IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 16, Issue 9 Ver. V (Sep. 2017), PP 09-13
www.iosrjournals.org

Correlation between Vernal Keratoconjunctivitis and Intestinal Parasitic Infestation in children from North-East India

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Abstract: *Vernal keratoconjunctivitis (VKC) is a chronic recurrent bilateral allergic inflammation of the conjunctiva characterized by intermittent exacerbations, which are seasonal in timing during which keratitis may develop. It typically affects children in hot, humid regions, and with higher load of airborne allergens. It is a common ocular surface disorder in the Mediterranean region, central Africa, India, and South America. There are conflicting reports on the effect of parasitic intestinal load in the pathogenesis of atopy. Anti-parasitic treatment was reported to improve the course of VKC. In this case control study, 102 cases and 102 controls were examined who were below 18 years of age. Clinical diagnosis was established and stool examination for parasites was done. Children from 4 to 9 years of age were mainly affected and the prevalence of VKC was maximum among children with illiterate parents. We did not find any association of the presence of intestinal parasites and VKC as reported in some studies. A personal history of asthma and dust were recognized as risk factors. Intestinal parasitic infestation did not play a role in VKC, and we can conclude that treating intestinal parasites will probably not help in the better prognosis of VKC.*

Keywords: *asthma, children, intestinal parasites, vernal keratoconjunctivitis*

Date of Submission: 02 -09-2017 Date of acceptance: 20-09-2017

I. Introduction

Vernal keratoconjunctivitis (VKC) is a chronic recurrent bilateral allergic inflammation of the conjunctiva, which is accompanied by seasonal exacerbations during which keratitis may develop[1]. It typically affects children and adolescents with male preponderance. Greater prevalence of VKC is seen in hot, humid regions, and higher load of airborne allergens. It is a common ocular surface disorder in the Mediterranean region, central Africa, India, and South America[2,3,4,5,6,7,8]. The mast cell mediated ocular surface inflammation results in itching, tearing, redness, photophobia, lid swelling and conjunctival chemosis during the acute phase. Chronic surface inflammation due to a classic late-phase response with associated eosinophilia and neutrophilia develops in the more severe forms of disease. These patients often have severe symptoms and ocular surface damage and remodeling can lead to visual loss due to corneal scarring and limbal deficiency[9]. The pathogenesis of VKC is complex and involves environmental, endocrine, racial, and genetic factors[10,11]. Many studies of allergic diseases show a rural environment to be protective but the mechanism of this effect is unknown[12,13]. There are conflicting reports on the effect of parasitic intestinal load in the pathogenesis of atopy[14,15], and whether helminthiasis is protective[16,17] or a risk factor for allergy[18]. Anti-parasitic treatment was reported to improve the course of VKC in two case series[19,20], and a hospital-based study in Nigeria showed that patients with VKC had a larger intestinal parasite load in their stools than unaffected controls[21]. These findings suggest that parasites play a role in the pathogenesis of VKC and that treatment of parasitic infestation may control VKC. This study is aimed to examine the association between VKC and parasitic intestinal worm infestation.

II. Methods And Materials

It is a case control study conducted on 102 cases and 102 controls in the outpatient department of the Dept. of Ophthalmology, Silchar Medical College and Hospital, Assam from April to August 2016.Demographic and clinical data was collected in a data collection form. The case definition for VKC used in this study was intense itching, brownish discoloration of conjunctiva and characteristic papillary hypertrophy of the palpebral or limbal conjunctiva, edema, stringy discharge, photophobia and seasonal periodicity. The presence of itching in addition to a minimum of two other symptoms was regarded as a case[21].

The exclusion criterion for "cases" was any patient with VKC who had been receiving any form of treatment for intestinal parasites in the past 3 months. The definition for "controls" was children without above features of VKC. All children aged <18 years attending the eye department for the first time between April and August 2016 were screened and categorized and registered either as cases or controls, as the case may be. Informed consent was obtained from children through their mothers/guardians after careful explanation. Respondents were given the choice of abstention from participating without any fear of victimization. The following data was collected from the patients : Age, gender, personal and family allergies, age of onset of the disease, presenting symptoms, and visual acuity, slit lamp examination for clinical signs, intraocular pressure, fundus examination, details of treatment (medical and surgical) and complications. The bulbar and tarsal conjunctiva, and the cornea and limbus were evaluated, and the severity of involvement was graded clinically. It is usually possible to classify the disease severity into mild, moderate, severe and blinding categories (Table-01)[9]. Patients may have findings that do not fall into the same severity. In these instances the corneal findings were given more importance over conjunctival findings.

Table-01: Grading of Vernal Keratoconjunctivitis

	Mild	**Moderate**	**Severe**	**Blinding**
Bulbar Conjunctiva	Congestion	Congestion	Thickening Horner-Trantas Dots	Granulomas
Tarsal Conjunctiva	Micro Papillae	Macro(<1mm) Papillae	Giant(>1mm) Papillae	Mega Cobblestones
Cornea	--	Microerosions	Macroerosions	Shield Ulcer
Limbus	--	Focal($<180^0$) Inflammation	Diffuse($>180^0$) Inflammation	Limabal Deficiency

Both cases and controls had their stools examined for intestinal parasites by a qualified microbiologist. Stool examination was classified as positive when parasites or ova were seen in stool, either macroscopically or with the aid of the microscope. The type of parasite seen was identified and noted. Data of each patient was recorded in the data collection form. Approval for conducting the study was secured from the Ethical Committee of Silchar Medical College and Hospital, Assam. (Sample size calculation: Precision = 5.00%, Prevalence = 5.00 %, Population size = infinite, Confidence Interval = 95%. Estimated sample size = 73)

III. Results And Observations

A total of 102 cases and 102 controls, aged below 18 years were examined.
Maximum number of patients (53.9%) belonged to the 4-9 years age group. 77.4% of the patients were below 12 years of age. There is Male preponderance with a Male:Female ratio of 1.5:1.0. (Table 01)

TABLE 01 :		
AGE (YEARS)	**CASE**	**CONTROL**
0 – 3	11 (10.8%)	12
4 – 6	19 (18.6%)	21
7 – 9	36 (35.3%)	28
10 - 12	13 (12.7%)	15
13 - 15	14 (13.7%)	15
16 - 18	09 (8.8%)	11
GENDER		
MALES	61 (59.8%)	57
FEMALES	41 (40.2%)	45

The socio-economic status based distribution of these patients showed that 64 patients (62.7%) belonged to lower socioeconomic group, while 38 patients (37.3%) belonged to middle and upper socioeconomic group. The criteria for lower, middle and upper socioeconomic status were based on the criteria provided by modified Kuppuswamy socioeconomic status scale[22].

The prevalence of VKC was maximum among children whose parents were illiterate (41.2%). (Table 02)

Table 02 :		
Socioeconomic Status	**Case**	**Control**
Lower	64 (62.7%)	58
Middle	26 (25.5%)	27
Upper	12 (11.8%)	17
Education Of Parent	**Case**	**Control**
Illiterate	42 (41.2%)	39
Primary	23 (22.5%)	26
Secondary	21 (20.6%)	23
Professional	16 (15.7%)	14

In this study 9 patients (8.8%) had a positive personal history of allergic disorders, of which 5 patients (4.9%, P= 0.03) had personal history of asthma and 4 patients (3.9%, P=0.646) of eczema.Exposure to dust which is a potent allergen in VKC was maximum in these patients (67.6%, P= 0.002). Exposure to other potent allergens such as animals and food was also present but was not of statistical importance. (Table 03)

Table 03 :		
	Case	**Control**
Asthma	5 (4.9%)	2
Eczema	4 (3.9%)	4
Allergen Exposure	**Case**	**Control**
Dust	69 (67.6%)	54
Animals	19 (18.6%)	17
Food	23 (22.5%)	22
Others	0	0

Moderate severity of VKC (47%) was mainly found in patients of this study. (Table 04)
The common reported symptoms were itching (100%), redness of eye (63%), and watery discharge (59%), photophobia (21%). The commonest signs were palpebral papillae (61%) and limbal thickening (49%). Conjunctival pigmentation was present in 27% of patients.

Table 04 :	
Type Of Vkc	**Case**
Mild	36 (35.4%)
Moderate	48 (47%)
Severe	18 (17.6%)
Blinding	0

23.5% of the cases (P =0.628) and 26.5% patients of the control group tested positive for presence of parasite/ova in their stool sample. 16 cases had eggs, 3 cases had trophozoites and 5 cases had cysts in their stool sample. The presence of parasites/ova in the stool samples of the cases as well as the controls were nearly of equal numbers (P=0.628, statistically not significant). Parasitic ova were mainly present in the samples.

(Table 05) Ascaris lumbricoides was the most prevalent parasite among the cases as well as the control group, followed by Hymenolepis nana.

Table 05 :		
	Case	**Control**
Eggs	16	18
Trophozoites	3	2
Cysts	5	7
Total	24 (23.5%)	27 (26.5%)
Type Of Parasite	**Case**	**Control**
Hook Worm	3	3
Ascaris Lumbricoides	7	8
Hymenolepis Nana	6	7
Giardia Lamblia	3	4
E. Histolytica	5	5

IV. Discussion

In our study, 102 cases and 102 controls were examined who were below 18 years of age. Children from 4 to 9 years of age were mainly affected with VKC making 53.9% of the cases. 77.4% cases were below 12 years of age. VKC is believed to be a disease of childhood and usually resolves at puberty. A study from Nigeria showed that peak age was from 4-6years and mostly children from 4-12 years of age suffered from VKC[21]. 61 males and 41 females were found as cases with a male preponderance and male:female ratio of 1.5:1. Some Europian studies have found the M:F ratio to be 3:1[4,5], which did not match with ours, but interestingly workers from Africa have reported it to be nearly same as ours[8].

62.7% patients belonged to the lower socioeconomic group while 37.3% belonged to middle and upper socioeconomic group. Most of the other studies[23,24] show a higher prevalence of VKC in upper socioeconomic groups which was not the same in our study probably due to the attendance of majority of poor patients in our government hospital though a study from Andhra Pradesh, India showed similar findings as ours[25]. The prevalence of VKC was maximum among children whose parents were illiterate (41.2%). This may be attributed to the fact that illiterate parents find it difficult to understand the early symptoms of VKC of their children and report late to hospitals with more severe symptoms.

In this study 9 patients (8.8%) presented with a positive personal history of allergic disorders, 5 patients (4.9%, P= 0.03) had personal history of asthma and 4 patients (3.9%, P=0.646) of eczema. There is a different picture seen in the temperate zones as reported by Lambiase et al., and Bonini et al., who found associated systemic allergies in 41.5-48.7% patients in different series[3,5]. Ujwala S Saboo et al reported that allergic conditions were present in only 4.9% in their study[24]. Stefan et al and Resnikoff et al found asthma as an important systemic allergic condition associated with VKC[19,23]. 67.6% cases of VKC exhibited a history of exposure to dust which is a potent allergen in VKC. Exposure to other potent allergens such as animals and food was also present but was not of statistical importance. Stefan De Smedt et al and Dahan E et al also found that dust played an important risk factor in VKC[10,23].Moderate severity of VKC (47%) was mainly found in patients of this study. 47% cases were of moderate type of VKC comprising of congested bulbar conjunctiva, tarsal conjunctival macro papillae, corneal Microerosions and focal limbal involvement (<180°) but no Horner-Trantas dots. Ujwala et al and Prasada Rao et al also reported that their majority of cases consisted of papillae and limbal involvement[24,25].

The common reported symptoms were itching (100%), redness of eye (63%), and watery discharge (59%), photophobia (21%). The commonest signs were palpebral papillae (61%) and limbal thickening (49%). Conjunctival pigmentation was present in 27% of patients. Ujwala et al in her study found a higher percentage of patients with redness of eyes, watery discharge, palpebral papillae and limbal thickening, but noted lesser conjunctival pigmentation[24]. 23.5% of the cases (P =0.628) and 26.5% patients of the control group tested positive for presence of parasite/ova in their stool sample.16 cases had eggs, 3 cases had trophozoites and 5 cases had cysts in their stool sample. The presence of parasites/ova in the stool samples of the cases as well as the controls were nearly of equal numbers (P=0.628, statistically not significant). Parasitic ova were mainly present in the samples. We did not find any association of the presence of intestinal parasites and VKC like

Stefan et al who also could not find any concrete evidence though Ajaiyeoba et al reported that children with worm infestation stand a high risk of developing VKC in African children[21]. Ascaris lumbricoides was the most prevalent parasite among the cases as well as the control group, followed by Hymenolepis nana which corresponds to the reports of Rajapandiyan et al who carried out a study on prevalence of intestinal parasitic infection in North East Assam[26].

V. Conclusion

VKC is an ocular allergic condition mainly affecting children below puberty. Low socioeconomic group, a personal history of asthma and dust were recognized as risk factors for VKC. Intestinal parasitic infestation did not play a role in VKC, and we can conclude that treating intestinal parasites will probably not help in the better prognosis of VKC, though further detailed study is needed to establish the fact.

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*Dr.Abhisek Mondal. "Correlation between Vernal Keratoconjunctivitis and Intestinal Parasitic Infestation in children from North-East India." IOSR Journal of Dental and Medical Sciences (IOSR-JDMS) 16.9 (2017): 09-13