

Allergic rhinitis guidelines knowledge, attitudes, and practices among primary health care physicians: A national multicentre cross-sectional study

Hisham Almousa¹, Saad M. Alsaad², Dawood Ismail¹,
Saleh Mahjoub¹, Sultan Bin Obaid¹, Saad Alsaleh³

¹College of Medicine, King Saud University, Riyadh, Saudi Arabia, ²Family and Community Medicine Department, College of Medicine, King Saud University, Saudi Arabia, ³Otolaryngology-Head and Neck Surgery Department, College of Medicine, King Saud University, Saudi Arabia

ABSTRACT

Background: Allergic rhinitis (AR) is considered one of the most common reasons for patients visiting primary health care clinics. Physicians' adherence to management guidelines for AR results in better patient outcomes. Therefore, the present study aimed to assess the knowledge, attitudes, and practices of primary health care practitioners (PHCPs) towards allergic rhinitis guidelines in Saudi Arabia. **Methods:** This observational cross-sectional study conducted from August 2021 to November 2021 included 282 primary care physicians across all regions of Saudi Arabia. We used a two-part, validated, self-administered Perception Attitude and Practice of Primary Care Practitioners questionnaire. The first part was demographics, and the second part comprised three domains (perception, attitude, and practice) including 48 items. Statistical Package for the Social Sciences (SPSS), version 21 was used to analyze the data. **Results:** Most of the 282 physicians were Saudis (79%). Allergic rhinitis and its impact on asthma (ARIA) guidelines were recognized by 71% of the physicians. Second-generation oral antihistamines were considered the safest drug by the majority (82%), followed by intranasal corticosteroids (75.2%). Most physicians diagnosed AR based on clinical history (95%), while (43%) utilized allergy testing. Intranasal corticosteroids were the most preferred treatment option (70%) followed by second-generation and first-generation oral antihistamines (66% and 55%, respectively). **Conclusion:** Our study demonstrates the importance of education and awareness for PHCPs managing AR. ARIA guidelines should be implemented as a standard of care for AR, as PHCPs are the first ones to encounter patients with AR, to improve outcomes and avoid undertreatment and complications.

Keywords: Allergic rhinitis, attitudes, knowledge, practices, primary health care

Introduction

Allergic rhinitis (AR) is defined as inflammation of the nasal mucosa and mucosal membranes. The pathophysiology involves an inflammatory response mediated by immunoglobulin E (IgE)

Address for correspondence: Dr. Saad Alsaleh, Otolaryngology-Head and Neck Surgery Department, College of Medicine, King Saud University, Saudi Arabia.
E-mail: Alssaad@KSU.EDU.SA

Received: 11-01-2023

Revised: 02-03-2023

Accepted: 06-03-2023

Published: 30-06-2023

in response to an allergen. AR presents as nasal obstruction, postnasal discharge, runny nose, nasal itching, sneezing, and itchy eye tearing.^[1,2] AR affects the patients' quality of life (AR has a negative impact on the patients' quality of life and their daily activity), and is associated with asthma, sinusitis, nasal polyps, lower airway infections, anosmia, otitis media, and dental malocclusion.^[3,4] The prevalence of AR is estimated to be 40% worldwide,^[5,6] and 26.51% among children in Riyadh, Saudi Arabia.^[7] Moreover, a recent study in Abha, Saudi Arabia, reported that the prevalence of AR is 32% in men and 38.6% in women.^[8]

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow_reprints@wolterskluwer.com

How to cite this article: Almousa H, Alsaad SM, Ismail D, Mahjoub S, Bin Obaid S, Alsaleh S. Allergic rhinitis guidelines knowledge, attitudes, and practices among primary health care physicians: A national multicentre cross-sectional study. J Family Med Prim Care 2023;12:1202-8.

Access this article online

Quick Response Code:



Website:
<http://journals.lww.com/JFMPC>

DOI:
10.4103/jfmprc.jfmprc_85_23

Most patients with AR initially seek medical advice from their primary care physician^[9]; in fact, it is considered one of the most common reasons for patients visiting primary health care (PHC) clinics, accounting for up to 40% of the patients' visits in almost half of all PHC clinics.^[10,11] A study from Singapore showed that 71% of patients with rhinitis visited their primary care physician, while only 18% visited ENT specialists,^[11] demonstrating the importance of PHC physicians in the diagnosis, treatment, and follow-up of AR.

AR and its impact on asthma (ARIA) guideline are considered the first evidence-based guideline to be published and updated regularly since 2001.^[12] Despite the wide availability of alternative treatments mentioned in the ARIA guidelines, many primary care physicians show poor adherence to these guidelines and continue to treat the disease incompletely.^[1,13] Adherence to ARIA guidelines has been associated with better patient outcomes.^[14]

In comparison to other parts of the world, statistics on primary care attitudes and practices toward the management of AR in Saudi Arabia are still limited. To close this gap, we want to focus on primary care in this region. Our study pursues a better understanding of how PHC physicians manage and treat AR in daily practice, their perspectives on patient compliance, as well as their comprehension and application of guidelines. Therefore, we used the Perception Attitude and Practice of Primary Care Practitioners (PAP-PCP), a validated questionnaire from a Malaysian study to assess perception, attitude, and practice toward ARIA guidelines in our region.^[15]

Methods

Study design and setting

This was an observational cross-sectional study conducted among primary care physicians (family medicine physicians and general practitioners) across all regions of Saudi Arabia. Data were collected from August 2021 until November 2021.

Population of the study

We included all primary care physicians currently practicing in outpatient clinics across all regions of Saudi Arabia. Specialized physicians (otorhinolaryngologists, internists, pulmonologists, or immunologists) were excluded from this study.

Study tool

The study tool was adapted as a PAP-PCP questionnaire with permission from.^[15] This validated, anonymous questionnaire was sent as a Google form through email to all participants to be self-administered, and a reminder was sent afterwards.

The PAP-PCP is designed as a baseline assessment of the perception, attitude, and practice of primary care practitioners regarding different AR practice guidelines. It is a self-administered questionnaire that was created by experts, such as otorhinolaryngologists and public health physicians, and

adapted from literature reviews.^[16-18] The research questionnaire comprised two parts: (1) demographics, which included sex, years of clinical practice, level of education, workplace region, and race, in addition to the overall number of patients seen in a given week (total number of rhinitis or asthma patients per week). The second part had three domains (perception, attitude, and practice) with a total of 48 items. In the perception domain, there were nine items with a dichotomous scale response to each item (yes, not sure, and no). The attitude domain had 20 items with a Likert scale response to each item (5, strongly agree; 4, agree; 3, neutral; 2, disagree; and 1, strongly disagree). The practice domain had 19 items with a Likert scale response to each item (5, always; 4, often; 3, sometimes; 2, seldom; and 1, never).

Perception is defined as the way something is viewed, understood, or interpreted. In the questionnaire, this was explored by assessing views on the presence of AR practice guidelines, diagnosis, common symptoms, and classification and severity.

Attitude is a certain way of thinking or feeling about something and was explored by assessing general attitudes, behaviors and cognitive components in the diagnosis, classification, and treatment of AR. Practice is defined as the genuine implementation of a thought, concept, or procedure. In the questionnaire, this was assessed by evaluating common practices for investigating AR and preferred practices regarding allergy testing and therapy.

Ethical considerations

All participants agreed and signed the informed consent form. Respondents were not being able to fill in the survey unless they agree. The informed consent was clear and indicated the objective of the research; in addition, the participants were free to withdraw from the study at any time point they would like to do so without any further commitment. No incentives or rewards will be given to participants. This study was approved by the King Saud University Ethical Committee (No. E-21-6054).

Statistical analysis

Microsoft Excel was used to tabulate and code the data, and SPSS 21 was used to analyze it. The sociodemographic features of the individuals were summarized using descriptive statistics. The frequency (number [*n*], percent [%], and mean [SD]) were used to express numerical data. A Likert scale was used to code the questions (5, strongly agree; 4, agree; 3, neutral; 2, disagree; and 1, strongly disagree). The internal consistency of the questionnaire was estimated using Cronbach's alpha coefficient.

Results

Demographics

As seen in Table 1, The current study comprised 282 physicians. Most physicians were men (men, [55%]; women, [45%]). Of the total, (41.5%) were resident physicians under training and supervision, and (86.5%) had <10 years of practice. Most

Table 1: Demographic characteristics of the study participants

Variable	Total n	Percentage
Gender		
Male	155	(55%)
Female	127	(45%)
Years of Practicing		
<5 Years	167	(59.2%)
5–10 Years	77	(27.3%)
>10 Years	38	(13.4%)
Level of education		
General practitioner	93	(33%)
Resident	117	(41.5%)
Registrar	32	(11.3%)
Fellow	15	(5.3%)
Consultant	25	(8.9%)
Workplace region		
Riyadh province	51	(18.1%)
West province	114	(40.4%)
Eastern province	29	(10.3%)
Northern province	15	(5.3%)
South province	73	(25.9%)
Race		
Saudi	223	(79.1%)
Non-Saudi	59	(20.9%)
Total estimated number of patients seen in a week's time		
0–60	103	(36.5%)
60–120	93	(33%)
120–180	65	(23%)
180–240	18	(6.4%)
>240	3	(1.1%)
The number of patients with rhinitis seen per week		
0–10	136	(48.2%)
10–20	99	(35.1%)
20–30	39	(13.8%)
30–40	7	(2.5%)
>40	1	(0.4%)
The number of patients with asthma seen per week		
0–10	130	(46.1%)
10–20	75	(26.6%)
20–30	60	(21.3%)
30–40	14	(5.0%)
>40	3	(1.1%)

of the participants (79%) were Saudi Arabian nationals. The estimated number of patients seen in the clinic per week was 0–120 (69.5%), the number of patients with rhinitis seen per week was 0–20 (83.3%), and the number of patients with asthma seen per week was 0–20 (72.7%). Most responses came from participants in the west province of Saudi Arabia [Figure 1].

Perception domain

Between the Global Initiative for Asthma (GINA) and ARIA guidelines, more physicians recognized the GINA guidelines, at 79.8% and 71.6%, respectively. Only 53.2% reported knowing of other guidelines for AR. When asked if they knew rhinitis could be classified into allergic and non-AR, 67.4% of physicians

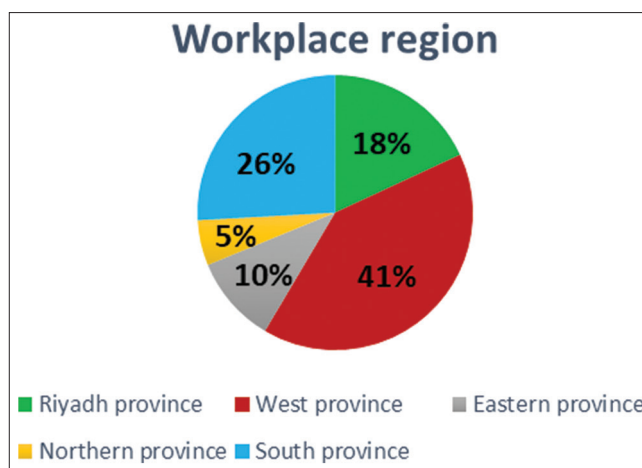


Figure 1: Distribution of participants workplace in Saudi Arabia

knew the difference between them, while 17.4% did not know, and 15.2% were not sure. While physicians (30.5%) agreed on the importance of certain allergy testing to distinguish between AR and non-AR, the majority did not know or were not sure. Most physicians (80.5%) agreed that it is necessary to evaluate asthma in patients with AR, and 62.1% knew how to classify AR based on severity [Table 2].

Attitude domain

Most physicians reported that ARIA guidelines are useful for categorizing and treating patients with AR (72% and 71%, respectively). A recent revision of diagnostic guidelines has subdivided AR into intermittent and persistent; some participants (55%) recognized that the subdivision has been proposed.

Most PHC physicians (82.6%) considered second-generation oral antihistamines to be the safest medication for AR, followed by intranasal corticosteroids (75.2%) and oral antihistamines and decongestants (61%). Conversely, the use of oral corticosteroids was viewed as the least safe medication as only 23.4% considered it safe and 48.6% did not agree on its safety as a treatment option of AR. Most physicians agreed that compliance is affected by the adverse effects of the prescribed medication, the efficacy of the ongoing treatment (82.6%), and the frequency of the doses (81.9%). The cost and taste of the medication were considered the least factors to affect compliance (53%) [Table 3].

Practice domain

Most of the PHC physicians diagnosed AR based on its clinical history (95%), while 43% of the physicians utilized allergy testing to help them diagnose their patients. Less than 30% reported using other modalities such as nasal endoscopy and imaging. In allergy testing, most physicians reported using serum total IgE (29%) followed by skin prick test and serum-specific IgE (27% and 10%, respectively). Intranasal corticosteroids were the most preferred treatment option (70%), followed

Table 2: Perception domain

Question	Total n (%)			Cronbach's Alpha
	Yes	No	Not sure	
Do you know allergic rhinitis and its impact on asthma (ARIA) guidelines?	202 (71.6%)	32 (11.3%)	48 (17%)	0.806
Do you know the global initiative for asthma (GINA) guidelines?	225 (79.8%)	28 (9.9%)	29 (10.3%)	0.797
Do you know other guidelines for allergic rhinitis (AR)?	150 (53.2%)	77 (27.3%)	55 (19.5%)	0.806
Do you know rhinitis can be divided into AR and non-AR?	190 (67.4%)	49 (17.4%)	43 (15.2%)	0.798
Is specific allergy testing necessary to distinguish between AR and non-AR?	86 (30.5%)	117 (41.5%)	79 (28%)	0.803
In your opinion, is an evaluation of asthma necessary for AR patients?	227 (80.5%)	25 (8.9%)	30 (10.6%)	0.801
Do you know how to identify AR patients?	254 (90.1%)	12 (4.3%)	16 (5.7%)	0.798
Do you know the common symptoms of AR?	269 (95.4%)	4 (1.4%)	9 (3.2%)	0.797
Do you know how to classify allergic rhinitis based on severity?	175 (62.1%)	53 (18.8%)	54 (19.1%)	0.805

Table 3: Attitude domain

Question	Total n (%)					Mean	Cronbach's Alpha
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree		
ARIA guidelines are useful in categorizing patients?	119 (42.2%)	84 (29.8%)	76 (27%)	3 (1.1%)	0 (0%)	4.13	0.793
A new subdivision of allergic rhinitis has been proposed as "intermittent" and "persistent"?	67 (23.8%)	89 (31.6%)	107 (37.9%)	16 (5.7%)	3 (1.1%)	3.71	0.800
The severity of allergic rhinitis has been classified as "mild" or "moderate/severe" depending on the severity of the symptom and quality of life outcomes?	83 (29.4%)	100 (35.5%)	74 (26.2%)	19 (6.7%)	6 (2.1%)	3.83	0.804
The diagnosis of allergic rhinitis is based upon the concordance between a typical history of allergic symptoms and allergy tests?	95 (33.7%)	88 (31.2%)	72 (25.5%)	22 (7.8%)	5 (1.8%)	3.87	0.793
ARIA guidelines are useful for the treatment of your allergic rhinitis patients?	100 (35.5%)	100 (35.5%)	80 (28.4%)	0 (0%)	2 (0.7%)	4.05	0.793
I feel this medication is safe for treating AR patients							
First-generation oral antihistamines	79 (28%)	90 (31.9%)	57 (20.2%)	36 (12.8%)	20 (7.1%)	3.61	0.788
Second-generation oral antihistamines	108 (38.3%)	125 (44.3%)	43 (15.2%)	5 (1.8%)	1 (0.4%)	4.18	0.797
Intranasal corticosteroids	103 (36.5%)	109 (38.7%)	49 (17.4%)	16 (5.7%)	5 (1.8%)	4.02	0.807
Oral antihistamines and decongestants	72 (25.5%)	100 (35.5%)	61 (21.6%)	26 (9.2%)	23 (8.2%)	3.61	0.790
Leukotriene antagonist	61 (21.6%)	73 (25.9%)	107 (37.9%)	36 (12.8%)	5 (1.8%)	3.53	0.797
Oral corticosteroids	14 (5%)	52 (18.4%)	79 (28%)	86 (30.5%)	51 (18.1%)	2.62	0.795
Immunotherapy	44 (15.6%)	53 (18.8%)	90 (31.9%)	69 (24.5%)	26 (9.2%)	3.07	0.798
Intranasal antihistamine	67 (23.8%)	98 (34.8%)	79 (28%)	28 (9.9%)	10 (3.5%)	3.65	0.793
I feel that treatment compliance is affected by these factors							
Adverse effects produced by medications	141 (50%)	104 (36.9%)	30 (10.6%)	6 (2.1%)	1 (0.4%)	4.34	0.795
Fears of adverse effects reported	107 (37.9%)	109 (38.7%)	48 (17%)	13 (4.6%)	5 (1.8%)	4.06	0.801
Route of administration	115 (40.8%)	108 (38.3%)	42 (14.9%)	13 (4.6%)	4 (1.4%)	4.12	0.791
Frequency of doses	123 (43.6%)	108 (38.3%)	37 (13.1%)	11 (3.9%)	3 (1.1%)	4.20	0.792
Efficacy of on-going treatment	119 (42.2%)	114 (40.4%)	45 (16%)	4 (1.4%)	0 (0%)	4.23	0.796
Cost of medication	73 (25.9%)	78 (27.7%)	68 (24.1%)	39 (13.8%)	24 (8.5%)	3.49	0.803
Taste	57 (20.2%)	72 (25.5%)	87 (30.9%)	44 (15.6%)	22 (7.8%)	3.35	0.801

by second-generation oral antihistamines and first-generation oral antihistamines (66% and 55%, respectively). Other physicians (50%) preferred to use a combination of antihistamine and intranasal corticosteroids [Table 4].

Discussion

AR is a highly prevalent condition, and PHC providers play an important role in diagnosing and managing AR. The management of AR varies greatly from physician to physician. The PAP-PCP questionnaire was distributed among PHC providers as part of assessing the current understanding of AR. Of the

282 physicians, the majority reported seeing fewer than 20 cases of AR per week; however, on average, 13.3% of all patients visiting PHC physicians were seen due to AR.

Assessment of the primary health care physician's perception

We found that physicians had a greater knowledge of GINA than ARIA guidelines. However, in the four ASEAN countries' study, the knowledge of both guidelines was similar.^[5] Most of the physicians knew that they should evaluate asthma in patients with AR; however, they demonstrated low awareness regarding

Table 4: Practice domain

Question	Total n (%)					Mean	Cronbach's Alpha
	Always	Often	Sometimes	Seldom	Never		
I diagnose my patient with AR by							
Clinical history	228 (80.9%)	40 (14.2%)	13 (4.6%)	0 (%)	1 (0.4%)	4.75	0.800
Anterior rhinoscopy	47 (16.7%)	65 (23%)	72 (25.5%)	38 (13.5%)	60 (21.3%)	3.00	0.793
Allergy testing	80 (28.4%)	42 (14.9%)	48 (17%)	45 (16%)	67 (23.8%)	3.08	0.781
Imaging paranasal sinuses	28 (9.9%)	59 (20.9%)	61 (21.6%)	50 (17.7%)	84 (29.8%)	2.63	0.788
Nasal endoscopy	10 (3.5%)	28 (9.9%)	41 (14.5%)	56 (19.9%)	147 (52.1%)	1.93	0.789
I treat AR patients with							
First-generation oral antihistamines	87 (30.9%)	67 (23.8%)	45 (16%)	30 (10.6%)	53 (18.8%)	3.37	0.783
Second-generation oral antihistamines	91 (32.3%)	96 (34%)	64 (22.7%)	23 (8.2%)	8 (2.8%)	3.85	0.793
Intranasal corticosteroids	118 (41.8%)	80 (28.4%)	55 (19.5%)	19 (6.7%)	10 (3.5%)	3.98	0.808
Oral antihistamines and decongestants	74 (26.2%)	76 (27%)	67 (23.8%)	24 (8.5%)	41 (14.5%)	3.42	0.784
Leukotriene antagonist	18 (6.4%)	45 (16%)	87 (30.9%)	56 (19.9%)	76 (27%)	2.55	0.783
Intranasal decongestants	60 (21.3%)	88 (31.2%)	64 (22.7%)	34 (12.1%)	36 (12.8%)	3.36	0.784
Oral corticosteroids	9 (3.2%)	39 (13.8%)	77 (27.3%)	67 (23.8%)	90 (31.9%)	2.33	0.789
Immunotherapy	10 (3.5%)	27 (9.6%)	67 (23.8%)	71 (25.2%)	107 (37.9%)	2.16	0.784
Intranasal antihistamine	46 (16.3%)	71 (25.2%)	61 (21.6%)	48 (17%)	56 (19.9%)	3.01	0.782
Combination of antihistamine and intranasal steroids	51 (18.1%)	92 (32.6%)	70 (24.8%)	18 (6.4%)	51 (18.1%)	3.26	0.792
Combination of antihistamine and leukotriene antagonists	24 (8.5%)	56 (19.9%)	68 (24.1%)	44 (15.6%)	90 (31.9%)	2.57	0.777
Combination of leukotriene antagonists and intranasal steroids	20 (7.1%)	62 (22%)	66 (23.4%)	37 (13.1%)	97 (34.4%)	2.54	0.778
In allergy testing, I use	Skin prick test.	Skin patch test.	Serum total IgE.	Serum-specific IgE.	Serum eosinophilia.	None of the above	0.826
	76 (27%)	14 (5%)	82 (29.1%)	30 (10.6%)	15 (5.3%)	65 (23%)	
I have to refer to an ENT specialist when I counter							
					1-Nasal crusting 46 (15.9%)		
					2-Unilateral nasal symptoms 136 (48.2%)		
					3- Nasal bleeding 129 (45.7%)		
					4- Nasal itching 17 (6.02%)		
					5- Nasal blocking (congestion) 25 (8.8%)		
					6- Persistent nasal obstruction after maximal medical therapy 235 (83.3%)		

the classification of AR into allergic and nonallergic (67%). Furthermore, most physicians did not consider specific allergy testing necessary to distinguish between them. This is a domain that needs to be improved as it may help guide the management. In line with the ARIA guidelines, it is necessary to perform specific allergy testing, and an accurate diagnosis of AR requires both medical history and skin prick/or IgE test to differentiate allergic from non-AR.^[19] In a study conducted in Philippines, clinical symptoms had a sensitivity of >80% and a specificity of 30% in comparison to skin prick tests in diagnosing AR.^[20]

Although the physicians claimed to have an awareness of the symptoms and severity of AR, this should be further evaluated in a separate questionnaire, e.g., by quizzing their knowledge of symptomatology.

Assessment of the primary health care physician's attitude

The majority of physicians (72%) agreed that the ARIA guidelines are effective in categorizing and treating patients with AR, which is nearly the same number as those who reported awareness of the guidelines. Most physicians reported that AR is diagnosed based on the similarity between a typical history of allergic symptoms and allergy testing, although most did not consider

specific allergy testing to be necessary. Second-generation oral antihistamines were considered the safest treatment option, followed by intranasal corticosteroids. Oral corticosteroids were considered the least safe, which is in line with ARIA guidelines and the literature.^[15,19] Further education is needed regarding the safety and side effects of first-generation antihistamine as most PHC physicians considered it to be safe. The majority of participants believed that various factors influence treatment compliance, with adverse effects being the most important.

Assessment of the primary health care physician's practice

The majority of PHC physicians diagnosed AR through clinical history, with allergy testing being more commonly used than nasal endoscopy. The common use of allergy testing could be attributable to the country's free government healthcare system. Studies from other countries report that allergy tests were not implemented in primary care due to high costs and lack of technical support.^[5,11,21] The preferred modality of testing was serum total IgE assessment, followed by a skin prick test. The nasal endoscopy was the least used due to the technical challenges of its use by a nonspecialized physician. In the treatment of AR, intranasal corticosteroids followed by oral antihistamines were the preferred medications, which is in line with the ARIA guidelines and the literature.^[5,15,19,22-26]

Limitations

There are a few limitations to the current study. First, the majority of the participants had <5 years of experience, and only a few had >10 years of experience. Most of the participants were residents despite that the majority of active PHC providers in Saudi Arabia are general practitioners, followed by residents. Finally, there is insufficient literature in Saudi Arabia for comparison; hence, further studies are needed to accurately represent the existing knowledge and ensure its generalizability.

Conclusion and Future Recommendations

Our study demonstrates the importance of education and awareness among PHCP in ensuring optimal treatment of AR patients. The use of ARIA guidelines should be implemented as the standard of care in AR, as PHCPs are the first ones to encounter patients with AR. This is crucial for better outcomes and the prevention of undertreatment and complications. A national consensus endorsing ARIA guidelines is also needed for better implementation.

Financial support and sponsorship

This study was supported by the College of Medicine Research Center, Deanship of Scientific Research, King Saud University, Riyadh, KSA.

Conflicts of interest

There are no conflicts of interest.

References

- Keith PK, Desrosiers M, Laister T, Schellenberg RR, Wasserman S. The burden of allergic rhinitis (AR) in Canada: Perspectives of physicians and patients. *Allergy Asthma Clin Immunol* 2012;8:7.
- Bousquet J, Van Cauwenberge P, Khaltaev N; Aria Workshop Group; World Health Organization. Allergic rhinitis and its impact on asthma. *J Allergy Clin Immunol* 2001;108:s147-334.
- Pawankar R, Bunnag C, Chen Y, Fukuda T, You-Young K, Le LT, *et al.* Allergic rhinitis and its impact on asthma update (ARIA 2008)-western and Asian-Pacific perspective. *Asian Pacific J Allergy Immunol* 2009;27:237-43.
- Bousquet J, Khaltaev N, Cruz AA, Denburg J, Fokkens WJ, Togias A, *et al.* World health organization; GA (2) LEN; AllerGen. allergic rhinitis and its impact on asthma (ARIA) 2008 update (in collaboration with the world health organization, GA (2) LEN and AllerGen). *Allergy* 2008;63(Suppl 86):8-160.
- Abdullah B, Snidvongs K, Recto M, Poerbonegoro NL, Wang Y. Primary care management of allergic rhinitis: A cross-sectional study in four ASEAN countries. *Multidiscip Respir Med* 2020;15:726.
- Katellaris CH, Lai CK, Rhee CS, Lee SH, De Yun W, Lim-Varona L, *et al.* Nasal allergies in the Asian-Pacific population: Results from the allergies in Asia-Pacific Survey. *Am J Rhinol Allergy* 2011;25 (5 Suppl):S3-15.
- Sobki SH, Zakzouk SM. Point prevalence of allergic rhinitis among Saudi children. *Rhinology* 2004;42:137-40.
- Alzahrani R, Alrayah M, Alzaidi AA, Almalki AH, Althaqafi AA, Alswat FH, *et al.* Prevalence of allergic rhinitis among the population in Al Baha city, Saudi Arabia. *IJMDC* 2020;4:2287-91.
- Van Hoecke H, Vastesaegeer N, Dewulf L, De Bacquer D, Van Cauwenberge P. Is the allergic rhinitis and its impact on asthma classification useful in daily primary care practice? *J Allergy Clin Immunol* 2006;118:758-9.
- Gregory C, Cifaldi M, Tanner LA. Targeted intervention programs: Creating a customized practice model to improve the treatment of allergic rhinitis in a managed care population. *Am J Manag Care* 1999;5:485-96.
- Wang DY, Chan A, Smith JD. Management of allergic rhinitis: A common part of practice in primary care clinics. *Allergy* 2004;59:315-9.
- Brozek JL, Bousquet J, Agache I, Agarwal A, Bachert C, Bosnic-Anticevich S, *et al.* Allergic rhinitis and its impact on asthma (ARIA) guidelines—2016 revision. *J Allergy Clin Immunol* 2017;140:950-8.
- Baldacci S, Maio S, Simoni M, Cerrai S, Sarno G, Silvi P, *et al.* The ARGA study with general practitioners: Impact of medical education on asthma/rhinitis management. *Respir Med* 2012;106:777-85.
- Bousquet J, Lund VJ, Van Cauwenberge P, Bremard-Oury C, Mounedji N, Stevens MT, *et al.* Implementation of guidelines for seasonal allergic rhinitis: A randomized controlled trial. *Allergy* 2003;58:733-41.
- Abdullah B, Kandiah R, Hassan NF, Ismail AF, Mohammad ZW. Assessment of perception, attitude, and practice of primary care practitioners towards allergic rhinitis practice guidelines: Development and validation of a new questionnaire. *World Allergy Organ J* 2020;13:100482.
- Yang HJ, Kim YH, Lee B, Kong DY, Kim DK, Kim MA, *et al.* Unmet primary physicians' needs for allergic rhinitis care in Korea. *Allergy Asthma Immunol Res* 2017;9:265-71.
- Baena-Cagnani CE, Mahashur A, Jawad J, Murrieta-Aguttes M, Tadros FA, Gharagozlou M, Mahmud T. Unmet needs in allergic rhinitis: International survey on management of allergic rhinitis by physician and patient: The optimal management (ISMAR 2 study). *World Allergy Organ J* 2015;8:A239-40.
- Prepageran N, De Yun Wang GN, Maurer M. The status quo and unmet needs in the management of allergic rhinitis and chronic rhinosinusitis: A Malaysian perspective. *Asia Pac Allergy* 2014;4:142-8.
- Klimek L, Bachert C, Pfaar O, Becker S, Bieber T, Brehler R, *et al.* ARIA guideline 2019: Treatment of allergic rhinitis in the German health system. *Allergo J Int* 2019;28:255-76.
- Castor MAR, Recto MT, Sumpaico MW. Correlation of skin prick test with symptoms and physical examinations finding in allergic rhinitis among Filipino Children. *Phil J Allergy Asthma Immunol* 2016;19:19-28.
- Van Hoecke H, Vastesaegeer N, Dewulf L, Sys L, van Cauwenberge P. Classification and management of allergic rhinitis patients in general practice during pollen season. *Allergy* 2006;61:705-11.
- Navarro-Locsin CG, Romualdez JA. Attitudes, practices on allergic rhinitis of generalists and specialists in Philippine National Capital Region. *Asia Pac Allergy* 2015;5:203-9.
- Passalacqua G, Musarra A, Senna G, Bousquet J, Ferrara C, Lonati C, *et al.* Physicians' prescribing behaviour and clinical

- practice patterns for allergic rhinitis management in Italy. *Clin Mol Allergy* 2020;18:20.
24. Wang DY. Management of allergic rhinitis in general practitioners. *Asia Pac Allergy* 2012;2:233-6.
25. Al-Rasheedi AN. Knowledge of, attitudes towards, and practices of intranasal corticosteroids usage among the allergic rhinitis patients of Northern Saudi Arabia: A cross-sectional study. *Healthcare* 2023;11:537.
26. Bhargave C, Verma M, Jakes RW, Okamoto Y. Knowledge and attitude among patients and physicians on allergic rhinitis (KAPPA): An international survey. *J Asthma Allergy* 2022;15:1645-64.