

Prevalence of Allergic Rhinitis among Adults, Jazan Region, Saudi Arabia

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Abstract: The prevalence of AR and other allergic diseases has increased globally, and the geographical prevalence rates vary.

Objective: This study was designed to estimate the prevalence of AR symptoms among adults in Jazan Region Saudi Arabia.

Methods: A cross-sectional study was conducted health college students, Jazan University, Jazan, Saudi Arabia. The study used the International Study of Asthma and Allergies in Children (ISAAC) questionnaire.

Result: The number of students studied was 1210 the male 654 (54.0%) and the female were 556 (46.0%). The mean age of them was 21.5 ± 1.4 years. The symptoms suggestive of ever-having had AR were common, affecting 532 (44.0%) of adult overall, with an estimated 476 (39.3%) experiencing symptoms of sneezing in the last 12 months. The prevalence a clinician diagnosis of AR was 259 (21.4%). The prevalence and frequency of symptoms according to the seasons (winter, summer, spring and autumn) was 337 (27.8%), 134 (11.0%), 146 (12.0%) and 98 (8.1%) respectively. The frequency symptoms may involved the nose only, eye only or both was 246 (20.3%), 139 (11.5%) and 326 (26.9%) respectively. According to the severity of symptoms 522 (43.1%) students had nose problem interfere with their daily activities in the last 12 months. Plain area had more number of students with AR- related symptoms, which was 253 (20.9%) students than other areas (costal area 205 (17.0%) and mountain 74 (6.1%) students).

Conclusion: This study found the prevalence of AR adult in Jazan was 44.0%, this exceeding range of reported prevalence rates from various parts of the world and SA (10-40%). Only 21.4% of those with AR-related symptoms were confirmed by doctors, they do not consider AR as a disease.

Keywords: Prevalence, AR, ISAAC, Adult, Jazan region.

1. INTRODUCTION

Allergic Rhinitis (AR) is clinically defined as a symptomatic disorder of the nose induced by an immunoglobulin E-mediated inflammation of the membranes of the nose following allergen exposure [1]. Chronic or acute inflammation of the mucous membrane of the nose due to allergens results in the generation of excessive amounts of mucus and fluid, commonly producing runny nose, nasal congestion, nasal and soft palate itching, and sneezing [1]. The incidence and prevalence of AR has increased worldwide over the past 10 years, as has the burden it places on already poorly financed health care systems [2]. It is the most common allergic respiratory disorder, affecting 19% of the general population in Europe, 8.8% to 16% in the United States of America (USA), [3-4]. AR frequently affects teenagers and young adults, with prevalence decreasing after the age of 20 years [5]. It is associated with limited or severe, incapacitating symptoms that can affect health-related quality of life, leisure activities, and work productivity [4, 5-7] even though the disease responds effectively to treatment [8].

Rhinitis is typically classified etiologically into allergic and non-allergic causes. Non-AR is characterized by chronic nasal symptoms and the lack of identifiable allergic triggers. This study focuses on individuals with AR, including both seasonal and perennial AR. Seasonal AR is associated with sensitization to fungal, tree, grass, and weed pollens, and with symptoms that vary seasonally. Perennial AR is associated with sensitization to indoor allergens such as fungi, cockroaches, dust mites, and animal proteins (e.g., cat dander), and with year-round symptoms, with or without seasonal exacerbations. The physical symptoms of AR, such as sneezing, rhinorrhea, and nasal congestion, may interfere with one's ability to carry out daily activities. Rhinitis symptoms may be associated with headache, irritability, poor concentration, loss of sleep, and resulting fatigue. The functional impact of these symptoms ranges from mild to seriously debilitating effects on social, physical, and emotional functioning. AR may interfere with cognitive tasks, may impair work performance, and may cause work absences.

Because AR is so common in the population and allergens are ubiquitous, AR creates a significant burden in the workplace in terms of effects on work performance and health care costs. Although some occupational exposures to airborne allergens present in the workplace can cause occupational rhinitis, non-occupational AR represents a vastly greater burden in workplace settings overall.

The International Study of Asthma and Allergy in Children (ISAAC) phase I protocol was designed to identify the symptoms of asthma, AR and eczema. The data generated from these surveys can estimate the prevalence of these health problems, which based on the symptomatology and participants perception.

There have been a limited number of epidemiological studies in population older than 16 years old from SA and the Eastern Mediterranean region. However, among children below the age of 15 years, reported an increasing prevalence of AR from 20% in 1986 to 25% in 1995 [9]. Another study that used the ISAAC phase 1 questionnaire to evaluate AR symptoms indicated a 26.5% prevalence among 6 to 15 years old children in SA [10]. More recently, a study that also used the ISAAC questionnaire reported a prevalence rate of 12.7% of allergic rhinitis in school children between the age of 4 to 16 years [11]. A recent study conducted in Jazan region revealed that AR was common, affecting 25.7% of children overall, with an estimated 19.3% experiencing symptoms of sneezing in the last 12 months. The prevalence of children with parental reports of ever having a clinician diagnosis of allergic rhinitis was 13.1% overall [12].

The aim of this study was to estimate the prevalence of AR in adults in Saudi Arabia (SA) using the validated Arabic version of the ISAAC questionnaire.

2. MATERIAL AND METHOD

Study Area:

This study conducted in Jazan (also called Gizan) region is one of the thirteen regions of the Kingdom of SA. It is located on the tropical Red Sea coast in southwestern Saudi Arabia. Jazan covers an area of 11,671 square kilometers, including some 5,000 villages and towns with a total population of 1.5 million. This study was cross-sectional study conducted among health colleges' students, Jazan University, Jazan region, SA over a period of 3 months started in January 2016 to fulfill the proposed objectives.

Sample Design and Size:

The ultimate objective of the study was to estimate the prevalence of AR among adult in Jazan region, SA using Health Colleges students, Jazan University as target population to represent adults in the region. For this purpose, multistage cluster random sampling utilized. Health Colleges in Jazan University is classified into three main campuses, the medical campus 1 (College of Medicine and College of Applied Medical Sciences (AMS)), Medical campus 2 (College of Pharmacy, College of Public Health and College of Nursing) and medical campus 3 (College of dentistry). Following Cochran (1977), the suitable sample size determined on the bases of the standard formula given by:

$$n = \frac{Z^2 \pi(1 - \pi)}{d^2}$$

Where:

n: the sample size.

π : is an anticipated proportion here, the prevalence of asthma.

Z: the standardized variable that corresponds to 95% level of confidence.

d: the desired marginal error.

Since there is no prior knowledge about the prevalence of AR in Jazan region we will set the values $\pi = 0.5$ to provide the maximum sample size, d the desired marginal error = 0.05 and $z=1.96$, the study sample size, denoted (n), is given by:

$$n = \frac{(1.96)^2 \times (0.5) \times (0.5)}{(0.05)^2} = 384$$

Since the sample proportion to the total population is less than 0.05 of the total number of health colleges' students in Jazan region, we don't need to use the finite population correction factor to adjust the sample size. However, in order to increase precision, which might be lost as a result of adopting multi-stage cluster sampling method, we multiply the sample size (n) by the design effect factor, which is the ratio of the variance of estimates for a particular sample design to the variance of estimates for a simple random sample of the same size. The design effect is equal to the number of medical campuses in Jazan University, so that the minimum sample size required is 1152. The sample size distributed between both sexes according to the sex ratio in the colleges. The colleges as well students in the different clusters selected using simple random technique. We add 15% to total sample size as non responders for that the total sample were 1325 distributed according to the three medical campuses as follow 500, 625 and 200 respectively.

Data collection and analysis:

Data collected using structured questionnaire that developed by ISAAC. The questionnaire written in Arabic and were mainly address to target group and filled by them. These data had been entered and analyzed using Statistical Package for Social Sciences (SPSS) software version 20.0.

3. RESULT

A total of 1325 questionnaires were distributed to the students, 38 questionnaires were removed due to incomplete data. The overall response rate was 91.3% for that the final total sample size was 1210 students. Male students completed 654 (54.0%) questionnaires, and female completed 556 (46.0%). The background characteristics of the study population are shown in Table I. The mean age of them was 21.5 ± 1.4 years. Most of them 1074 (88.8%) within age from 20 to 23 years old. The maximum age was 30 years, which account only 0.2% of all population. Most of study population was lived in rural area 761 (62.9%). Students from mountain area only represent 13.4% of study population. Most of study population were single 1093 (90.3%).

Table I: The background characteristics of the study population

Total students		Gender		Total
		Male	Female	
		654 (54.0%)	556 (46.0%)	1210 (100%)
Age	18 years old	2	3	5 (0.4%)
	19 years old	8	33	41 (3.4%)
	20 years old	156	138	294 (24.3%)
	21 years old	161	109	270 (22.3%)
	22 years old	193	119	312 (25.8%)
	23 years old	98	100	198 (16.4%)
	24 years old	21	35	56 (4.6%)
	25 years old	13	14	27 (2.2%)
	26 years old	1	1	2 (0.2%)
	27 years old	0	2	2 (0.2%)
	28 years old	0	1	1 (0.1%)
	29 years old	0	0	0 (0.0%)
30 years old	1	1	2 (0.2%)	
Total				1210 (100%)
Residency	Urban	226	223	449 (37.1%)
	Rural	428	333	761 (62.9%)
	Total (0.049)			1210 (100%)
Geographical Distribution	Coastal	210	258	468 (38.7%)
	Plain	347	233	580 (47.9%)
	Mountain	97	65	162 (13.4%)

	Total (0.000)			1210 (100%)
Marital Status	Single	627	466	1093 (90.3%)
	Married	26	80	106 (8.8%)
	Divorced	1	8	9 (0.7%)
	Widow	0	2	2 (0.2%)
	Total (0.000)			1210 (100%)
College (Program)	Medicine	100	100	200 (16.5%)
	Dentistry	111	76	187 (15.5%)
	Pharmacy	76	64	140 (11.6%)
	Applied Medical Sciences	149	102	251 (20.7%)
	Nursing	146	169	315 (26.0%)
	Public Health	72	45	117 (9.7%)
	Total (0.006)			1210 (100%)
Academic Level	3 rd	140	128	268 (22.1%)
	4 th	46	55	101 (8.3%)
	5 th	172	146	328 (27.1%)
	6 th	31	56	87 (7.2%)
	7 th	153	86	239 (19.8%)
	8 th	35	13	48 (4.0%)
	9 th	46	22	68 (5.6%)
	10 th	4	17	21 (1.7%)
	11 th	0	0	0 (0.0%)
	12 th	27	23	50 (4.1%)
	Total (0.000)			1210 (100%)

The prevalence of AR-related symptoms is shown in Table II, which revealed the symptoms suggestive of ever-having had AR were common, affecting 532 (44.0%) of health college students overall, with an estimated 39.3% experiencing symptoms of sneezing in the last 12 months. The prevalence of nose problem accompanied by itchy watery eyes over the last 12 months was 30.3% overall. The prevalence and frequency of symptoms according to the seasons (winter, summer, spring and autumn) was 337 (27.8%), 134 (11.0%), 146 (12.0%) and 98 (8.1%) respectively. The frequency symptoms may involved the nose only, eye only or both was 246 (20.3%), 139 (11.5%) and 326 (26.9%) respectively. According to the severity of symptoms 522 (43.1%) students had nose problem interfere with their daily activities in the last 12 months as shown in table II. Those who had allergy confirmed by doctor were 259 (21.4%). In all these data there was no significant statistical difference between male and female

Table II: Prevalence of AR-related symptoms

#	Items	Male	Female	Total	P
1	Ever had a problem with sneezing, or a runny, or blocked nose when you DID NOT have a cold or the flu?	291 (24.0%)	241 (20.0%)	532 (44.0%)	0.526
2	Sneezing, or a runny, or blocked nose in the last 12 months when you DID NOT have a cold or the flu?	260 (21.5%)	216 (17.8%)	476 (39.3%)	0.303
3	Nose problem been accompanied by itchy watery eyes in the last 12 months	198 (16.4%)	169 (13.9%)	367 (30.3%)	0.487
4	Nose problem interfere with your daily activities in the last 12 months	298 (24.6%)	224 (18.5%)	522 (43.1%)	0.331
5	Prevalence of AR symptoms in Winter (Dec – Mar)	176 (14.5%)	161 (13.3%)	337 (27.8%)	0.535
6	Prevalence of AR symptoms in Summer (Jun – Sep)	73 (6.0%)	61 (5.0%)	134 (11.0%)	0.527
7	Prevalence of AR symptoms in Spring (Mar – Jun)	78 (6.4%)	68 (5.6%)	146 (12.0%)	0.754
8	Prevalence of AR symptoms in Autumn (Sep – Dec)	47 (3.9%)	51 (4.2%)	98 (8.1%)	0.175
9	Have you ever had hay fever (Nose only)	144 (11.9%)	102 (8.4%)	246 (20.3%)	0.520
10	Have you ever had hay fever (Eye only)	69 (5.7%)	70 (5.8%)	139 (11.5%)	0.520
11	Have you ever had hay fever (Nose + Eye)	175 (14.4%)	151 (12.5%)	326 (26.9%)	0.520
12	Allergy confirmed by doctor	150 (12.4%)	109 (9.0%)	259 (21.4%)	0.058

Table III showed frequency of AR-related symptoms (ever-having had AR symptoms) according to the college distribution.

The highest prevalence in nursing college (9.6%) followed by AMS College (9.4%), where College of public health account the least one (5.0%). Male reported more symptoms than female in all colleges. According to the severity of symptoms that interfere with their work nursing college and AMS college reported the highest rate (12.0% and 10.0% respectively), with lowest rate in college of pharmacy 3.8% of participants. The rate of confirmed allergy by doctor were close to each other in all colleges (college of medicine 17.0%, college of dentistry 16.0%, college of pharmacy 18.6% and college of AMS 17.5%) except college of public health (25.6%) and college of nursing (29.6%).

Table III: Frequency of AR-related symptoms according to the colleges.

#	Items	Colleges						Total	P	
		Medicine	Dentistry	Pharmacy	AMS	Public Health	Nursing			
1	Ever had a problem with sneezing, or a runny, or blocked nose when you DID NOT have a cold or the flu?	Male	43 (3.6%)	53 (4.4%)	43 (3.5%)	65 (5.4%)	35 (2.8%)	52 (4.3%)	291 (24.0%)	0.068
		Female	45 (3.7%)	26 (2.2%)	31 (2.6%)	49 (4.0%)	26 (2.2%)	64 (5.3%)	241 (20.0%)	0.061
		Total	88 (7.3%)	79 (6.6%)	74 (6.1%)	114 (9.4%)	61 (5.0%)	116 (9.6%)	532 (44.0%)	0.015
2	Sneezing, or a runny, or blocked nose in the last 12 months when you DID NOT have a cold or the flu?	Male	36 (3.0%)	46 (3.8%)	41 (3.4%)	63 (5.2%)	41 (3.4%)	33 (2.7%)	260 (21.5%)	0.029
		Female	40 (3.3%)	28 (2.3%)	32 (2.6%)	45 (3.7%)	49 (4.1%)	22 (1.8%)	216 (17.8%)	0.007
		Total	76 (6.3%)	74 (6.1%)	73 (6.0%)	108 (8.9%)	90 (7.5%)	55 (4.5%)	476 (39.3%)	0.000
3	Nose problem been accompanied by itchy watery eyes in the last 12 months	Male	24 (2.0%)	31 (2.6%)	31 (2.5%)	43 (3.6%)	44 (3.6%)	25 (2.1%)	198 (16.4%)	0.627
		Female	32 (2.6%)	16 (1.3%)	24 (2.0%)	35 (2.9%)	47 (3.9%)	15 (1.2%)	169 (13.9%)	0.006
		Total	56 (4.6%)	47 (3.9%)	55 (4.5)	78 (6.5%)	91 (7.5%)	40 (3.3%)	367 (30.3%)	0.037
4	Nose problem interfere with your daily activities in the last 12 months	Male	39 (3.2%)	65 (5.4%)	20 (1.6%)	73 (6.0%)	29 (2.4%)	72 (6.0%)	298 (24.6%)	0.000
		Female	32 (2.6%)	26 (2.1%)	27 (2.2%)	48 (4.0%)	19 (1.6%)	72 (6.0%)	224 (18.5%)	0.008
		Total	71 (5.8%)	91 (7.5%)	47 (3.8%)	121 (10.0%)	48 (4.0%)	144 (12.0%)	522 (43.1%)	0.000
5	Allergy confirmed by doctor	Male	18 (1.5%)	22 (1.8%)	11 (0.9%)	27 (2.2%)	21 (1.8%)	51 (4.2%)	150 (12.4%)	0.000
		Female	16 (1.3%)	8 (0.7%)	15 (1.2%)	17 (1.4%)	10 (0.8%)	43 (3.6%)	109 (9.0%)	0.001
		Total	34 (2.8%)	30 (2.5%)	26 (2.1%)	44 (3.6%)	31 (2.6%)	94 (7.8%)	259 (21.4%)	0.000

Table IV showed frequency of AR-related symptoms according to the seasons and college distribution. The highest season with many reported symptoms was winter (22.8%). With highest prevalence in college of pharmacy (35.7%) followed by college of nursing (30.8 %%), where College of public health account the least one (20.5%). There was no clear statistical significant difference in frequency in symptoms in winter between the colleges according to the gender (14.5% and 13.3% respectively) ($p = 0.121$). Autumn months were the least months with allergic symptoms (8.1%) despite changes in weather.

Table IV: Frequency of AR-related symptoms according to the seasons and colleges distribution.

#	Items		Colleges						Total	P
			Medicine	Dentistry	Pharmacy	AMS	Public Health	Nursing		
1	Prevalence of AR symptoms in Winter (Dec – Mar)	Male	22 (1.8%)	27 (2.2%)	32 (2.6%)	42 (3.5%)	12 (1.0%)	41 (3.4%)	176 (14.5%)	0.053
		Female	24 (2.0%)	20 (1.7%)	18 (1.5%)	31 (2.5%)	12 (1.0%)	56 (4.6%)	161 (13.3%)	0.583
		Total	46 (3.8%)	47 (3.9%)	50 (4.1%)	73 (6.0%)	24 (2.0%)	97 (8.0%)	337 (27.8%)	0.121
2	Prevalence of AR symptoms in Summer (Jun – Sep)	Male	12 (1.0%)	11 (0.9%)	7 (0.6%)	20 (1.6%)	10 (0.8%)	13 (1.1%)	73 (6.0%)	0.867
		Female	9 (0.7%)	8 (0.7%)	7 (0.6%)	14 (1.2%)	5 (0.4%)	18 (1.4%)	61 (5.0%)	0.787
		Total	21(1.7%)	19 (1.6%)	14 (1.2%)	34 (2.8%)	15 (1.2%)	31 (2.5%)	134 (11.0%)	0.867
3	Prevalence of AR symptoms in Spring (Mar – Jun)	Male	13 (1.1%)	14 (1.2%)	16 (1.3%)	19 (1.5%)	4 (0.3%)	12 (1.0%)	78 (6.4%)	0.156
		Female	12(1.0%)	12 (1.0%)	8 (0.7%)	13 (1.1%)	3 (0.2%)	20 (1.6%)	68 (5.6%)	0.696
		Total	25 (2.1%)	26 (2.2%)	24 (2.0%)	32 (2.6%)	7 (0.5%)	32(2.6%)	146 (12.0%)	0.280
4	Prevalence of AR symptoms in Autumn (Sep – Dec)	Male	8 (0.7%)	5 (0.4%)	2 (0.2%)	9 (0.7%)	5 (0.4%)	18 (1.5%)	47 (3.9%)	0.303
		Female	14 (1.2%)	6 (0.5%)	7 (0.6%)	7 (0.6%)	3 (0.2%)	14 (1.1%)	51 (4.2%)	0.500
		Total	22 (1.9%)	11 (0.9%)	9 (0.8%)	16 (1.3%)	8 (0.6%)	32 (2.7%)	98 (8.1%)	0.422

Hay fever was reported in many of participant in relation to their colleges as showed in Table V. The prevalence of hay fever involving both eye and nose was 26.9%. The prevalence of hay fever in both eyes and nose was similar in college of pharmacy, college of AMS and college of public health (30.0%), college of medicine showed the lowest prevalence (11.5%). Hay fever (nose only) reported in 23.5% of dental college students (the highest rate), where college of nursing reported the least one (15.2%). There was clear statistical significant statistical difference in frequency of hay fever symptoms according to the college and gender ($p=0.000$).

Table V: Frequency of hay fever according to the colleges.

#	Items		Colleges						Total	P
			Medicine	Dentistry	Pharmacy	AMS	Public Health	Nursing		
1	Have you ever had hay fever (Nose only)	Male	22 (1.8%)	26 (2.1%)	9 (0.7%)	36 (2.0%)	22 (1.8%)	29 (2.5%)	144 (11.9%)	0.008
		Female	19 (1.6%)	18 (1.5%)	13 (1.1%)	21 (1.7%)	12 (1.0%)	19 (1.5%)	102 (8.4%)	0.004
		Total	41 (3.4%)	44 (3.6%)	22 (1.8%)	57 (4.7%)	34 (2.8%)	48 (4.0%)	246 (20.3%)	0.000
2	Have you ever had hay fever (Eye only)	Male	18 (1.5%)	10 (0.8%)	9 (0.7%)	18 (1.5%)	8 (0.7%)	6 (0.5%)	69 (5.7 %)	0.008
		Female	15 (1.2%)	12 (1.0%)	6 (0.5%)	18 (1.5%)	7 (0.6%)	12 (1.0%)	70 (5.8%)	0.004
		Total	33 (2.7%)	22 (1.8%)	15 (1.2%)	36 (3.0%)	15 (1.3%)	18 (1.5%)	139 (11.5%)	0.000
3	Have you ever had hay fever (Nose + Eye)	Male	21 (1.7%)	33 (2.7%)	23 (2.0%)	40 (3.3%)	20 (1.6%)	38 (3.1%)	175 (14.4%)	0.008
		Female	29 (2.4%)	18 (1.5%)	20 (1.6%)	23 (1.9%)	14 (1.2%)	47 (3.9%)	151 (12.5%)	0.004
		Total	50 (4.1%)	51 (4.2%)	43 (3.6%)	63 (5.2%)	34 (2.8%)	85 (7.0%)	326 (26.9%)	0.000

Table VI showed frequency of AR-related symptoms (ever-having had AR symptoms) according to the geographical distribution of the students as all students were lived in their families area, those who are coming from outside Jazan they lived in corresponding area of the medical campus. Plain area had more number of students with AR-related symptoms (20.9%) than other areas (costal area 17.0% and mountain 6.1%). There was no clear statistical significant difference in prevalence of AR-related symptoms between the geographical areas according to the gender (24.0% and 20.0% respectively) ($p = 0.776$).

Females were reported symptoms more than male in coastal area for most of the items than in plain area where male without clear statistical significant difference.

Table VI: Frequency of AR-related symptoms according to the geographical regions.

#	Items	Geographical Region			Total	P	
		Costal	Plain	Mountain			
1	Ever had a problem with sneezing, or a runny, or blocked nose when you DID NOT have a cold or the flu?	Male	90 (7.4%)	154 (12.7%)	47 (3.9%)	291 (24.0%)	0.655
		Female	115 (10.0%)	99 (8.2%)	27 (2.2%)	241 (20.0%)	0.835
		Total	205 (17.0%)	253 (20.9%)	74 (6.1%)	532 (44.0%)	0.776
2	Sneezing, or a runny, or blocked nose in the last 12 months when you DID NOT have a cold or the flu?	Male	82 (6.8%)	130 (10.7%)	48 (4.0%)	260 (21.5%)	0.150
		Female	99 (8.2%)	87 (7.2%)	30 (2.4%)	216 (17.8%)	0.191
		Total	181 (15.0%)	217 (17.9%)	78 (6.4%)	476 (39.3%)	0.008
3	Nose problem been accompanied by itchy watery eyes in the last 12 months	Male	54 (4.5%)	109 (9.0%)	35 (2.9%)	198 (16.4%)	0.304
		Female	77 (6.3%)	71 (5.9%)	21 (1.7%)	169 (13.9%)	0.845
		Total	131(10.8%)	180 (14.9%)	56 (4.6%)	367 (30.3%)	0.315
4	Nose problem interfere with your daily activities in the last 12 months	Male	92 (7.6%)	157 (13.0%)	49 (4.0%)	298 (24.6%)	0.482
		Female	101 (8.4%)	101 (8.3%)	22 (1.8%)	224 (18.5%)	0.611
		Total	193 (16.0%)	258 (21.3%)	71 (5.8%)	522 (43.1%)	0.384
5	Allergy confirmed by doctor	Male	51 (4.2%)	70 (5.8%)	29 (2.4%)	150 (12.4%)	0.139
		Female	44 (3.7%)	49 (4.0%)	16 (1.3%)	109 (9.0%)	0.586
		Total	95 (7.9%)	119 (9.8%)	45 (3.7%)	259 (21.4%)	0.183

During winter seasons participants reported more symptoms than others (27.8%) and the least in autumn (8.1%). In all seasons male reported more symptoms than female except in autumn. The rates of confirmed allergy by doctor are more in mountain area than others as shown in table VII.

Table VII: Frequency of AR-related symptoms according to the geographical regions.

#	Items	Geographical Region			Total	P	
		Costal	Plain	Mountain			
1	Prevalence of AR symptoms in Winter (Dec – Mar)	Male	56 (4.6%)	98 (8.0%)	22 (1.8%)	176 (14.5%)	0.507
		Female	74 (6.1%)	71 (5.8%)	16 (1.3%)	161 (13.3%)	0.518
		Total	130 (10.7%)	169 (13.9%)	38 (3.1%)	337 (27.8%)	0.143
2	Prevalence of AR symptoms in Summer (Jun – Sep)	Male	28 (2.3%)	33(2.7%)	12(1.0%)	73(6.0%)	0.572
		Female	27(2.2%)	28(2.3%)	6(0.5%)	61(5.0%)	0.582
		Total	55 (4.5%)	61(5.0%)	18(1.5%)	134 (11.0%)	0.497
3	Prevalence of AR symptoms in Spring (Mar – Jun)	Male	25 (2.1%)	37(3.1%)	16(1.3%)	78(6.5%)	0.334
		Female	27 (2.2%)	28(2.3%)	13(1.0%)	68(5.6%)	0.158
		Total	52 (4.3%)	65(5.4%)	29(2.3%)	146 (12.0%)	0.031
4	Prevalence of AR symptoms in Autumn (Sep – Dec)	Male	13 (1.0%)	25 (2.1%)	9 (0.7%)	47(3.9%)	0.851
		Female	21 (1.8%)	24 (2.0%)	6 (0.5%)	51(4.3%)	0.559
		Total	34 (2.8%)	49 (4.1%)	15 (1.2%)	98 (8.1%)	0.590

Hay fever was reported in many of participant in relation to their geographical distribution as showed in Table VIII. The prevalence of hay fever in both eyes and nose was 30.2% of students lived in mountain area followed by 28.8% in those who were lived in coastal area and those who lived in plain area reported the least frequency (24.5%). Hay fever (nose only) reported in 22.2% of students lived in plain area (the highest rate), where those lived in costal and mountain areas reported the least one (18.4% and 19.1% respectively). There was no clear statistical significant difference in frequency of hay fever symptoms according to the geographical distribution and gender ($p=0.351$).

Table VIII: Frequency of AR-related symptoms according to the geographical regions.

#	Items	Geographical Region			Total	P	
		Costal	Plain	Mountain			
1	Have you ever had hay fever (Nose only)	Male	49 (4.0%)	76 (6.3%)	19 (1.6%)	144 (11.9%)	0.215
		Female	37 (3.1%)	53 (4.3%)	12 (1.0%)	102 (8.4%)	0.308
		Total	86 (7.1%)	129 (10.6%)	31 (2.6%)	246 (20.3%)	0.351
2	Have you ever had hay fever (Eye only)	Male	21 (1.7%)	36 (3.0%)	12 (1.0%)	69 (5.7%)	0.215
		Female	36 (3.0%)	24 (2.0%)	10 (0.8%)	70 (5.8%)	0.308
		Total	57 (4.7%)	60 (5.0%)	22 (1.8%)	139 (11.5%)	0.351
3	Have you ever had hay fever (Nose + Eye)	Male	60 (5.0%)	80 (6.6%)	35 (2.9%)	175 (14.5%)	0.215
		Female	75 (6.2%)	62 (5.1%)	14 (1.1%)	151 (12.4%)	0.308
		Total	135 (11.2%)	142 (11.7%)	49 (4.0%)	326 (26.9%)	0.351

Table IX revealed that only 175 (14.5%) of all total population, had clinical diagnosed AR had confirmed diagnosis by doctor. Only 84 (6.9%) of those who were confirmed by doctor had no symptoms. Those who reported symptoms without doctor confirmation were 357 (29.5%). Only 109 (9.0%) of those with hay fever had symptoms confirmed by doctor as AR.

A considerable number of students having symptom during last 12 months had confirmed diagnosis 157 (13.0%). Allergy confirmed by doctor in relation to seasons (winter, summer, spring and autumn) were 8.3%, 4.0%, 3.6% and 3.2% respectively, with only clear statistical significant difference in allergy confirmed by doctor and symptoms occurred during winter, summer and autumn months ($p= 0.000, 0.000, 0.001$ respectively).

Table IX show: the relation between AR-related symptoms with confirmed one

#	AR-related symptoms	Allergy confirmed by doctor			LR
		Yes	No	Total	
1	Ever had a problem with sneezing, or a runny, or blocked nose when you DID NOT have a cold or the flu?	Yes	175 (14.5%)	357 (29.5%)	0.000
		No	84 (6.9%)	594 (49.1%)	
		Total	259 (21.4%)	951 (78.6%)	
2	Sneezing, or a runny, or blocked nose in the last 12 months when you DID NOT have a cold or the flu?	Yes	157 (13.0%)	319 (26.3%)	0.000
		No	102 (8.4%)	632 (52.3%)	
		Total	259 (21.4%)	951 (78.6%)	
3	Nose problem been accompanied by itchy watery eyes in the last 12 months	Yes	136 (11.2%)	231 (19.1%)	0.000
		No	123 (10.2%)	720 (59.5%)	
		Total	259 (21.4%)	951 (78.6%)	
4	Prevalence of AR symptoms in Winter (Dec – Mar)	Yes	101 (8.3%)	236 (19.5%)	0.000
		No	158 (13.1%)	715 (59.1%)	
		Total	259 (21.4%)	951 (78.6%)	
5	Prevalence of AR symptoms in Summer (Jun – Sep)	Yes	49 (4.0%)	85 (7.0%)	0.000
		No	210 (17.4%)	866 (71.6%)	
		Total	259 (21.4%)	951 (78.6%)	
6	Prevalence of AR symptoms in Spring (Mar – Jun)	Yes	44 (3.6%)	102 (8.4%)	0.008
		No	215 (17.8%)	849 (70.2%)	
		Total	259 (21.4%)	951 (78.6%)	
7	Prevalence of AR symptoms in Autumn (Sep – Dec)	Yes	39 (3.2%)	59 (4.9%)	0.001
		No	220 (18.2%)	892 (73.7%)	
		Total	259 (21.4%)	951 (78.6%)	
8	Have you ever had hay fever (Nose only)	Yes	95 (7.8%)	151 (12.5%)	0.000
		No	164 (13.6%)	800 (66.1%)	
		Total	259 (21.4%)	951 (78.6%)	
9	Have you ever had hay fever (Eye only)	Yes	14 (1.2%)	125 (10.3%)	0.000
		No	245 (20.2%)	826 (68.3%)	
		Total	259 (21.4%)	951 (78.6%)	
10	Have you ever had hay fever (Nose and eye)	Yes	109 (9.0%)	217 (17.9%)	0.000
		No	150 (12.4%)	734 (60.7%)	
		Total	259 (21.4%)	951 (78.6%)	

4. DISCUSSION

For several years the ISAAC questionnaire has been used all over the world and has proven it-self useful for assessing the prevalence and morbidity of asthma and allergic diseases. It is an easy-to-apply questionnaire that can be completed quickly without interfering with activities. This first study carried out in university student in Jazan Region to establish the prevalence of AR-related symptoms among adult in Jazan Region, Saudi Arabia.

Much of the data on the prevalence of rhinitis and/or asthma in the Middle East has come from the International Study of ISAAC or ISAAC-inspired studies of schoolchildren and (more rarely) university students. Although most studies had focused on asthma, the self-reported or parent-reported prevalence of current (12-month) rhinitis symptoms across the region ranged from 9% to 38%. The most extensive data again concerned the country of Iran [13].

The prevalence of AR and other allergic diseases has increased globally in the last three decades, and the geographical prevalence rates vary from 10% to 45% [14-17]. In addition to genetic factors, lifestyle factors influence the prevalence of AR and other allergic diseases. These include changing life styles, increasing vehicular pollution, increasing ownership of indoor plants and pets, choice of bedding and carpets, and an increasing use of air conditioning [14-17]. In addition, the increase in the prevalence of AR and other allergic diseases may also be attributed to changes in the perception of symptoms among patients and increased awareness and diagnosis of allergic diseases among healthcare professionals.

The prevalence of lifetime AR, rhinitis during the past 12 months, and hay fever were 44.0%, 39.3% and 30.3%, respectively. These result were close to the result of study conducted among children from secondary schools in the city of Riyadh, which revealed the prevalence of lifetime rhinitis, rhinitis during the past 12 months, and hay fever were 43.8%, 38.6% and 21.1%, respectively. Where the prevalence of AR in SA ranged from 20% to 40% in current study the prevalence was higher than the national range of this condition, which highlighted the role of environmental factors in the region to be incriminated as precipitating factors. That had been supported by higher frequency of symptoms during winter seasons (27.8%) and in plain area (20.9%) can be explained by windy months (Ghubra) and this area rich with farms and animals, which may play great role in generating air-borne allergens.

The present study shows that male report more rhinitis symptoms during the preceding 12 months compared with female, which is against "Hormonal rhinitis" and a higher rate of cosmetic use may account for the higher reported rate of symptoms in the girls. It also reported that the prevalence of hay fever in both eyes and nose was 30.2% of students lived in mountain area followed by 28.8% in those who were lived in coastal area and those who lived in plain area reported the least frequency (24.5%), which also contradicting with other studies [18-19].

5. CONCLUSIONS

This study revealed that the prevalence of AR health college students, Jazan University was 44.0%, it is higher than range of reported prevalence rates from various parts of the world and SA. Only 14.5% of those with AR-related symptoms were confirmed by doctors, most likely they do not consider AR as a disease. This study should be followed by another study to list and identify the importance of environmental factors in relation to AR and its symptoms and other allergic conditions.

6. LIMITATIONS OF THE STUDY

Although the present study is the first to consider prevalence of AR among Jazan University students, it has some significant limitations. First the study was based on sample size, so the AR prevalence results should be interpreted carefully. Second, our participants were health college students and thus may not truly represent the adult group population. Finally, this study depend of participant experience to report symptoms , which can be miss interpreted inform of over/under estimated these symptoms, which may affect the result of this study.

Competing of interests:

The authors have no conflict of interest to declare.

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