

# Vernal keratoconjunctivitis among primary school students in Butajira Town

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## Abstract

**Background:** In Ethiopia, there is no epidemiological data on the magnitude of vernal keratoconjunctivitis (VKC) in the community.

**Aim:** The purpose of this study was to identify the magnitude, types, related family allergy and complications of VKC among school children of Butajira town.

**Methods:** This cross-sectional study was conducted between January 1st and February 28th 2008 to clinically evaluate students of Butajira primary school for the presence of VKC. Stratified random sampling of all grades was used to identify the study population. An operational definition was set to classify the types of VKC and hand held slit lamp microscope was used to examine all study subjects.

**Results:** A total of 792 students, 348 (43.9%) males and 444 (56.1%) females, were screened. VKC was diagnosed in 41 (5.2%) of the cases. Out of the cases, 26 (63.4%) were males and 15 (36.6%) were females, making a male to female ratio of 1.7:1. The majority of VKC patients, 23 (56.2%) were between 11 and 15 years of age. Limbal, mixed and palpebral types of VKC were seen in 24 (58.5%), 12 (29.3%) and 5 (12.2%) cases, respectively. Related family allergy was obtained in 5 (12.2%) cases. Keratoconus and corneal ulceration were not found

**Conclusion:** The finding of 5.2% VKC cases indicates that the disease is one of the common causes of ocular morbidity among the study population. As VKC is a chronic, recurrent condition, school health education about its supportive and symptomatic management need to be given to teachers and students. [Ethiop. J. Health Dev. 2012;26;(3):226-229]

## Introduction

Vernal kerato-conjunctivitis (VKC) is a bilateral chronic form of allergic disease of the external eye characterized by interstitial inflammation of the conjunctiva with the involvement of the cornea. Acute allergic diseases of the eye account for up to 2.7% of all medical consultations in general medical practice giving an annual incidence rate of 51 per 1000 population (1). As the name “vernal” which means ‘young’ or ‘spring’, suggests it is a disease of youth with remission and exacerbation during the month of spring and summer. The age of onset is usually between 5 to 20 years with male preponderance in the ratio of 2:1, peak age of onset being 8-12 years (2).

VKC is chronic, recurrent, and self limiting (usually lasting 4-10 years after its onset), and spontaneously resolves during puberty. Type I and IV hypersensitivity reactions have been implicated for its pathogenesis. Its main clinical presentations are intense itching, photophobia, redness, tearing and tenacious discharge (3). Itching is the predominant symptom. Absence of itching makes the diagnosis questionable. Two-third of the cases with VKC have family history of atopy (allergic rhinitis, bronchial asthma, eczema and environmental allergies). Rubbing of the eyes is associated with the development of keratoconus and aggravation of the symptoms, releasing different mediators (4).

Though it is a disease of worldwide distribution, it is more prevalent in warm dry climates like the Mediterranean, Middle East, African and Indian subcontinents. It accounts for 0.5-1% of the eye disease

in most part of the world and represents 3% of the serious ophthalmic disease in some regions of the world (5). A community based study conducted in Goro District of Gurage Zone of Ethiopia showed a prevalence of VKC to be 1.6% among children (6). A severe form of the condition in most developing countries is potentially a blinding disease. The loss of vision is due to corneal complications like corneal scars, astigmatism, keratoconus and adverse effects of un-supervised topical corticosteroids (cataract and glaucoma) (7).

The high prevalence of VKC seen at the outpatient department of Menelik II Hospital and the lack of data on the pattern and typical clinical picture of this medical condition provided the impetus for this study. No such study has been carried out in Ethiopia previously. This study was designed to assess the magnitude, types, related family allergy and complications of VKC among school children of Butajira in Gurage Zone.

## Methods

This cross-sectional study was conducted in Butajira Town of Gurage Zone, the Southern Nations and Nationalities and Peoples Region of Ethiopia from January 1<sup>st</sup> to February 28<sup>th</sup>, 2008. The population of Meskan District is 183,331 (2006-census) with a surface area of 59,000 hectares. Meskan District is in a woinadega climatic zone. Butajira, which is the main town of the district, is found 135 km southwest of Addis Ababa. It is one of the areas in the country with a high magnitude of eye diseases that was targeted by ORBIS

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International. That was why the town was selected for this study.

Since there was no similar previous study done in the area, the estimated prevalence of VKC was taken to be 50%. The sample size was calculated using the formula  $n = \frac{(Z\alpha)^2 p(1-p)}{d^2}$  where  $n$  is the sample size,  $Z\alpha$  is significance level at 95% to be 1.96,  $P$ , the prevalence of VKC taken to be 50% and  $d$ , margin of error at 4%. The calculated sample size, therefore, was found to be 600. Anticipating the response rate of 90%, the sample size of 667 was obtained.

The study was approved by the Research and Publication Committee of the Department of Ophthalmology, School of Medicine, Addis Ababa University. Permission was also obtained from school directors. All school children aged 20 years or less were included. Exclusion criteria were cases with other forms of allergic conjunctivitis such as seasonal allergic conjunctivitis (SAC), atopic keratoconjunctivitis (AKC) and giant papillary conjunctivitis (GPC). Cases with external eye diseases like bacterial or viral conjunctivitis, major traumatic insults to the eye, history of recent ocular surgery (conjunctival, scleral, lacrimal gland) and history of application of herbal medication were also excluded.

The students were clustered in 33 classes with 70-82 students/class. One class was selected from each grade by a stratified random cluster sampling method. All participants were informed about the study aim. Participant students 15 years or older gave verbal consent to be included in the study. For those students under 15 years of age, written consent in Amharic was obtained from parents. The consent was taken home by each participant, signed by one of the parents or guardian and brought back to the investigator before enlisting them.

Physical examinations of the participants were done at the convenience of the school administration. Clinical examination was conducted by the principal investigator for all the selected students. Tarsal conjunctiva and anterior segment examinations of both eyes were done using a handheld slit lamp microscope. At the same site, two trained enumerators took visual acuity of all students diagnosed to have VKC under the supervision of the principal investigator. The enumerators also filled an interviewer applied questionnaire for cases of VKC aged 15 years and above.

For children less than 15 years of age, the questionnaire was translated into Amharic and was sent to be filled by parents at home. The questionnaire included age, sex, place of residence, age of onset of the disease, seasonal variations, associated allergic or atopic illness and family history of VKC or associated allergic conditions. Those students with VKC were given one tube of oxy-tetracycline, hydrocortisone and Polymyxin B Sulphate

(Terra-Cortril) eye suspension to be applied three times daily and referred to the nearby eye clinic, Gar Bet Ledekuman, for follow up. Health education was given on the nature, course and prognosis of the disease.

VKC was diagnosed according to the following operational definitions set initially. There must be intense itching, redness and photophobia in each case. Palpebral VKC involves the upper tarsal conjunctiva with giant papillae (cobble stone) whose diameter is greater than 1 mm. Limbal VKC is characterized by limbal thickening, broadening or opacification, elevated gelatinous excrescences along the limbus and Horner-Trantas dot. Mixed VKC is considered if there were both limbal and palpebral signs.

Data analysis was done using statistical package for social science (SPSS version 15.0). Differences between proportions were compared using chi-square test. Differences between mean values were compared using the student's t-test.

## Results

A total of 792 school children were examined from January 1st 2008 to February 28, 2008 in Butajira Primary School. The age of the children examined ranged from 5 to 19 years (with the average of 10 years and 6 months). Out of the total 792 children examined, 348 (43.9%) were males and 444 (56.1%) females (Table 1). A total of 41 (5.2%) children were found to have VKC of whom 26 (63.4%) were male and 15 (36.6%) female (Table 2). The disease was bilateral in all the cases. The peak age group of VKC was in the range of 11-15 years and the lowest 16-20 years (Table 3).

Table 1: Age and sex distribution of the study population

Age	Sex		Total
	Male	Female	
5-10	169 (21.3%)	229 (28.9%)	398 (50.3%)
11-15	167 (21.1%)	208 (26.3%)	375 (47.3%)
16-20	12 (1.5%)	7 (0.9%)	19 (2.4%)
	348 (43.9%)	444 (56.1%)	792 (100%)

Table 2: Sex distribution of VKC cases

Types of VKC	Sex		Total (%)	X <sup>2</sup>
	Male	Female		
Limbal	15 (1.9%)	9 (1.1%)	24 (3.0%)	P=0.012
Mixed	8 (1.0%)	4 (0.5%)	12 (1.5%)	P=0.451
Palpebral	3 (0.4%)	2 (0.3%)	5 (0.7%)	P=0.481
<b>Total</b>	<b>26 (3.3%)</b>	<b>15 (1.9%)</b>	<b>41 (5.2%)</b>	

Table 3: Age distribution of VKC cases

Types of VKC	Age (years)			Total (%)	X <sup>2</sup>
	5-10	11-15	16-20		
Limbal	10 (1.3%)	13 (1.6%)	1 (0.1%)	24 (3.0%)	P=0.014
Mixed	5 (0.6%)	7 (0.9%)	-	12 (1.5%)	P=0.433
Palpebral	2 (0.3%)	3 (0.4%)	-	5 (0.67%)	P=0.482
<b>Total</b>	<b>17 (2.2%)</b>	<b>23 (2.9%)</b>	<b>1 (0.1%)</b>	<b>41 (5.2%)</b>	

All the three types of VKC namely limbal, palpebral and mixed were seen. The most dominant subtype seen was limbal which consisted of 24 (3.0%) cases. This was followed by the mixed type which constituted of 12 (1.5%) of the cases, and the palpebral form making 5 (0.8%) cases. Corneal complications consisted of superficial punctate epithelial keratitis which was seen with fluorescein staining in 3 (7.3%) of the VKC cases. Major complications like corneal ulcer, cataract, keratoconus and glaucoma were not detected.

The duration of the disease varied from 3 months to 5 years. The average duration was 3 years. And the severity of the symptoms and signs correlated well with the duration of the disease. The peak age of onset of the disease was found to be in the age range of 11–14 years followed by 6–10 years (1.2% and 1.1% respectively). Out of the total 41 cases, male preponderance was in the ratio of 2.2:1. This almost paralleled the findings of the studies carried out in other parts of the world.

The study shows predilection of the disease for exacerbation during the relatively hot season. Eighteen (43.9%) of the children with VKC reported worsening of the symptoms during hot and dry seasons while 6 (14.6%) reported worsening of symptoms during the rainy and cold seasons. Fourteen (34.1%) reported to suffer equally throughout the year. The rest, 3 (7.3%), did not specify a seasonal variation.

The most frequently encountered symptoms in the study was intense itching (100%) followed by redness (87.8%). The commonest sign seen was perilimbal gelatinous infiltrates, 30 (73.2%) followed by cobblestone tarsal papillae in 17 (41.5%) cases (Table 4). The number of recurrences was from 2 to 5 times per year and there was no correlation between the age of the children and frequency of episodes. Visual acuity ranged from 6/6 to 6/12 in all VKC cases.

Table 4: Symptoms and signs of VKC cases

Presenting symptoms and signs	No. of cases (%)
<b>Symptoms</b>	
Itching	41 (100%)
Redness	36 (87.8%)
Tearing	31 (75.6%)
Photophobia	25 (61%)
<b>Signs</b>	
Cobblestone papillae	17 (41.5%)
Horner Tranta's dots	6 (14.6%)
Perilimbal gelatinous infiltration	30 (73.2%)

Patients with VKC often give a history of allergy or of atopic diseases such as allergic rhinitis, asthma or hay

fever, but in this study, co-existing non-ocular allergic conditions could be detected in only 5 (12.2%) of the total 41 VKC cases (Table 5).

Table 5: Association between VKC and atopic diseases

Atopic disease	VKC cases (n=41)	
Bronchial asthma	4 (9.8%)	P=0.433
Rhinitis	1 (2.4%)	
Dermatitis	-	
<b>Total</b>	<b>5 (12.2%)</b>	

### Discussion

The prevalence of VKC, 5.2%, seen confirms that it is not a rare disease among individuals aged 20 years or less in the study area. The study from Chad also reported a prevalence of 5% (8). Interestingly, the disease was more frequent among males than females and this was similar to the study done in Uganda (9). VKC was the leading cause of outpatient morbidity among Palestinians in East Jerusalem, accounting for 10% of 74,000 annual outpatient visits to the ophthalmic clinic in Israel (10) which is a higher prevalence as compared to our study. This may be because the Palestinian study was a clinical one while ours was a community study. In addition, environmental and hereditary factors may contribute to the difference.

In one epidemiological report from Northern Europe, the prevalence of VKC was clearly augmented by the immigration of children from African or Asian origin indicating a relatively higher prevalence in African and Asian countries (11). This suggests that both genetic and environmental factors are implicated in the incidence of the disease. Until now, however, genetic studies confirming a relationship of VKC to a particular genotype have not been performed.

Limbal VKC is a well recognized form of the disease in patients studied in the Middle East and black Africa (12). The limbal form of VKC was also found more frequently in the black population as recently reported from Nigeria (13). In our patients, 58.5% had the limbal form of the disease. In the Nigerian case of 109 patients, only 5% had a positive family history of allergy. In our study, 12.2% of the cases had family allergy, but the association was not significant ( $p=0.433$ ). Similarly limbal VKC was the sixth most frequent diagnoses in Cameroon where the disease was rarely associated with other allergic manifestations (14).

This study demonstrated that VKC is more frequent among children 6-20 years of age. A low association of VKC with atopic disease has been seen in this study. Early diagnosis of such ocular allergies facilitates prompt treatment, elimination of symptoms and prevention of vision debilitation. Finally, the findings of this study may help in stimulating the conduct of further population based studies.

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