.8%) and severe (19.1%) disease [24]. This distribution highlights the substantial disease burden in this cohort and reinforces the importance of standardized grading systems in guiding treatment decisions. The Bonini grading system, which classifies VKC severity based on clinical signs and symptoms, has been validated as a useful tool for monitoring disease progression and treatment response [25]. The clinical implications of these findings are substantial for the management of VKC in Bangladesh. The high prevalence of moderate-to-severe disease (70.2%) in this cohort suggests that many patients present with advanced disease, potentially due to delayed diagnosis or inadequate initial management. Current management guidelines recommend a stepwise approach, with mild VKC responding to supportive measures and antihistamines, while moderate-to-severe cases may require topical corticosteroids or immunomodulators such as cyclosporine [26]. The European expert consensus on VKC management emphasizes the importance of early referral to specialists for patients with moderate-to-severe disease or those with corneal involvement [27]. In the Asian context, the Management of Vernal Keratoconjunctivitis in Asia Expert Working Group has developed best-practice recommendations for the assessment, diagnosis, and management of VKC, highlighting the need for standardized guidelines across the region [28].

LIMITATIONS

This study has several limitations, including its single-center design, purposive sampling technique, modest sample size of 47 patients, and absence of

long-term follow-up data to assess disease chronicity, treatment outcomes, or progression to corneal complications.

CONCLUSION

Vernal keratoconjunctivitis predominantly affects young males in the first two decades of life in this Bangladeshi cohort, with palpebral form being the most common clinical presentation. The universal presence of itching, high frequency of giant papillae, and corneal involvement in one-fifth of patients underscore the substantial disease burden. Seasonal variation with spring-summer predominance is notable, emphasizing the need for timely diagnosis, appropriate management, and vigilant monitoring to prevent vision-threatening complications.

RECOMMENDATION

Early referral to ophthalmologists and standardized grading using the Bonini system should be adopted for all VKC patients. Future multicenter prospective studies with larger sample sizes and longitudinal follow-up are essential to validate these findings and optimize management protocols in Bangladesh.

CONFLICT OF INTEREST

The authors declare no conflicts of interest. No funding was received for this study. The corresponding author had full access to all data and final responsibility for the decision to submit for publication.

AI DECLARATION

Artificial intelligence tools contributed marginally to manuscript preparation and development. All core scientific content was human-verified.

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ETHICAL APPROVAL

The study was approved by the Institutional Ethics Committee

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