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VERNAL KERATOCONJUNCTIVITIS IN SCHOOL CHILDREN IN NORTH BANGALORE: AN EPIDEMIOLOGICAL AND CLINICAL EVALUATION

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ABSTRACT: OBJECTIVE: To describe the demographic profile, clinical presentation and health seeking behaviour in children with vernal keratoconjunctivitis in north Bangalore. **MATERIALS AND METHODS:** Cross sectional survey of school children conducted between Feb 2014 to May 2014. Children were interviewed using a questionnaire on Vernal keratoconjunctivitis related symptoms. Children received a full eye examination including vision using snellen chart, slit lamp examination and fundus examination where required. **RESULTS:** A total of 2500 children screened, 450 children had Vernal keratoconjunctivitis related symptoms and signs. Mean age at presentation was 9.1yrs with male predominance of children. Ocular itching was the predominant symptom (88%). Majority of the patients had mixed form of Vernal keratoconjunctivitis (62%). Medical care for eye problems was sought in only 22% of the patients. Vernal keratoconjunctivitis related complications such as corneal scarring (9%), peripheral corneal neovascularization (8%) and limbal stem cell deficiency (2%) were seen. **CONCLUSION:** This survey of prevalence and clinical pattern of VKC shows higher prevalence rate in this area as compared to other tropical countries but the clinical pattern of VKC seen is essentially similar to that seen in other tropical countries. Long term follow up is required to ascertain the risk factors for increasing prevalence rate and the need for better primary eye care and accessibility of eye care to the population in the community.

KEYWORDS: Vernal Keratoconjunctivitis, Allergic Eye disease, Papillae, Ocular Itching.

ABBREVIATIONS: VKC: vernal keratoconjunctivitis.

INTRODUCTION: Vernal keratoconjunctivitis (VKC) is a chronic, bilateral allergic disease of the eye that typically affects young individuals with male preponderance.^{1,2} Greater prevalence of VKC is seen in the regions with hot and dry climate, and higher load of airborne allergens.

VKC differs from other ocular allergies for age of onset, clinical symptoms and scarce response to anti-allergic treatment.³ Typical symptoms are ocular itching, watering, foreign body sensation and mucoid discharge.⁴ The disease may involve upper tarsal or limbal conjunctiva characterised by papillary hypertrophy of the palpebral and/or the limbal conjunctiva giving a cobble stone appearance.

These signs are associated with bulbar or perilimbal conjunctival pigmentation, bulbar hyperemia and corneal changes like superficial punctate keratopathy, corneal erosions and scarring. The disease has a good prognosis with spontaneous resolution after puberty, few sight-threatening complications due to corneal damage can occur. Patients with VKC experience significant morbidity, which affects the quality of life.

Many hospital based studies have explained the clinical characteristics of VKC but these studies are prone to referral bias.⁵

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So we conducted a population based study to know the spectrum of disease in the community in this part of Bangalore. We describe the prevalence, the clinical pattern of VKC and the accessibility of eye care to the population in the community.

MATERIALS AND METHODS: The study was performed during the dry season of Feb 2014 to May 2014. The study was approved by our Institutional Review Board. The sample size calculation, questionnaire and examination methodology were based on an earlier pilot study. 2 schools located in this area were randomly selected from the district school lists. Children or their parents or guardians were interviewed using a questionnaire based on symptoms related to VKC. The following data was retrieved from the questionnaire: Age, gender, personal and family allergies, age of onset of the disease, presenting symptoms, duration of disease, seasonal variation (seasonal/perennial), data on health-seeking behavior and details of treatment for VKC if any. Symptoms were graded as mild, moderate and severe by frequency of symptoms in a day and its influence on daily activities.

All children underwent a full eye examination, including visual acuity measurement in each eye separately using a snellen chart, with and without pinhole. Anterior segments were examined with a portable slit lamp at the school premises. Students with VKC related symptoms on questionnaire and/or with palpebral papillae perilimbal pigmentation/limbal hypertrophy were referred to the base hospital for further evaluation. For these students autokeratometry was performed and anterior segments were examined with a slit lamp examination. Dilated funduscopy was performed if vision was not improving with refraction.

We defined VKC on the basis of history and the presence of conjunctival papillae 1mm diameter over the upper tarsal plate and/or limbal hypertrophy. Active VKC was diagnosed based on the complaint of ocular itching in the presence of upper tarsal conjunctival papillae and/or limbal hypertrophy with perilimbal pigmentation. The quiescent form was diagnosed based on a previous history of ocular itching and inactive upper tarsal conjunctival papillae and/or scarring.

The palpebral form included patients with characteristic signs of cobble stone papillae of >1mm on the upper tarsal conjunctiva with no limbal infiltration, while the limbal form consisted of papillae of <1mm on the upper tarsal conjunctiva with limbal infiltration and mixed form had features of both palpebral and limbal types of VKC.

Based on the severity of symptoms at presentation and presence of clinical signs of VKC i.e. bulbar hyperemia, conjunctival secretions, papillary reaction, trantas spots, corneal involvement at presentation, the severity of disease was graded as per the method described by Bonini et al.⁶ Grade 0,1,2 was classified as mild and Grade 3, 4, 5 as severe VKC.

Astigmatism of >2 diopters was considered clinically significant. A diagnosis of keratoconus was made on clinical signs and irregular astigmatism on keratometry. Limbal stem deficiency was made on presence of peripheral corneal neovascularization along with conjunctivalization.

RESULTS: A total of 2500 students in the age group of 6years to 16years were screened between Feb 2014 to May 2014, 450 of whom had VKC. The mean age of onset of symptoms was 9.1 years $\pm$ 6.63 years ($\pm$ Standard Deviation). There were 396 males and 54 females. The male (M) to female (F) ratio was 7.3:1 (Table 1). Active VKC at presentation was seen in 279(62%) pts. 6.2% had either a positive family or personal history of allergic disorders of which respiratory tract related allergies (bronchitis, rhinitis, asthma) were common.

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The reported symptoms were itching (90%), redness (82%), watering/mucoid discharge (60%) and FB sensation (52%) (Fig 1). Ocular itching was the predominant symptom. The presenting signs were palpebral papillae (87%), limbal hypertrophy (67%), bulbar hyperemia (22%) and perilimbal pigmentation (16%). We had isolated palpebral form in 17.5%, limbal form in 8.5% of patients and majority of patients had mixed form of disease. The clinical grading based on severity of disease is shown in (Table 2). Severe form of VKC was seen in 24% of patients.

According to WHO classification of visual handicap only 3 pts. had uncorrected low vision from VKC induced corneal astigmatism.

The commonest ocular complication due to VKC was peripheral neovascularization seen in 12pts followed by corneal scarring (8pts), limbal stem cell deficiency (8pts) and keratoconus (4pts).

Medical care for eye problems was sought in only 22% of patients and of those attending medical care only 12% had a follow up of once in 3 months.

AGE	MALE(n)	FEMALE(n)	Total
6-18	43	16	59 (13%)
9-11	169	20	189 (14%)
12-14	111	15	126 (28%)
15-16	73	3	76 (17%)
Total	396	54	

Table 1: Demographic Profile

Fig.1: Distribution of Symptoms

Fig. 2: Distribution of Signs

SEVERITY		Number (%)
0	MILD	171 (38)
1		90 (20)
2		81 (18)
3	SEVERE	72 (16)
4		9 (2)
5		27 (6)

Table 2: Severity grading of disease as per Bonini et al

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DISCUSSION: Vernal keratoconjunctivitis is a common eye disease in tropical countries, but the majority of studies have been hospital based, which are prone to selection bias, because only children who are from educated and affordable families in urban areas are more likely to attend the eye department.

Our study is a cross sectional survey of school children conducted in north Bangalore, thus confirming our study to be unbiased. Our study showed that VKC in this part of Indian subcontinent is essentially similar to the demographic profile and clinical presentation described in other tropical countries.⁵ The study was undertaken during the second half of the long dry season when we believe most children with VKC in this region would have had active disease i.e., between February 2014 to May 2014.

The study included 2500 school children, among whom 450 of them presented with symptoms and signs suggestive of VKC. Children in the age group of 6 to 16 years were screened. The mean age of the child at the time of presentation was 9.1 ± 5.3 years. Thus confirming that VKC is a disease of childhood and usually resolves at puberty. Saboo US et al.⁵ had the mean age of presentation as 12 years in their hospital based study.

We had a higher prevalence rate of 18% and higher active VKC 62% in our study because we conducted the study during the dry season when VKC was at its peak.

The male to female ratio in our study was 7.3:1 showing a very high male preponderance. M: F ratio in our study is slightly higher than those reported from other parts of the world, but confirms the global pattern of male preponderance of VKC. Saboo US et al.⁵ reported a M: F of 6.4:1 in their study. Leonardi and co-workers in two separate observation including a multicentric study from Italy found M:F ratio between 3.3 and 3.5.^{7,8}

The children presented with classical symptoms of VKC like itching of eyes, redness, watering and foreign body sensation; of which 80% of children had ocular itching as their predominant symptom. Similar results was observed by De Smedt et al.⁴ and Saboo US et al.⁵ in their studies.

Personal or family history of allergy was noted in 6.2% of children. Hospital based studies undertaken in Europe, Asia and Africa give conflicting results in relation to VKC and atopy (Asthma, eczema).

VKC has seasonal exacerbations. The seasonal pattern was seen in 65% of patients and chronic perennial disease was seen in 35% of patients in our study. Saboo. U.S et al.⁵ have reported a similar pattern where the chronic perennial form was seen in 36% of the patients. In Europe and Asia, exacerbations of VKC generally follow a seasonal pattern. Khan MD et al and Chenge B et al.^{9,10} have reported findings that further confirm our results.

The prevalence of subtypes of VKC is different in various parts of the world. The multi centric study from Italy.⁸ reported predominance of limbal presentation (53.8%) whereas Ukponmwan reported 82.6% cases with palpebral presentation in Nigeria.¹¹ De Smedt et al in a School Survey on VKC in central Africa reported predominance of limbal presentation (98.4%), In contrast, majority of our cases (74.0%) had a mixed presentation comprising of both limbal as well as palpebral involvement, followed by isolated palpebral involvement in 17.5% and limbal involvement in 8.4% of the patients. This pattern was similar to the Saboo.U.S et al.⁵ study in south India. Perilimbal conjunctival pigmentation is a new clinical sign described in VKC.^{12,13,14} In this series, perilimbal conjunctival pigmentation was documented in 16% of the patients. Rao et al., described perilimbal pigmentation as a consistent finding in VKC.

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VKC can cause various corneal complications leading to decreased vision. Bonini et al.³ noted permanent visual loss in 6% of patients due to corneal complications and scarring. We had a total of 32(7.1%) complications of which 8 patients had corneal scarring, 4 had keratoconus diagnosed clinically, 8 patients had limbal stem cell deficiency and 12 had peripheral corneal neovascularisation. Some hospital based studies in tropical countries have shown corneal complications develop in 15% to 30% of patients presenting to a hospital, our population based study show a lower incidence of complications (7%). This may be due to reduction in selection bias. However the incidence of mild corneal complications could have been underestimated in our study since fluorescein staining and orbscan was not done.

Other series have reported a very low incidence of keratoconus from 0.5 to 2.1%. We noted moderate to severe vision loss of <20/50 in 9.12% of our patients, of which 3 had visual acuity of <20/200. Peripheral corneal neovascularization is a known finding in VKC. Saboo U S et al.⁵ have reported isolated peripheral corneal neovascularization in 7.26% of patients and LSCD in 1.2% patients. These findings could be due to chronic persistent inflammation leading to destruction of the limbal stem cells resulting in conjunctivalization of the cornea.

Regarding the health seeking behaviour of patients, medical care for eye problems was sought in only 22% of the patients and of those taking medical care only 12% had a regular follow up of once in 3 months. This highlights the need for improving health care seeking behavior by various methods including increasing awareness of disease and treatment options by publicizing in schools, school screening programmes.

The strength of this study is that it presents the prevalence and the unmet need for diagnosis and treatment of VKC in this part of north Bangalore. Short comings of our study was that 2 schools may not be representative of the community and there was no follow up study.

Image. 1: Perilimbal pigmentation

Image. 2: Bulbar hyperemia

Image. 3: Papillary hypertrophy

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