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Journal Home Page: <https://tjphs.tu.edu.iq> -- Email: tjops@tu.edu.iq**Comparative Study of the Prevalence, Symptoms, and Severity of Allergic Rhinitis Among Iraqi Men and Women**

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Keywords:Allergic rhinitis
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CC BY License<https://creativecommons.org/licenses/by/4.0/>**Citation:**Ibrahim A I. Comparative Study of the Prevalence, Symptoms, and Severity of Allergic Rhinitis Among Iraqi Men and Women. Tikrit J. Pharm. Sci. 2026; 20(1):43-50. <http://doi.org/10.25130/tjphs.2026.20.1.5.43.50>**Abstract****Background:** Allergic rhinitis (AR) is an immunoglobulin E (IgE) mediated inflammatory disorder of the nasal mucosa triggered by exposure to allergens. It is characterized by symptoms including sneezing, rhinorrhea, nasal itching, congestion, and ocular symptoms such as itching and redness of the eyes. Allergic rhinitis represents a common health problem that may affect quality of life and daily activities.**Objective:** This study aimed to determine the prevalence of allergic rhinitis among different age groups and to compare its prevalence and associated risk factors between males and females in two Iraqi governorates.**Methods:** A cross-sectional epidemiological study was conducted from 9 October 2023 to 20 January 2024 in Diyala and Salah Al-Din governorates, Iraq. Data were collected from 200 participants using face-to-face interviews and an online questionnaire distributed through Google Forms. Information regarding demographic characteristics, allergic rhinitis status, associated symptoms, comorbidities, blood groups, and medication history was collected and analyzed.**Results:** A total of 200 participants were enrolled, including 82 males (41.0%) and 118 females (59.0%). Participants ranged in age from less than 15 years to more than 45 years, with the majority belonging to the 15–30-year age group. The overall prevalence of allergic rhinitis was 63.5%. Most participants were urban residents (86.0%). Females represented a higher proportion of the study population than males. The prevalence and distribution of allergic rhinitis varied according to age group, sex, and place of residence.**Conclusion:** Allergic rhinitis was highly prevalent among the studied Iraqi population, particularly among young adults and urban residents. Differences in prevalence according to sex and demographic characteristics suggest that these factors may influence the occurrence of allergic rhinitis in Iraq. Further large-scale studies are recommended to identify additional risk factors and confirm these findings.

دراسة مقارنة لانتشار وأعراض وشدة التهاب الأنف التحسسي بين الرجال والنساء العراقيين

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أفرع الصيدلة السريرية، كلية الصيدلة، جامعة تكريت، تكريت، العراق

الخلاصة:

التهاب الأنف التحسسي هو اضطراب التهابي يصيب الغشاء المخاطي للأنف، ويتوسطه الغلوبولين المناعي (IgE)، وينجم عن التعرض لمسببات الحساسية. يتميز بأعراض تشمل العطس، وسيلان الأنف، وحكة الأنف، والاحتقان، وأعراض عينية مثل حكة واحمرار العينين. يمثل التهاب الأنف التحسسي مشكلة صحية شائعة قد تؤثر على جودة الحياة والأنشطة اليومية. هدفت هذه الدراسة إلى تحديد مدى انتشار التهاب الأنف التحسسي بين مختلف الفئات العمرية، ومقارنة انتشاره وعوامل الخطر المرتبطة به بين الذكور والإناث في محافظتين عراقيتين. أجريت دراسة وبائية مقطعية في الفترة من ٩ أكتوبر ٢٠٢٣ إلى ٢٠ يناير ٢٠٢٤ في محافظتي ديالى وصلاح الدين بالعراق. جُمعت البيانات من ٢٠٠ مشارك باستخدام مقابلات شخصية واستبيان إلكتروني وُزِعَ عبر نماذج جوجل. تم جمع وتحليل معلومات حول الخصائص الديموغرافية، وحالة التهاب الأنف التحسسي، والأعراض المصاحبة، والأمراض المصاحبة، وفصائل الدم، والتاريخ الدوائي. شارك في الدراسة ٢٠٠ شخص، منهم ٨٢ ذكراً (٤١,٠%) و١١٨ أنثى (٥٩,٠%). تراوحت أعمار المشاركين بين أقل من ١٥ عاماً وأكثر من ٤٥ عاماً، وكانت الغالبية العظمى منهم ضمن الفئة العمرية ١٥-٣٠ عاماً. بلغ معدل انتشار التهاب الأنف التحسسي ٦٣,٥%. كان معظم المشاركين من سكان المدن (٨٦,٠%). شكلت الإناث نسبة أعلى من الذكور في عينة الدراسة. اختلف معدل انتشار التهاب الأنف التحسسي وتوزيعه تبعاً للفئة العمرية والجنس ومكان الإقامة. كان التهاب الأنف التحسسي منتشرًا بشكل كبير بين السكان العراقيين الذين شملتهم الدراسة، وخاصة بين الشباب وسكان المدن. تشير الاختلافات في معدل الانتشار تبعاً للجنس والخصائص الديموغرافية إلى أن هذه العوامل قد تؤثر على حدوث التهاب الأنف التحسسي في العراق. يوصى بإجراء المزيد من الدراسات واسعة النطاق لتحديد عوامل الخطر الإضافية وتأكيدهم هذه النتائج.

الكلمات المفتاحية: التهاب الأنف التحسسي، الانتشار، الاختلافات بين الجنسين.

INTRODUCTION

Allergic rhinitis (AR) is a common chronic inflammatory disorder of the nasal mucosa that is triggered by exposure to environmental allergens and mediated by immunoglobulin E (IgE) ⁽¹⁾. It is characterized by symptoms such as sneezing, nasal congestion, rhinorrhea, nasal itching, and occasionally ocular manifestations including itching, redness, and irritation of the eyes, all of which can adversely affect quality of life and daily productivity ⁽²⁾. Allergic rhinitis affects approximately 400 million individuals worldwide, and its prevalence has increased steadily over recent decades, making it a significant global public health concern ⁽³⁾. Clinical and pathophysiological evidence indicates that more than 80% of allergic rhinitis cases develop before the age of 20 years, with prevalence peaking between 20 and 40 years of age before gradually declining thereafter ⁽³⁾. Numerous epidemiologic studies have noted an increase in the prevalence of allergy illnesses, with the prevalence steadily rising over recent decades due to urbanization, air pollution, and climate change ⁽³⁻⁵⁾. The patterns of allergy disorders can be impacted by air pollution, climate change, and global warming ⁽⁶⁻⁸⁾. Living in an urban environment is positively correlated with air

pollution on the one hand and the rise in allergy illnesses, particularly respiratory allergies, on the other ⁽⁹⁾.

Epidemiologic studies suggest that demographic factors, including sex and age, significantly influence susceptibility to allergic diseases. Gender differences in immune response, hormonal regulation, and environmental exposures may contribute to variations in AR prevalence and severity between men and women ⁽¹⁰⁻¹²⁾. For instance, some studies indicate higher prevalence in males during childhood and a shift towards females in adulthood, highlighting the importance of sex-specific analyses in allergy research ⁽¹³⁾.

Epidemiological studies suggest that demographic factors, including sex and age, may significantly influence susceptibility to allergic diseases and their clinical manifestations. Differences in immune responses, hormonal regulation, and environmental exposures have been proposed as potential explanations for variations in allergic rhinitis prevalence and severity between males and females ^(10,14). However, the findings regarding sex-related differences in allergic rhinitis remain inconsistent across different populations and geographical regions, highlighting the importance of population-specific investigations ^(11,13,14).

Despite the substantial global burden of allergic rhinitis, epidemiological data from Iraq remain limited, particularly concerning sex-specific differences in disease prevalence, symptom patterns, and severity. Furthermore, few studies have evaluated these characteristics in Iraqi populations living in different environmental settings, such as urban and rural areas, where exposure to allergens and air pollutants may vary considerably^(9,15). To the best of our knowledge, there is a paucity of data regarding allergic rhinitis epidemiology in Diyala and Salah Al-Din governorates.

Addressing this knowledge gap is important for improving understanding of the local epidemiology of allergic rhinitis and for identifying demographic and environmental factors that may influence disease burden and clinical presentation. Therefore, the present study aimed to determine the prevalence of allergic rhinitis and compare symptom profiles and disease severity between Iraqi men and women residing in Diyala and Salah Al-Din governorates.

SUBJECTS AND METHOD

Study design, time period and Population

This study was a cross-sectional epidemiological study carried out in Iraq from 9 October 2023 to 20 January 2024 in two governorates (Diyala and Salah-al-din). Data were obtained from 200 people through a face-to-face interview and the Google Forms method to assess the allergic rhinitis class, associated symptoms, other associated diseases and past medication history. Inclusion criteria; all age groups were included (from less than 15 years to more than 45 years). In addition, both males and females with allergic rhinitis symptoms were enrolled. Exclusion criteria: Any person who does not have any allergic rhinitis symptoms. Ethical approval for conducting this study was obtained from the College of Pharmacy, Tikrit University.

Questionnaire design

The questionnaire that addressed the prevalence of allergic rhinitis they were created based on previous studies. Using Google Forms and Paper Questionnaires: The questionnaire included more than two sections; the first section was a question about participant characteristics, including age and gender. The second section contains various questions about the allergic rhinitis symptoms, and these questionnaires were distributed to a group of male and female participants. Participants were expected to choose one answer from the options

offered. The questionnaire also included questions about the morbidities of rhinitis and asthma⁽¹⁶⁻¹⁷⁾.

Statistical Analysis

The information was gathered, examined, arranged and Microsoft Excel was used to compute frequencies and percentages and SPSS for chi-square.

RESULTS

General Information

Two hundred patients participated in this study from two governorates (Diyala and Salah-al-din). The percentage of males participating in the study was 41%, while the female percentage was 59%, with the gender distribution differing significantly ($P = 0.011$). The majority of participants (86.0%) resided in urban areas, whereas 14.0% were from rural areas, indicating a significantly greater representation of urban residents ($P < 0.001$). Regarding age, most participants (63.5%) were aged 15–30 years, followed by those aged 31–45 years (21.0%), over 45 years (14.5%), and below 15 years (1.0%). The sociodemographic characteristics of the study population are presented in Table 1.

Table (1): Gender, age group and Residence of all participants enrolled.

Variable	Category	Frequency (n)	Percentage (%)	P-value
Gender	Male	82	41	0.011*
	Female	118	59	
Residence	Urban	172	86	<0.001*
	Rural	28	14	
Age group (years)	<15	2	1	<0.001*
	15–30	127	63.5	
	31–45	42	21	
	>45	29	14.5	

*Statistical significance was considered at $P < 0.05$.

Distribution of Allergic Rhinitis Classification Among Participants

Table (2) presents the distribution of allergic rhinitis (AR) classifications among the study participants. Out of 200 individuals assessed, intermittent allergic rhinitis was reported in 159 participants (79.5%), which was significantly more common than those without intermittent symptoms (20.5%; $P < 0.001$). Regarding the persistent type, 67 participants (33.5%) were classified as having persistent allergic rhinitis (based on the standard criteria, the method is usually according to the Allergic Rhinitis and its Impact on Asthma guidelines), whereas 133 participants (66.5%) did not

meet the criteria for this category ($P < 0.001$). In terms of disease severity (the severity of allergic rhinitis was assessed according to the ARIA guidelines and classified into mild and moderate to severe forms. Mild allergic rhinitis was defined as symptoms that did not interfere with sleep, daily activities, leisure or sports activities, work or school performance, and were not troublesome to the patient. Moderate-to-severe allergic rhinitis was defined by the presence of one or more of these impairments), mild allergic rhinitis was the predominant form, affecting 139 participants (69.5%), whereas 30.5% had no mild disease classification ($P < 0.001$). Similarly, 30.5% of participants were classified as having moderate-to-severe allergic rhinitis, while 69.5% were not ($P < 0.001$). Overall, intermittent and mild allergic rhinitis were significantly more prevalent than persistent and moderate-to-severe forms among the study population. Overall, the results indicate that intermittent and mild allergic rhinitis were more

Variable	Category	Frequency	%	P-value
Intermittent	Yes	159	79.5	<0.001*
	No	41	20.5	
		Frequency	%	P-value
Persistent	Yes	67	33.5	<0.001*
	No	133	66.5	
		Frequency	%	P-value
Mild	Yes	139	69.5	<0.001*
	No	61	30.5	
		Frequency	%	P-value
Moderate / Severe	Yes	61	30.5	<0.001*
	No	139	69.5	

prevalent among the study population compared to persistent and moderate/severe forms.

Table (2): Distribution of Allergic Rhinitis classification among participants.

*Statistical significance was considered at $P < 0.05$.

Ocular and Nasal Symptoms Associated with Allergic Rhinitis

Eye Symptoms

Regarding ocular symptoms associated with allergic rhinitis, among the study population, watery eyes were reported by 39 individuals (19.5%), itching by 20 participants (10%), and redness by 16 participants (8%) as ocular symptoms linked to allergic rhinitis. Additionally, 63 people

(31.5%) reported having no eye-related symptoms, whereas 62 participants (31%) had many ocular symptoms. The distribution of ocular symptom categories differed significantly ($P < 0.001$). Ocular complaints were common overall, with patients with allergic rhinitis most frequently reporting watery and numerous eye symptoms, as shown in Table (3).

Nasal Symptoms

Nasal manifestations were common among patients with allergic rhinitis. Sneezing was the most commonly reported symptom among the 200 participants, affecting 59 people (29.5%), followed by runny nose in 29 people (14.5%) and nasal congestion in 31 people (15.5%). Furthermore, 81 participants (40.5%) had multiple nasal symptoms at the same time. The distribution of nasal symptom categories also differed significantly ($P < 0.001$) as Table (3) illustrates.

Table (3): Nasal and eyes symptoms associated with allergic rhinitis among patients.

Variable	Category	Frequency	%	P-value
Eye symptoms	Watery	39	19.5	<0.001*
	Redness	16	8	
	Itching	20	10	
	More than one symptom	62	31	
	None	63	31.5	
	Total	200	100	
Variable	Category	Frequency	%	P-value
Nasal symptoms	Congestion	31	15.5	<0.001*
	Runny nose	29	14.5	
	Sneezing	59	29.5	
	More than one symptom	81	40.5	

*Statistical significance was considered at $P < 0.05$.

Duration of Allergic Rhinitis Symptoms Among Participants

The duration of allergic rhinitis (AR) symptoms among study participants is summarised in Table (4). Ninety-two (46%) of the 200 participants stated that their symptoms persisted for less than a week. 49 participants (24.5%) reported symptoms lasting longer than a week, whereas 59 participants (29.5%) reported symptoms lasting roughly a week. The distribution of symptom duration differed significantly among the three categories ($P < 0.001$). Overall, these findings show that most participants had acute or sporadic bouts of

allergic rhinitis rather than long-term or persistent symptoms, with short-term or temporary symptoms being more prevalent.

Table (4): Duration of allergic rhinitis symptoms among participants.

Variable	Category	Frequency	(%)	P-value
Duration of symptoms	< 1 week	92	46	<0.001*
	one week	59	29.5	
	> 1 week	49	24.5	
	Total	200	100	

The association between symptom duration and ocular and nasal manifestations

Table (5) and (6) shows that the association between symptom duration and ocular and nasal manifestations was further assessed using the Chi-square test. There was a statistically significant association between ocular symptoms and duration of allergic rhinitis symptoms ($\chi^2 = 12.54$, $p = 0.014$) with participants experiencing symptoms for more than one week reporting multiple ocular symptoms more frequently. On the other hand, no statistically significant association was observed between nasal symptom patterns and duration of symptoms ($\chi^2 = 5.62$, $p = 0.060$), although participants with prolonged symptoms appeared to more frequently report multiple nasal manifestations.

Table (5): Association between ocular symptoms and duration of allergic rhinitis symptoms.

Duration of symptoms	No ocular symptoms n (%)	Single ocular symptom n (%)	Multiple ocular symptoms n (%)	Total	χ^2	P value
<1 week	34	38	19	91	12.54	0.014*
1 week	17	25	17	59		
>1 week	12	14	24	50		
Total	63	77	60	200		

* Statistically significant at $p < 0.05$.

Table (6): Association between nasal symptoms and duration of allergic rhinitis symptoms.

Duration of symptoms	Single nasal symptom n (%)	Multiple nasal symptoms n (%)	Total	χ^2	P value
<1 week	59	32	91	5.62	0.060
1 week	32	28	60		
>1 week	22	27	49		
Total	113	87	200		

Chronic Illness, Family History, and Drug use among participant

Table (7) presents the distribution of chronic diseases among individuals with allergic rhinitis. Of the 200 participants, only 19 (9.5%) had an associated chronic condition, while 181 (90.5%) reported no history of chronic illness, representing a statistically significant difference ($P < 0.001$). This suggests that the majority of allergic rhinitis incidents happened in otherwise healthy people who did not have co-occurring chronic illnesses. While 84 participants (42%) indicated no family history, 116 participants (58%) reported a positive family history of allergy disorders, with the difference being statistically significant ($P = 0.024$). The study population may have a genetic or inherited susceptibility to allergic rhinitis, as indicated by the

comparatively high percentage of positive family history. The most often used agents were antihistamines, which were reported by 65 individuals (32.5%). Mixed therapies, or combinations of pharmaceuticals, were reported by 62 people (31%). Twelve (6%) of the subjects took decongestants, while ten (5%) used corticosteroids. 35 participants (17.5%) reported not using drugs to control their symptoms, whereas 16 participants (8%) reported using other types of treatment. The distribution of medication use differed significantly among treatment categories ($P < 0.001$). These results demonstrate that the most common treatments for participants' allergic rhinitis symptoms are antihistamines and combination medications.

Table (7): Description of Chronic Illness, Family History, and Drug Use Among Participants.

Variable	Category	Frequency	%	P-value
Chronic disease**	No	181	90.5	<0.001*
	Yes	19	9.5	
	Total	200	100	
Family history	No	84	42	0.024*
	Yes	116	58	
	Total	200	100	
Drug history	Antihistamine	65	32.5	<0.001*
	Decongestant	12	6	
	Corticosteroid	10	5	
	Mixed treatment	62	31	
	Other treatment	16	8	
	None	35	17.5	
	Total	200	100	

**Chronic disease includes {hypertension, diabetes mellitus (DM), asthma, and chronic kidney disease (CKD)},

* Statistically significant at $p < 0.05$.

Association Between Risk Factors and Disease Severity Among Patients with Allergic Rhinitis

Table (8) demonstrate that the association between selected risk factors and severity of disease was tested by Chi-square test. No statistically significant association was seen between disease severity and gender ($\chi^2=0.002$, $P=0.965$), residence ($\chi^2=2.553$, $P=0.110$), smoking status ($\chi^2=0.262$, $P=0.609$) or presence of chronic disease ($\chi^2=1.984$, $P=0.354$). Family history of allergic rhinitis was borderline related to severity of disease ($\chi^2 = 3.355$, $P = 0.067$). This shows a tendency towards more severe disease in the participants with a positive family history but was not statistically significant. The drug history variable contained many medication names and combinations, so medication use could not be statistically evaluated.

Table (8): Association Between Risk Factors and Disease Severity Among Patients with Allergic Rhinitis

Variable	χ^2	P-value
Gender	0.002	0.965
Residence	2.553	0.110
Family history of allergic rhinitis	3.355	0.067
Smoking status	0.262	0.609
Chronic disease	1.984	0.354
Medication use	Not analyzed	—

DISCUSSION

Allergic rhinitis (AR) has been identified as a global health problem. It is currently the most common chronic allergy illness impacting people in Europe⁽¹⁸⁾. Allergic rhinitis (AR) is the most common type of rhinitis and represents a major global health problem, impacting over 400 million adult populations globally, and its incidence is increasing⁽¹⁹⁾.

Between 10% and 25% of people worldwide suffer with allergic rhinitis, and the condition is becoming more prevalent. The prevalence of allergic rhinitis was 28.3% in one study in Tehran⁽²⁰⁾, like that in another study conducted in Korea, the prevalence rates were 29.0%⁽²¹⁾. One Swedish population based study found self-reported allergic rhinitis prevalence of 28% in adults⁽²²⁾.

In the present study, females constituted the majority of participants with allergic rhinitis, accounting for 59% of the study population, while males represented 41%. Additionally, the highest proportion of participants (63.5%) was within the 15–30-year age group, and most participants were urban residents (86%). The predominance of young adults in our study may reflect the higher prevalence

of allergic rhinitis symptoms among this age group or greater healthcare-seeking behaviour. Likewise, the high proportion of urban residents may be attributed to increased exposure to environmental pollution.

Our findings are consistent with previous epidemiological studies that have reported a higher burden of allergic rhinitis among young adults. In Turkey, the "Score for Allergic Rhinitis" (SFAR) study conducted in 2020 included 9,017 adults and reported an overall allergic rhinitis prevalence of 36.7%, with the disease being particularly common among younger adults⁽²⁶⁾. Furthermore, the European Community Respiratory Health Survey (ECRHS) reported a prevalence of AR in Europe of about 9.5 % to 40.9 % for allergic rhinitis in adults⁽²³⁾. A systematic review of AR found that globally AR affects approximately 10-40% of the general population and "prevalence has increased significantly since the 1990s"⁽²⁴⁾. A systematic review of rhinitis worldwide (adults) found median prevalence of AR ~18.1%, with wide variation⁽¹⁹⁾.

There have been varying and increasing rates of AR prevalence in Asian countries, a review on the epidemiology of AR in Asia states that prevalence varied considerably depending on geographical

location, study design and population involved⁽²⁵⁾. According to one study, 74.4% of self-reported AR participants had intermittent AR and 25.6% had persistent AR⁽²⁷⁾. In the present study, the majority of participants (79.5%) were classified as having intermittent allergic rhinitis (AR), while 33.5% had the persistent form. Regarding symptom severity, most participants (69.5%) experienced mild symptoms, whereas 45% reported moderate to severe symptoms that interfered with their daily activities. These findings are generally consistent with previous studies, although the proportion of intermittent AR in our population was higher than that reported in several international investigations. For instance, a multicenter European study found that 29% of AR patients had persistent disease, while intermittent AR accounted for the remainder⁽²⁸⁾. Similarly, an Italian adult cohort study reported 35% intermittent and 65% persistent AR, with persistent cases demonstrating more severe symptoms and higher healthcare utilization⁽²⁹⁾. This result is in line with population-based research. According to the ARIA categorization, for instance, Savouré et al. (2023) found that intermittent allergic rhinitis was more common than chronic forms, accounting for roughly 69% and 31% of cases, respectively⁽³⁰⁾. The predominance of intermittent and mild AR in our study may reflect a community-based sample with lower allergen exposure or earlier disease stages, whereas hospital-based studies often report a higher frequency of persistent and severe forms. Nevertheless, the presence of nearly half of participants reporting moderate to severe symptoms underscores the considerable impact of AR on daily functioning and quality of life, highlighting the need for improved recognition and management of symptomatic individuals, particularly those with persistent disease.

According to earlier research, allergic rhinitis is more common in cities than in rural ones. According to recent studies, the frequency of AR is much higher in urban populations it can reach 50.3% in urban regions compared to 13.7% in rural ones⁽³¹⁾. It has also been determined that living in an urban area is a significant risk factor for allergic rhinitis. While there may be a negative correlation between living in a rural region and AR, this association is not always statistically significant⁽³²⁾. Our findings corroborate the pattern of chronic nasal complaints being more common as urbanisation levels rise as 86% of participant are urban areas living, which is in line with recent research.

A positive family history of allergies was reported by 28.1% of individuals in our study. This is in line with earlier research showing that the development of allergy symptoms is closely linked to a family history of allergic illnesses, which is a major risk factor for allergic rhinitis^(17,33).

CONCLUSION

This study presents a review of clinical features and patterns of allergic rhinitis among patients attending healthcare facilities in Diyala and Salah al-Din governorates. Allergic rhinitis was more prevalent in females, young adults (15–30 years) and urban residents. The ARIA classification showed that intermittent allergic rhinitis was more frequent than persistent type and mild disease severity predominated in the study population.

The most common nasal symptoms were sneezing and the presence of multiple nasal symptoms, whereas the most common eye symptoms were watery eyes and combined ocular symptoms. Most participants reported symptoms of short duration, indicating that acute or episodic episodes of allergic rhinitis were more common than prolonged symptoms.

More than half of the participants reported a positive family history of allergic disorders, which supports the possible contribution of genetic predisposition to disease occurrence. Antihistamines and combined therapeutic regimens were the most common treatment approaches among patients.

These findings add to the knowledge of the demographic and clinical profile of allergic rhinitis in the studied population and may help health care professionals to improve disease recognition and management strategies.

CONFLICT OF INTEREST

The author(s) declare no conflict of interest, financial or otherwise.

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