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Original Research Article

PREVALENCE OF DRY EYE DISEASE IN PATIENTS WITH ALLERGIC CONJUNCTIVITIS

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Abstract

Objectives: The present study was to evaluate the prevalence of dry eye disease in patients with different type of allergic conjunctivitis.

Methods: A detailed history of demographic characteristics, onset, duration, and progression of ocular symptoms, past and personal history, treatment history and clinical findings were taken to all allergic conjunctivitis patients. The patients of AC were divided into SAC (seasonal allergic conjunctivitis), PAC (perennial allergic conjunctivitis), and VKC (vernal keratoconjunctivitis). Diagnosis of dry eye diseases (DED) in all the diagnosed cases of AC was made based on Ocular Surface Disease Index (OSDI) questionnaire, TFBUT, and Schirmer's test.

Results: A total of 100 diagnosed cases of AC was enrolled. Mean age of male and female cases were 29.76 ± 18.56 years and 17.87 ± 12.32 years respectively. (55%) patients had Seasonal Allergic Conjunctivitis (SAC). 24% patients had Perennial Allergic Conjunctivitis (PAC). And 21% cases had Vernal Keratoconjunctivitis (VKC). Mild, moderate, and severe cases of allergic conjunctivitis were 24%, 18% and 29% respectively. Mean of OSDI score of PAC cases (27.28±13.45) was higher as compared to SAC (24.76± 11.98) and VKC cases (12.56±7.42). Similarly, mean of TFBUT score was higher in SAC cases (16.12± 6.54) as compared to PAC (14.45±7.21) and VKC cases (13.87±5.67). And the mean of Schirmers score as much more higher in VKC cases (23.12±12.76) as compared to PAC (15.54±9.76) and SAC cases (11.86± 6.47).

Conclusions: Male population were preponderance to allergic conjunctivitis. Prevalence of dry eye disease is more associated with PAC than SAC and VKC. Hence, we should properly examine allergic conjunctivitis eye for early diagnosis and prompt treatment of dry eye disease.

Key words: Allergic conjunctivitis, Drye eye disease, Prevalence

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INTRODUCTION

Ocular allergy does not cause major tissue damage, but it deteriorates patient's quality of life grossly and its prevalence in general population might go up to 30% [1]. Certain factors such as industrialization, air pollution, and global climate change and changes in personal hygiene contribute to individuals contact with the allergens and shapes their reaction to such [2]. Contact with allergens trigger an immune response which disrupts the corneal and conjunctival cell stability, especially the stability of goblet cells [3. Environmental factors and cell loss due to inflammation impair tear components, which may lead to dry eye disease [4].

Allergic conjunctivitis (AC) and dry eye syndrome (DES) are 2 of the most common anterior inflammatory disorders of the eye. These disorders have been regarded to be the epidemics of the 21st century [5]. Depending on the study, the prevalence of dry eyes has been reported to range from 5% to 35% of the population [6].

Seasonal allergic conjunctivitis (SAC) and perennial allergic conjunctivitis (PAC) are the most common forms of allergic conjunctivitis (AC) in the community. The symptoms of PAC and SAC are generally moderate in intensity but recur consistently and frequently [7]. The fundamental pathophysiology of DE and AC is rooted in the immunological alterations that result in inflammation of the ocular surface, and their shared pathogenesis paves the way to negative synergies that aggravate the other diseases [8, 9]. Previous reports have suggested that the reduced tear volume caused by DE hinders the removal of allergenic antigens on the ocular surface in patients with hay fever, which exacerbates AC associated with hay fever [10,11]. Similarly, AC has been shown to disrupt the tear film stability, contributing to worse outcomes in patients with DE [10,11]. These negative interactions between the two diseases necessitate bidirectional diagnosis and management to prevent chronic damage to the ocular surface. Objectives of our study was to evaluate the prevalence of dry eye disease in patients with allergic conjunctivitis.

MATERIAL & METHODS

The present study was conducted in the Department of Ophthalmology, Nalanda Medical College & Hospital, Patna during a period from October 2023 to February 2024.
A total of 100 patients with age group 5 to 50 years of clinically diagnosed cases of allergic conjunctivitis with a chief complaint of itchiness in eyes were enrolled in the present study

Exclusion criteria:

Patients with a history of contact lens wear, refractive surgery/any ocular surgery within last 6 months, ocular trauma, and any corneal pathology were excluded. And patients who had suffered from trachoma were smokers, were on topical antiglaucoma medications, or had systemic diseases like diabetes, collagen vascular disease, hypertension, and patients on immunosuppressants were also excluded from the study.

Procedure:

On the basis of Documento dE Consenso sobre Conjuntivitis Alérgica criteria, the patients of AC were categorized into mild, moderate, or severe [12]. A detailed history of demographic characteristics, onset, duration, and progression of ocular symptoms, past and personal history, treatment history and clinical findings were taken to all allergic conjunctivitis patients., The patients of AC were divided into SAC (seasonal allergic conjunctivitis), PAC (perennial allergic conjunctivitis), and VKC (vernal keratoconjunctivitis). The diagnosis of dry eye

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disease (DED) in all the diagnosed cases of AC was made based on Ocular Surface Disease Index (OSDI) questionnaire, [12] TFBUT [13], and Schirmer's test [14]. OSDI questionnaire was presented to all 100 patients of AC. It is a prevalidated questionnaire in English which includes 12 questions about the respondent' s past week's experience with the ocular symptoms, vision-related function, and environmental triggers, with each question given a score ranging from 0 (none of the time) to 4 (all of the time). The total OSDI score ranges from 0 to 100. A score of ≤12 is classified as normal, 13–22 as mild, 23–32 as moderate, and ≥33 as severe DED respectively. Schirmer's test using a standard 5 × 35 mm strip of Whatman-41 filter paper at normal room temperature was performed on all those with an OSDI score of >12. For Schirmer's test, a value of <10mm was considered abnormal. TFBUT test was performed to assess the stability of tear film. The test was repeated thrice, and the mean value was calculated. A value on TBUT of <10 s was considered abnormal (5–10 s considered marginal and <5 considered low).

STATISTICAL ANALYSIS

Data was analysed with the help of SPSS software. Mean and standard deviations were observed. P- value was taken less than or equal to 0.05 for significant differences ($p \leq 0.05$).

RESULTS

A total of 100 allergic conjunctivitis patients with age group 5 to 50 years were enrolled in the present study. Mean age of male and female cases were 29.76 ± 18.56 years and 17.87 ± 12.32 years respectively. It was statistically significant differences ($p<0.0001$). Among all AC cases, mean age of patients was 24.34 ± 14.67 years. 61% cases were males and 39% cases were females.

Table.1. Age wise distribution of AC patients

	Male (mean ± S.D.)	Female (mean ± S.D.)	P-value
Age	17.87 ± 12.32	29.76 ± 18.56	<0.0001

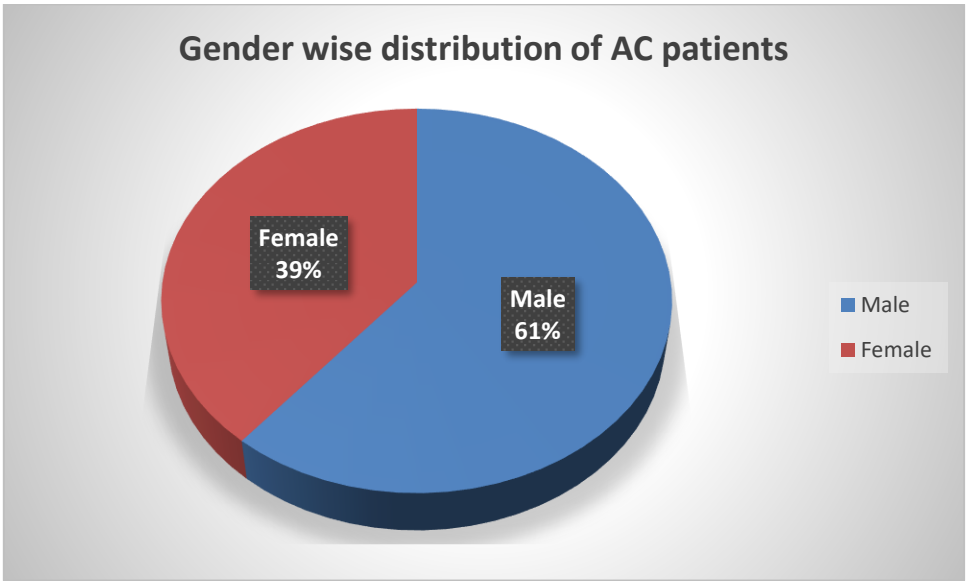

Figure.1. Gender wise distribution of AC patients

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Out of 100 allergic conjunctivitis patients, most of the cases (55%) had Seasonal Allergic Conjunctivitis (SAC). 24% patients had Perennial Allergic Conjunctivitis (PAC). And 21% cases had Vernal Keratoconjunctivitis (VKC).

Table.2. Types of allergic conjunctivitis

Allergic conjunctivitis	Number of subjects (N=100)	Percentage
Perennial allergic conjunctivitis (PAC)	24	100%
Seasonal allergic conjunctivitis (SAC)	55	55%
Vernal keratoconjunctivitis (VKC)	21	21%

In the present study, out of 24 cases of PAC, most of the cases 14(70.83%) had >32 OSDI score. out of 55 SAC cases, 13(23.64%) cases had >32 OSDI score. 11(20%) cases had 23-32 OSDI score. 18(32.73%) and 13(23.64%) cases had 13-22 and 0-12 OSDI score respectively. out of 21 VKC cases, most of the cases 11(52.39%) cases had 0-12 OSDI score. 6(28.57%) and 4(19.05%) cases had 13-22 and 23-32 OSDI score respectively. According to this score (table 3), mild, moderate, and severe cases of allergic conjunctivitis were 24%, 18% and 29% respectively.

Table.3. The distribution of OSDI scores in various subsets of allergic conjunctivitis

OSDI	No of cases of PAC	No of cases of SAC	No of cases of VKC	Total
>32	14(70.83%)	15(27.27%)	0	29(29%)
23-32	3(8.33%)	11(20%)	4(19.05%)	18(18%)
13-22	2(8.33%)	16(29.09%)	6(28.57%)	24(24%)
0-12	5(12.5%)	13(23.64%)	11(52.39%)	29(29%)
Total	24(100%)	55(100%)	21(100%)	100(100%)

In the present study, out of 24 PAC patients, TFBUT score of most of the cases 14(58.33%) had >10 mm. 9(37.5%) cases had 5-10 mm TFBUT score. only 1(4.17%) case had <5mm TFBUT score. out of 55 SAC cases, most of the cases 35(63.64%) had >10 mm TFBUT score. 11(20%) and 9(16.36%) case had 5-10 mm and <5 mm TFBUT score respectively. Out 21 VKC cases, most of the cases 16(76.19%) had also >10mm TFBUT score. 4(19.05%) cases had 5-10 mm. And only 1(4.76%) case had <5 mm TFBUT score. According to TFBUT, rate of prevalence of dry eye was 35%.

Table.6. Distribution of DED among AC based on TFBUT score.

TFBUT score	No of cases of PAC	No of cases of SAC	No of cases of VKC	Total
>10 mm	14(58.33%)	35(63.64%)	16(76.19%)	65(65%)
5-10 mm	9(37.5%)	11(20%)	4(19.05%)	24(24%)
<5 mm	1(4.17%)	9(16.36%)	1(4.76%)	11(11%)
Total	24(100%)	55(100%)	21(100%)	100(100%)

On the basis of Schirmers test, out of 24 PAC cases, most of the cases 12(50%) had >10mm Schirmers test value. 11(45.83%) case had 6-10 mm value. And only 1(4.17%) case had 0-5 mm Schirmers test value. Out of 55 cases of SAC, most of the cases 33(60%) had >10 mm Schirmers test value. 20(36.36%) cases had had 6-10 mm. And only 2(3.64%) cases had 0-5

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mm Schirmers test value. Out of 21 cases of VKC, most of the cases 18(85.71%) had >10 mm Schirmers test value. 2(9.52%) cases had 5-10 mm. and only 1(4.76%) case had 0-5 mm Schirmers test value. According to this table 6, rate of prevalence of dry eye disease was 37%.

Table.7. Distribution of DED among AC based on Schirmers test.

Schirmers test	No of cases of PAC	No of cases of SAC	No of cases of VKC	Total
>10 mm	12(50%)	33(60%)	18(85.71%)	63(63%)
6-10 mm	11(45.83%)	20(36.36%)	2(9.52%)	33(33%)
0-5 mm	1(4.17%)	2(3.64%)	1(4.76%)	4(4%)
Total	24(100%)	55(100%)	21(100%)	100(100%)

In the present study, mean of OSDI score of PAC cases (27.28±13.45) was higher as compared to SAC (24.76± 11.98) and VKC cases (12.56±7.42). Similarly, mean of TFBUT score was higher in SAC cases (16.12± 6.54) as compared to PAC (14.45±7.21) and VKC cases (13.87±5.67). And the mean of Schirmers score as much more higher in VKC cases (23.12±12.76) as compared to PAC (15.54±9.76) and SAC cases (11.86± 6.47).

Table.8. Comparison of Mean of various score between different type of allergic conjunctivitis.

Score	PAC	SAC	VKC
OSDI	27.28± 13.45	24.76± 11.98	12.56±7.42
TFBUT	14.45±7.21	16.12± 6.54	13.87±5.67
Schirmers	15.54±9.76	11.86± 6.47	23.12±12.76

DISCUSSIONS

Dry eye syndrome (DES) is caused by a heterogeneous group of diseases which share a functional tear deficit due to reduced production or excessive evaporation, associated with ocular discomfort symptoms which could limit the daily activities of affected patients [15]. Traditionally, DES and AC are regarded as two different diseases. However, recent literature has shown both conditions share similar characteristics, including several signs and symptoms [16]. Pflugfelder et al. [17] suggested that activated T-cells and an increase in inflammatory cytokines such as epidermal growth factor, interleukin-1 (IL-1), and IL-8, damage goblet cells and conjunctival epithelial, which account for a reduction of mucin production and subsequent decrease of tear film break-up time (BUT). Many reports have shown an instability of mucins and decreased BUT in AC and suggested that up-regulation of inflammation affects the tear balance [18,19]. Corneal mechanical changes, related with the complex allergic process, may lead to stromal thinning, and may increase the corneal curvature [20]. L9 The diagnosis of ocular surface disease begins with a patient history and the large variety of symptoms related to the disease. In the present study, we were taken the OSDI questionnaire for collecting the data. A total of 100 conjunctivitis cases were enrolled. Mean age of patients was 24.34 years. Mean age of male and female cases were 29.76 and 17.87 years respectively. A study conducted in Italy, which included 3685 patients with ocular allergies and concluded the mean age of AC was 38 ± 19 years [21].L1M In the present study, rate of prevalence of Allergic conjunctivitis was greater in males (61%) than females (39%). Similar study was conducted in Ethiopia, Alemayehu AM et al., VKC was reported to affect males (63.63%) more frequently than females (36.36%) [22].

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Another study stated that the incidence of DE among individuals with AC was presumed to be higher than the prevalence among the general population as the decreased tear production volume because DE hinders the removal of antigens from the ocular surface [10].
In the present study, among all AC cases, Seasonal Allergic Conjunctivitis (SAC) was seen in 55% cases. Perennial Allergic Conjunctivitis (PAC) was seen in 24% cases. And Vernal Keratoconjunctivitis (VKC) was seen 21% cases. Thus, SAC and PAC were the most common type of AC.

Miyazaki et al. [23] in their review article has revealed similar findings stating that SAC is the most common AC in central Japan and Italy. La Rosa M et al. [24] in their study have also shown that SAC and PAC are the most common AC.

In the present study, rate of prevalence of dry eye disease was varied from 35% to 37%. A study conducted in Southern California showed that out of 194 patients with itchiness 57.7% had clinically significant dry eye, thereby highlighting that there is a segment of patients who concomitantly suffer from AC and DED [25].

Previous studies on the epidemiology of DE have reported a global prevalence of 5–50% [26,27], and the relatively higher comorbidity rate in the AC cohort suggests that patients with AC may be predisposed to DE. Currently, the proposed pathological mechanisms include AC-induced lipid layer thickening of the tear film [11], instability of the tear film caused by the tear protein changes in AC [28], increased inflammatory cytokines secondary to a chronic disease [29], and prolonged use of antihistamines for symptomatic management [30], all of which may contribute to tear film disruption and the pathogenesis of DE [31]. A study on patients with DE and mild conjunctivitis, including AC, revealed no significant effect of conjunctivitis on TFBUT [10]. Conversely, a study noted a significant decrease in TFBUT in patients with SAC [11].

In the present study, 29% AC patients had a severe OSDI score (>32). Prevalence of ocular discomfort experienced by patients assessed by OSDI scoring was found to be maximum in patients of PAC. A prospective study conducted in Turkey found the prevalence of dry eye among patients of AC to be 12%. This difference could be because of their smaller sample size and younger age group (6–18 years) of patients [20]. Our observation was also in contrast to a study conducted in Southern India where 64% of patients had severe dry eye according to OSDI [32]. Differences in prevalence could also be observed due to climatic variations [23].
Reduced TFBUT is a significant objective sign of DED. In the present study, the shortest tear break-up time was observed in patients of PAC. This observation is supported by a study where it was observed that SAC was associated with advanced tear instability, shorter TFBUT, and thickening of the tear film lipid layer [28].

In the present study, the value of Schirmer-1 was < 10mm 50% patients of PAC, in 40% of SAC and in 14.28% of VKC. OSDI score was found to be significantly higher in PAC and SAC as compared to the VKC group. No great difference was observed in the three groups regarding mean TFBUT. Schirmer's score was found to be significantly less in PAC and SAC subjects compared to VKC subjects. In a recent systematic review and meta-analysis including studies on ocular allergy and dry eye, it was found that 47.2% of the patients with AC exhibited comorbid dry eyes [33].

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In the present study, we studied all the groups separately and found that the SAC was the most common allergic conjunctivitis. And we found that DED was significantly associated with AC and was maximum in patients with PAC than SAC and least in VKC.
Another study by Tibrewal S et al., found that, TBUT was lower in VKC children with TBUT around (8.8±4.5 secs) as compared to the controls, which was 10.8±5.5 seconds. In the same study, the non-invasive TBUT was found to be low but not statistically significant, (7±3 secs vs 8±2 secs). Thus, their study found that children with VKC had more prevalence of dry eyes and lower TBUT [34].

CONCLUSIONS

The present study concluded that the male population were preponderance to allergic conjunctivitis. Prevalence of dry eye disease is more associated with PAC than SAC and VKC. Hence, we should properly examine allergic conjunctivitis eye for early diagnosis and prompt treatment of dry eye disease.

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