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Research Article

ALLERGIC CONJUNCTIVITIS: PREVALENCE, SYMPTOMS, PRECIPITATING AND RISK FACTORS AMONG SAUDI POP- ULATION OF ARAR.

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Abstract:

Background: Allergic conjunctivitis (AC) is a common eye disease that can impair the quality of life of the affected people. The most common allergens responsible for AC are pollens, chemicals, air pollution and smoke.

Objective: In the current study we aimed to study the prevalence, symptoms, precipitating and risk factors for AC among Saudi population of Arar city in Northern Saudi Arabia.

Methods: This cross-sectional, community-based study was conducted on 426 Saudi people living in Arar city. The prevalence, symptoms, precipitating and risk factors for AC were studied using a predesigned questionnaire. Data entry and statistical analysis were done using SPSS (statistical package for social sciences) Version 22.

Results: The current study found that the prevalence of AC in Arar city is 51.5%. The main symptoms were itching, red eyes, tearing and burning/foreign body sensation of the eyes in 66.9%, 59.7%, 39.5% and 21.8% of the studied participants respectively. The most common precipitating factors were air borne dust, hot and humid weather and exposure to chemicals e.g. perfumes in 68.5%, 30.6% and 29% cases respectively. Male were found to be more susceptible to AC than females ($P > 0.05$) and there was significant association with age and positive family history of AC ($P < 0.05$).

Conclusion: The prevalence of AC is high in Arar city. Health education sessions about the nature of the disease and its precipitating and risk factors are recommended for better management of AC cases.

Key words: Allergic conjunctivitis, Arar, prevalence, precipitating and risk factors, Saudi Arabia, symptoms.

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INTRODUCTION:

Conjunctiva is a transparent mucous membrane covering that extends from the limbus of the eye to the eyelids margins. It is susceptible to irritation from allergens, especially during the hay fever season. Allergic conjunctivitis (AC) is an inflammatory disease of the conjunctiva caused mainly by an IgE-mediated mechanism. Seasonal allergic conjunctivitis (SAC), perennial allergic conjunctivitis (PAC), vernal keratoconjunctivitis (VKC) and atopic keratoconjunctivitis (AKC) are different types of the allergic conjunctivitis. The clinical and pathophysiological features of AKC and VKC are quite different from SAC and PAC, despite the fact that they share some common markers of allergy. [1]

Currently, at least 20% of world's population suffer from some form of AC. [2] The prevalence of ocular allergies in the general population is estimated to be up to 40% in the United States [3] and up to 35% in Europe and the Middle East. [4] These data suggest a high comorbidity of conjunctivitis and rhinitis, although in ophthalmic practice the incidence observed is necessarily skewed towards the former. Whether ocular allergies occur independently or in association with rhinitis, they have a serious impact on the quality of life of the effected individuals by putting limitations on their daily routine activities such as going outdoors, reading, sleeping and driving. [5,6]

Therefore, early diagnosis and treatment of patients with AC should improve their quality of life. Although many causes are known to be responsible for AC, but the most common allergens are pollen from trees, grass and ragweed, animal contact, perfumes, cosmetics, skin medicines, air pollution, dust mites and smoke. [7-10] The symptoms of AC may vary depending on its type. Acute AC is more common during the allergy season and is usually a short-term condition. The common symptoms include itching and burning sensation, swelling of eyelids and sometimes rhinorrhoea. While as chronic AC can occur anytime during the year and is a less prevalent than acute AC. Common symptoms that are usually relapsing include burning sensation of eyes, itching and photophobia.

The release of histamine and other active substances by mast cells, which lead to dilation of blood vessels, irritation of the nerve endings and over production of the tears is the main cause for the symptoms of AC. Allergic rhinitis and allergic rhino-conjunctivitis are common allergic disorders estimated to affect up to 40% of the population worldwide. [11,12]

Avoiding the allergens as the contact with grass in bloom during "hay fever season", animal contact, dusty and smoky conditions is important in the treatment of AC. The therapeutic treatment is done with topical and/or systemic antihistamines, mast cell stabilizers and nonsteroidal anti-inflammatory drugs (NSAIDs) and these medicines are generally safe and usually effective. [13]

The medical attention for AC is usually sought when the symptoms are severe and otherwise in many cases it may go underdiagnosed and consequently untreated. Use of healthcare resources and reduced quality of life of affected individuals justify studies on the prevalence of allergic conjunctivitis. [14] Therefore, this study was carried out to highlight the prevalence, symptoms, precipitating and risk factors for AC conjunctivitis among Saudi population of Arar, Northern Saudi Arabia.

MATERIALS AND METHODS:

Ethical issues: Ethical approval (Decision No: 21/40/H) was obtained from the Local Committee of Bioethics at Northern Border University and ethical principles were considered in all steps.

Study design: This cross-sectional, community-based study was conducted from June 15th. 2018 to March 15th. 2019 on 426 participants living in Arar city of Northern Saudi Arabia. The age of the participants ranged from 13 to 67 years with mean age of 30.4±11 years.

Methods: Data was collected using a predesigned questionnaire covering all the relevant items to conduct the study as socio-demographic characteristics, presence of allergic conjunctivitis (AC), family history, period of eye allergy, laterality of the affected eye, other allergies, seasonal variation, symptoms and precipitating factors for AC.

Data Analysis: Data entry and statistical analysis was carried out using SPSS (statistical package for social sciences) version 22. Participants' characteristics were summarized as numbers and percentages for qualitative variables. Chi-Square test and independent sample tests were used for testing of the associations. P value <0.05 was considered as statistically significant.

RESULTS:

Demographic data of the studied population are reflected in **Table 1**. More than half of the studied participants (51.5%) were 21-30 years old and 61.8% of the total cases were males.

Table 1: Sociodemographic characteristics and AC in the studied population.

Gender		Age groups (years)				Education level		AC present	
Male n (%)	Female n (%)	< 20 n (%)	21 – 30 n (%)	31 – 40 n (%)	> 40 n (%)	Low n (%)	High n (%)	Yes n (%)	No n (%)
263 (61.8)	163 (38.2)	46 (10.8)	219 (51.5)	103 (24.1)	58 (13.7)	90 (21.2)	336 (78.8)	219 (51.5)	207 (48.5)

Totals 426 = 100%

AC; allergic conjunctivitis

The duration of AC lasted for a period varying from one year to five years in 46% of participants and in most of the cases (78.2%) Ac was bilateral **Table 2**. There was no relation between ocular allergy and any other type of allergies in 67.7% of cases, but there

was a relation between AC and the season of the year as 62.9% of cases had seasonal eye allergy. In most of cases eye allergy lasted for less than one-week duration. Nearly 51% had opted to seek medical advice for their allergy.

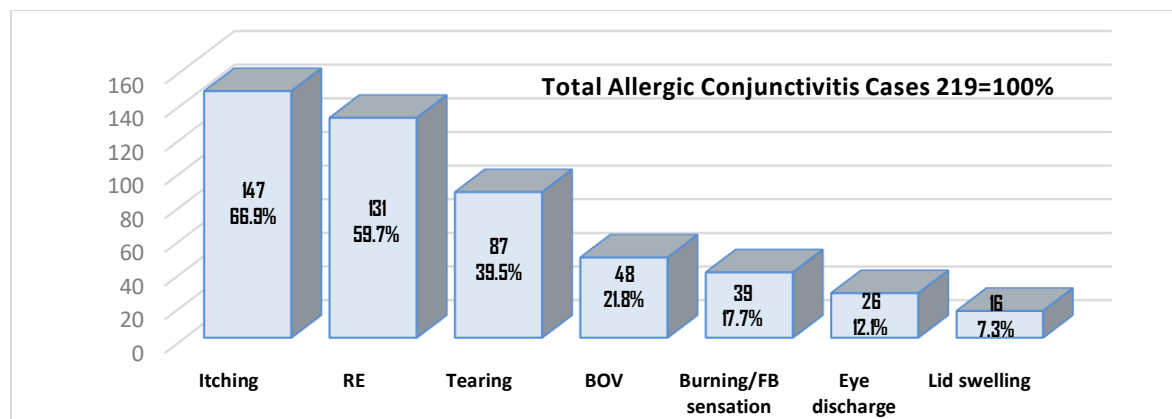
Table 2: Onset of AC, laterality, other associated allergies, seasonal variation, duration of allergy and medical advice in the studied cases.

Onset period of AC (years ago)			Laterality		Seasonal variation		Duration of active period of AC (weeks)			Associated allergies		Medical advice	
< 1 n (%)	1-5 n (%)	>5 n (%)	OE n (%)	BE n (%)	Yes n (%)	No n (%)	< 1 n (%)	1 – 3 n (%)	> 3 n (%)	Yes n (%)	No n (%)	Yes n (%)	No n (%)
37 (16.9)	101 (46)	81 (37.1)	48 (21.8)	171 (78.2)	138 (62.9)	81 (37.1)	148 (67.7)	32 (14.5)	39 (17.7)	71 (32.3)	148 (67.7)	111 (50.8)	108 (49.2)

Totals 426 = 100%

AC; allergic conjunctivitis, OE; one eye, BE; both eyes

The most common symptoms of AC were itching, red eye, tearing and burning sensation of the eyes in 66.9%, 59.7%, 39.5% and 21.8% cases respectively and the least common was swelling of the eye lids which occurred in only 7.3% of the cases. **(Figure1)**

**Figure 1: Symptoms of AC in the studied participants.**

AC; allergic conjunctivitis, BOV; blurring of vision, FB; foreign body, RE; red eye

The association of the symptoms and different demographic variables is shown in **Table 3**.

Table 3: Symptoms of AC in the studied participants in relation to their demographic variables.

Symptom		Gender		Ages	
		Females	Males	≤30yrs	>30yrs
		83 (100%)	136 (100%)	118 (100%)	101 (100%)
Itching	Yes	60 (72.3%)	87 (63.6%)	76 (64.2 %)	71 (70.2 %)
	No	23 (27.7%)	49 (36.4 %)	42 (35.8%)	30 (29.8%)
<i>p</i> - value		0.334		0.566	
Red eye	Yes	51 (61.7 %)	76 (55.8 %)	67 (56.7 %)	60 (59.6 %)
	No	32 (38.3 %)	60 (44.2 %)	51 (43.3 %)	41 (40.4 %)
<i>p</i> - value		0.576		0.855	
Tearing	Yes	34 (40.4%)	53 (39 %)	44 (37.3%)	43 (42.1 %)
	No	32 (38.3%)	101 (74 %)	74 (62.7%)	58 (57.9 %)
<i>p</i> - value		0.107		0.712	
Burning/FB sensation	Yes	21 (25.5%)	18 (13 %)	23 (19.4%)	16 (15.8%)
	No	62 (74.5 %)	118 (87 %)	95 (80.6 %)	85 (84.2%)
<i>p</i> - value		0.092		0.644	
BOV	Yes	18 (21.3%)	30 (22.1 %)	19 (16.4%)	28 (28.1%)
	No	65 (78.7%)	106 (77.9 %)	99 (83.6 %)	73 (71.9 %)
<i>p</i> - value		1		0.131	
Lid swelling	Yes	7 (8.5%)	9(6.5 %)	9 (7.5 %)	9 (8.8%)
	No	76 (91.5%)	127(93.5%)	109 (92.5 %)	92 (91.2%)
<i>p</i> - value		0.729		1	
Discharge	Yes	9 (10.6%)	18 (13%)	12 (10.4 %)	14 (14 %)
	No	74 (89.4%)	118 (87 %)	106 (89.6%)	87 (86 %)
<i>p</i> - value		0.782		0.589	

AC; allergic conjunctivitis, **BOV**; blurring of vision, **FB**; foreign body.

The most common precipitating factors were air borne dust, hot humid weather, chemicals e.g. perfume and smoke in 68.5% 30.6%, 29% and 16.1% of cases respectively, while as the least common was drug related like skin medications in 5.6% cases. (**Figure 2**)

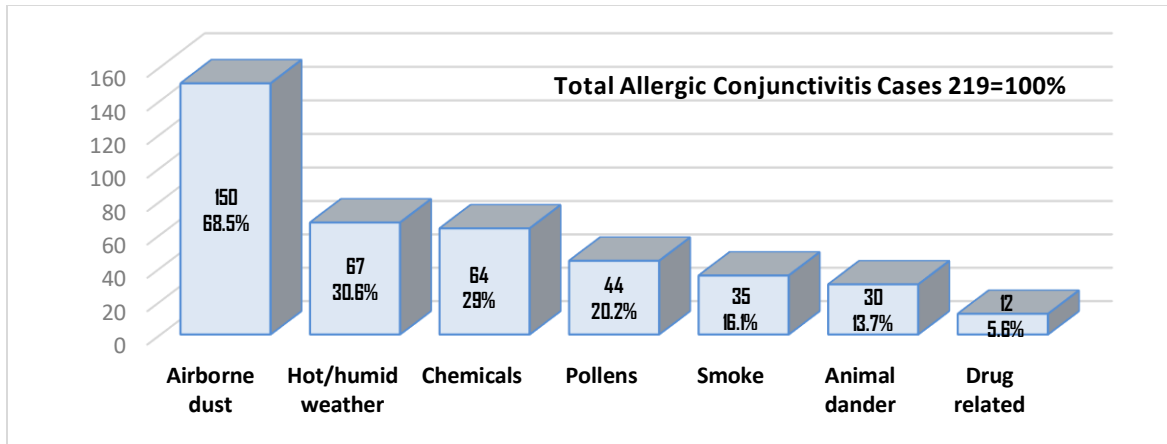


Figure 2: Precipitating factors for AC in the studied participants

The association of the precipitating factors and different demographic variables is shown in Table 4.

Table 4: Precipitating factors for AC in the studied participants in relation to demographic variables.

Precipitating factor		Gender		Ages	
		Females	Males	≤30yrs	>30yrs
		83 (100%)	136 (100%)	118 (100%)	101 (100%)
Exposure to dust	Yes	64 (76.6%)	87 (63.6%)	72 (61.2%)	78 (77.2 %)
	No	19 (23.4%)	49 (36.4%)	46 (38.8%)	23 (22.8%)
<i>p- value</i>		0.164		0.080	
Animal contact	Yes	11 (12.8 %)	19 (14.3 %)	12 (10.4 %)	18 (17.5 %)
	No	72 (87.2%)	117 (85.7%)	106 (89.6%)	83 (82.5 %)
<i>p- value</i>		1		0.300	
Exposure to hot/ humid weather	Yes	18 (21.3%)	49 (36.4 %)	26 (22.4 %)	41 (40.4 %)
	No	65(78.7 %)	87 (63.6%)	92 (77.6 %)	60 (59.6%)
<i>p- value</i>		0.107		0.038*	
Exposure to chemicals	Yes	34 (40.4 %)	30 (22.1%)	28 (23.9%)	35 (35.1%)
	No	49 (59.6%)	106 (77.9 %)	90 (76.1%)	66 (64.9 %)
<i>p- value</i>		0.04*		0.233	
Pollens	Yes	21 (25.5 %)	23 (16.9 %)	23 (19.4 %)	21 (21.1 %)
	No	62 (74.5%)	113 (83.1%)	95 (80.6%)	80 (78.9 %)
<i>p- value</i>		0.257		0.826	

Exposure to smoke	Yes	2 (2.1 %)	34 (24.7 %)	14 (11.9 %)	21 (21.1%)
	No	81 (97.9%)	102 (75.3 %)	104 (88.1%)	80 (78.9%)
<i>p- value</i>		0.0007***		0.221	
Drugs related	Yes	7 (8.5 %)	5 (3.9%)	11 (9%)	2 (1.8%)
	No	76 (91.5%)	131 (96.1%)	107 (91%)	99 (98.2%)
<i>p- value</i>		0.424		0.123	

The association of AC with gender, age group and family history of eye allergy is described in **Table 5**. Male were more susceptible to AC as 58.9% of AC cases were males ($P>0.05$). About half (42.7%) of cases of AC ranged from 21 -30 years old ($P<0.05$) and family history of eye allergy was found in 26.6% of cases ($P<0.05$).

Table 5: Association of AC with gender, age and family H/O AC.

Parameters		Response		Total 426 (100%)	<i>p- value</i>
		Yes 219 (100%)	No 207 (100%)		
Gender	Male	129 (58.9%)	135 (65%)	264 (61.9%)	0.201
	Female	90 (41.1%)	72 (35%)	162 (38.1%)	
Age (years)	<20	21 (9.7%)	25 (12%)	46 (10.8%)	0.011
	21-30	94 (42.7%)	126 (60.7%)	219 (51.4%)	
	31-40	64 (29%)	39 (18.8%)	102 (24%)	
	>40	41 (18.5%)	18 (8.5%)	58 (13.6%)	
Family H/O AC	Positive	58 (26.6%)	7 (3.4%)	65 (15.3%)	0.0001
	Negative	161 (73.4%)	200 (96.6%)	361 (84.7%)	

AC; allergic conjunctivitis, H/O; history of

DISCUSSION:

Ocular allergy is one of the most common ocular problems in clinical practice. Allergic conjunctivitis impairs the quality of life of the effected individuals by putting limitations on their daily routine activities. This across sectional study was conducted on 426 Saudi people of Arar city. This study aimed to show the prevalence, symptoms and precipitating and risk factors of AC in the studied population of Arar, Northern Saudi Arabia.

The current study showed that the prevalence of AC in Arar city is 51.5%. In Ghana, a cross-sectional community-based study on 1571 subjects reported that 39.9 % of them had allergic conjunctivitis [15]. In Nigeria, the prevalence of AC was found to be 42 % by Adenuga et al. [16] and 32% by Malu et al. [17]. In Brazil, a cross-sectional study conducted on

3,120 participants reported 20.7% prevalence of AC [18]. In India, a study conducted on 1775 subjects, AC was found to be prevalent in 12.22% subjects [19]. Another study conducted in Pakistan on 818 school children reported 19.2% prevalence of AC [20]. In United Arab Emirates, across sectional study while assessing the prevalence of different allergies found that AC was the commonest (40.8%) allergy [21]. Another study reported 41.7% prevalence of AC [22].

Regarding the symptoms of AC, our study showed that itching was the most common one in 66.9%, participants. The other symptoms as red eyes, tearing, burning/foreign body sensation, blurring of vision, ocular discharge and swollen eyelids were found in 59.7%, 39.5%, 21.8%, 17.7%, 12.1% and 7.3% cases respectively. Similar to our results itching was the

most common (almost in all cases) symptoms, followed by redness in 71.2 %, discharge in 66.3 %, tearing 39.3 %, photophobia 29.7% and clear mucinous discharge 17.9 % cases. [14] Another study reported, the most frequent complaint was itching in 20.8%, followed by redness in 17.4%, pain in (13.0%), watery discharge in 11.6%, sticky eyes in 4.8%, mucoid discharge in 4.6% puffy eyes in 4.3% cases [17]. However, another study found that the most frequently associated symptom with AC was tearing (74%), followed by photophobia (50.1%) and foreign body sensation (37.1%) [18]. In India another study reported, itching and frequent eye rubbing were observed in all the subjects; followed by watering of eyes (96.3%); while redness was observed in 29.5% and ropy discharge in 10.1% of the subject [15].

Our study reported seasonal eye allergy in 62.9 %. Another study reported seasonal allergy in 21.2% [18]. Another study reported that 45.2% of participants had seasonal allergy [23].

As regards factors associated with eye allergy our study reported, airborne dust by 68.5%, hot or humid weather 30.6%, chemicals e.g. detergents or perfume 29%, pollen-heavy air 20.2%, smoke 16.1% and animal dander by 13.7%. Another study reported, one third (35%) of the subjects had reported dust as the most common precipitating factor followed by smoke (19.3%) and sunlight (14.8%). Other allergens included pollen, grass and ragweed (11.9%), dandruff (3.2%), dry eye syndrome (1.8%) and cosmetics (1.9%) [19].

Regarding the family history our study found that only 15.4% of participants had family history of eye allergy and the rest 84.6 % had no history. In agreement with our result another study found that most of the subjects (81.1%) had no family history of allergic conjunctivitis in the rest, 14.7% of the parents/grandparents and 4.1% of the siblings had history of allergic conjunctivitis [19].

According to the association between eye allergy and gender our study found that it was more prevalent among male by 58.9% but there was no significant relation ($P=0.2$). However, there was a significant relation between eye allergy and age ($P=0.01$), it was more prevalent among patients aged 20-30 years old. In contrast to our results another study reported that eye allergy affecting more females than males (56.1% versus 45.9%) with a significant relation ($p = 0.01$) [14]. Another study reported, among cases with AC there were (47.4%) male and (52%) female subjects with 1:1.1 female/male ratio reflecting no statistically significant difference by gender ($P=0.07$) [24].

Another study found that AC was significantly more prevalent in the younger age groups, showing a prevalence of 38.4% in those aged 0–16 years and least in the age group above 50 years (4.9%) [17]. Another study reported, AC was significantly associated with gender ($p < 0.05$), but not with age ($p > 0.05$) [15].

CONCLUSION:

According to the current study, the prevalence of allergic conjunctivitis is high (51.5%) in Arar city. There is a significant association with age and positive family history. The most common precipitating factors are air borne dust, hot humid weather, chemicals and smoke. Health education sessions about the nature of the disease and avoiding the precipitating factors are recommended for better management of AC cases.

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