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The attitude and practices of patients regarding self-management of Allergic Rhinitis

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ABSTRACT

Introduction: Allergic rhinitis that is loosely termed as hay fever is an allergic reaction involving inflammation of the upper respiratory tract and involve symptoms of sneezing, runny nose with blockage and itching. The present study was conducted to observe the general population's attitude towards management of Allergic rhinitis and their practices related to its prevention and treatment. *Methods:* The present cross-sectional study recruited physician diagnosed Allergic rhinitis patients visiting community pharmacies of Lahore, on a structured questionnaire that was further divided into two sections: Attitude and Practices related questions. The questionnaire was completed by a population of 240 Allergic rhinitis patients. The present study spanned over the time duration of eight months. *Results:* Out of 240 respondents, only 29.6% of the study subjects presented a positive attitude regarding the management of Allergic rhinitis. While 70.4% of the study subjects presented negative attitude. As for the practices regarding the management of Allergic rhinitis, 27.1% of the respondents were observed to have good practices, while 72.9% presented poor practices. Among demographic variables, gender and educational status of the respondents were positively associated with the attitude and practices related to the management of Allergic rhinitis. The p-values <0.05 were considered statistically significant. *Conclusion:* This study reveals a significant deficiency in the attitude and practices among respondents, highlighting the need for targeted education and intervention. Positive attitude and practices are essential to promote good practices that would lead to better disease management and clinical outcomes.

Keywords: Allergic Rhinitis; Attitude; Practices; Treatment; Prevention.

1. INTRODUCTION

Allergic rhinitis is a heterogeneous disorder characterized by symptoms which are varied, include sneezing, nasal congestion or blockage, nasal itching and rhinorrhea (Bousquet et al., 2020). It is an immunological response to inhaled allergens that is mediated by immunoglobulin E (IgE) and involves type 2 cell-driven mucosal inflammation. The expression of the allergic rhinitis is significantly influenced by environmental variables (Bousquet et al., 2020). It is a worldwide health burden that deteriorates general health and quality of life by creating co-morbidities such conjunctivitis, sinusitis, asthma, and nasal polyps (Papadopoulos and Guibas, 2016). Though, this condition is often overlooked and regarded as a minor ailment, typically managed with over-the-counter medications (Papadopoulos and Guibas, 2016).

It is broadly categorized into two main types: allergic rhinitis and non-allergic rhinitis (Bousquet et al., 2020). Non-Allergic Rhinitis (NAR) is caused by non-allergic stimuli that are neither infectious or allergic, such as changes in the weather, exposure to caustic scents or cigarette smoke, and changes in barometric pressure. NAR also results in negative systemic IgE test findings (Tran et al., 2011). Allergic rhinitis is a common condition that affects as many as 10-20% of people globally (Papadopoulos and Guibas, 2016). Two important worldwide studies on the prevalence of allergic illnesses in children (International Study of Asthma and Allergy in Childhood, ISAAC) and adults (European Community Health Survey, or ECRHS) were conducted between 1990 and 2010 (Bousquet et al., 2020).

Studies on AR indicates that allergic rhinitis often develops early in life, with a prevalence exceeding 5% by the age of three (Papadopoulos and Guibas, 2016). The ISAAC phase III study found that the prevalence of AR ranged from 8.5% in children aged 6-7 to 14.6% in children aged 13-14 (Bousquet et al., 2020). This condition's incidence varies greatly throughout Asia, ranging from 27% in South Korea to 32% in the United Arab Emirates (Chong and Chew, 2018). The Prevalence of allergic rhinitis symptoms in Pakistan has been reported to be 28.58% (Hasnain et al., 2009). According to a United States study, 38.8% of patients with both seasonal and perennial allergic rhinitis had good symptom control, 47.6% had persistent symptoms, 50% were taking two or more medications for the condition, and 62.6% of patients had moderate to severe allergic rhinitis (Schatz, 2007).

The classic symptoms of allergic rhinitis, such as sneezing, rhinorrhea, nasal congestion, and nasal itching, are commonly reported by patients (Chong and Chew, 2018). AR is additionally linked with allergic conjunctivitis, which presents as eye discomfort, redness, and tears (Hasnain et al., 2009). External indicators of allergic rhinitis include frequent sniffling or clearing of the throat, rubbing at the nose or a transverse nasal fold, and allergic shiners, which are dark circles beneath the eyes resulting from nasal congestion (Small et al., 2011). An examination of the nose generally reveals nasal polyps, structural variations, pale and thin secretions, and nasal mucosal edema (Hasnain et al., 2009).

Four fundamental approaches are used to treat individuals with AR; these approaches are frequently used in combination: prescription drugs or Pharmacotherapy, allergen immunotherapy, patient education, and avoiding allergens (Papadopoulos and Guibas, 2016). Glucocorticoids (oral and intranasal), H1 receptor antagonists (second-generation H1-antihistamines) (oral and intranasal), antileukotrienes, ipratropium bromide (oral and intranasal), α-sympathomimetics (oral and intranasal), saline solutions (intranasal), anti-IgE antibodies (subcutaneous), and hormones (intranasal) are among the drug classifications used in pharmacotherapy (Emeryk et al., 2019). If a patient exhibits one or more symptoms consistent with allergic rhinitis, the condition is diagnosed clinically (Schatz, 2007).

In cases where the causative allergen needs to be targeted, allergy testing is often advised to search for certain IgE antibodies (Emeryk et al., 2019). When a patient has a clear diagnosis of AR, routine sino-nasal imaging is not recommended (Small et al., 2011). Topical steroids are strongly recommended if the patient's quality of life is being adversely affected by the symptoms of allergic rhinitis (Emeryk et al., 2019). It is highly recommended to use non-sedating second-generation antihistamines for main complaints of sneezing and itching (Schatz, 2007). Oral leukotriene receptor antagonists (LTRAs) are not recommended as the primary treatment for patients with allergic rhinitis (Emeryk et al., 2019). Combination pharmacologic therapy may be employed to treat AR patients when pharmacologic monotherapy is not enough (Hasnain et al., 2009).

When pharmacologic therapy, with or without environmental restrictions, is insufficient to relieve symptoms in patients with AR, clinicians should offer sublingual or subcutaneous immunotherapy (Seidman et al., 2015). According to the ARIA Pocket Guide for Pharmacists (2003), pharmacists should choose to treat allergic rhinitis in three groups based on the severity and frequency of

symptoms: Mild-intermittent, mild persistent/moderate-severe intermittent, and moderate-severe persistent (Emeryk et al., 2019). Oral H1-blockers, nasal H1-blockers, decongestants, nasal chromones, or nasal saline are the recommended therapies for mild intermittent symptoms (Hasnain et al., 2009). Treatment options for mild chronic or moderate-severe intermittent symptoms are similar and include nasal H1-blockers, oral H1-blockers, decongestants, and nasal steroids (Seidman et al., 2015).

After 7–15 days of treatment, more intervention is recommended if no progress is seen. Referring the patient to a doctor is advised for moderate-to-severe persistent symptoms (Todorova et al., 2017). Pollens, ragweed, house dust mites, cockroach droppings, animal allergens, specific chemicals, molds, scents, and passive smoking are only a few examples of the variety of environmental allergens (Chong and Chew, 2018). There will be a list of additional factors soon, including menstruation, exercise, pregnancy, ciliary dyskinesia syndrome, and nasal polyposis (Emeryk et al., 2019). Aspirin, oral contraceptives, and nasal decongestants are some of the medications that might cause allergic rhinitis and rhinitis medicamentosa (Skoner, 2001). According to statistics gathered over a 6-day period from patients in 22 different nations, 27.2% of all AR patients do not take their medications as directed.

Of these, only 11.3% took their medications as directed and at the appropriate times (MPR ≥70% and PDC ≤1.25). When they feel better, the majority of patients stop receiving treatment (Menditto et al., 2019). Individuals with allergic rhinitis frequently self-medicate themselves (Todorova et al., 2017). Since pharmacists are the most approachable medical professionals, they can help patients fill in the knowledge gaps about allergies and other comorbidities like asthma. Patients with allergies are often unaware of the life-threatening consequences of their condition till it has progressed (Shahid, 2024). Patient's quality of life can be enhanced by pharmacist's effective guidance in managing mild chronic and intermittent allergic rhinitis (Todorova et al., 2017).

2. METHODOLOGY

Study Design & Setting

The present study is a cross-sectional observational study, in which the data was collected from Allergic rhinitis patients visiting different community pharmacies of Lahore, Pakistan. This study was conducted for a duration of eight months. The study population comprised of adult patients of the age 18 and above.

Ethical Considerations

Ethical Approval was attained by the university ethical review board (ERB) and the study was carried out strictly following the guidelines and protocols. Upon enrolment of the study subjects, the detailed information of the study regarding methodology and purpose was informed to the patients. The personal information of participants was kept confidential. Participants were informed that they could easily withdraw from the study anytime.

Inclusion & Exclusion criteria

The physician diagnosed Allergic rhinitis adult patients were recruited for the present study. The patients with co-morbidities especially asthma and COPD were excluded along with the patients who did not presented consent to participate in the study. Based on the inclusion criteria, a total of 240 study subjects of both genders were recruited in the study.

Data Collection

The data was collected from the Allergic rhinitis patients visiting community pharmacies, upon consent to participate in the study. The data collection form consisted of demographic variables of the study subjects including age, gender, occupation, marital status, education, source of information regarding allergic rhinitis and presence of health care professional in immediate family. However, self-designed and validated questionnaire was utilized for accessing attitude and practices of the Allergic rhinitis patients.

The questionnaire was designed based upon the extensive literature review and validated through expert validation, face validation and pilot study. Questionnaire was divided into 2 sections containing 10 questions for attitude and practices each, provided 5 item Likert scale for grading. According to Bloom's criteria, 60% was considered the cut off ratio for assessment. The knowledge of the respondents was categorized as appropriate, if 60% of the questions were answered correct. In the similar manner, positive attitude along with the good practices were divided into categories upon 60% of the positive and correct scores.

Statistical Analysis

The statistical software SPSS version 21.0 was used for the statistical analysis of the collected data of the present study. The p-value <0.05 was considered statistically significant.

3. RESULTS

A total of 240 study subjects were included in the current study, the demographic variables are mentioned in the (Table 1). However, the attitude and practices frequencies are summarized in the table 2, and graphically represented in (Figure 1). Table 3 presents the response of participants upon attitude related question items. While, table-4 presents the response of participants regarding the practices related questions.

Table 1 Demographic characteristics of the study subjects (N=240)

No.	Variables	Categories	N (%)
1	Gender	Male	100 (41.7)
		Female	140 (58.3)
2	Age	Less than 20	39 (16.3)
		20-25 years	182 (75.8)
		25-30 years	09 (3.8)
		30 years and above	10 (4.2)
3	Occupation	Student	195 (81.3)
		Corporate job holder	23 (9.6)
		Businessman	5 (2.1)
		Housewife	12 (5)
		Jobless	2 (0.8)
		Others	3 (1.3)
4	Education	Secondary	47 (19.6)
		Bachelors	177 (73.8)
		Masters	16 (6.7)
5	Marital status	Married	32 (13.3)
		Unmarried	208 (86.7)
6	Healthcare professional in family	Yes	144 (60)
		No	96 (40)
7	Source of information	Seminars	6 (2.5)
		Research articles	21 (8.8)
		Literature brochures	156 (65)
		Medical magazines	4 (1.7)
		Workshops	2 (0.8)
		Social media platforms	51 (21.3)

Table 2 Attitude and Practices of respondents regarding Allergic rhinitis

No.	Variable	Categories	N (%)
1	Attitude	Positive	71 (29.6)
		Negative	169 (70.4)
2	Practices	Good	65 (27.1)
		Poor	175 (72.9)

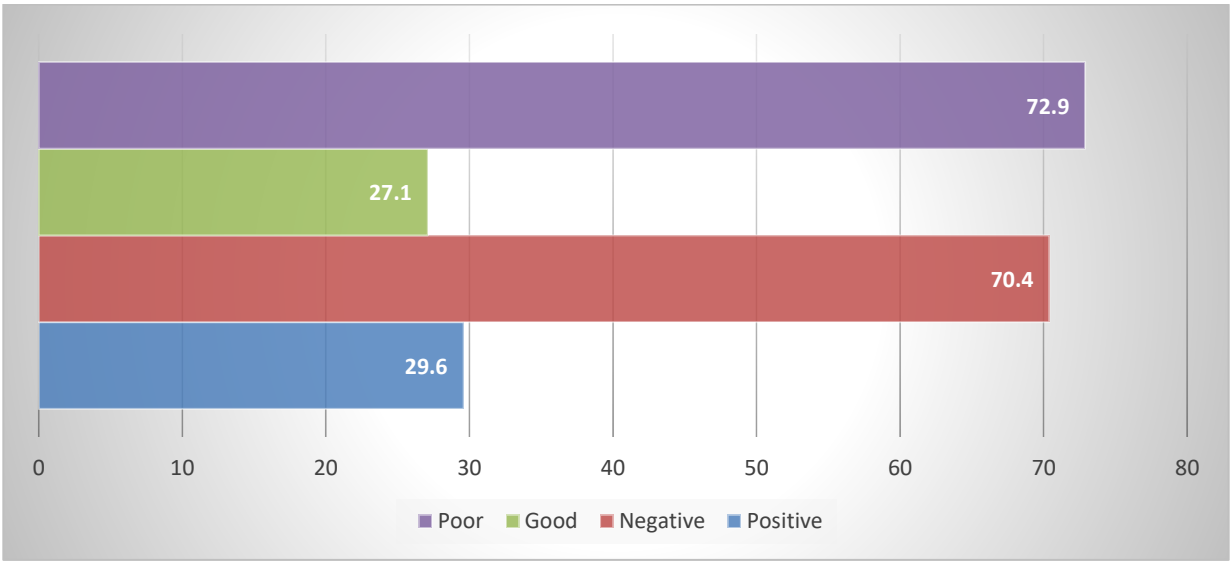

Figure 1 Practices (Poor and Good) and Attitude (Negative and positive) of patients regarding Allergic rhinitis

Table 3 The response of participants upon attitude related questions of AR- N (%)

No	Questions	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
1	I will avoid foods that trigger my rhinitis symptoms.	119 (49.6)	46 (19.2)	14 (5.8)	33 (13.8)	28 (11.7)
2	Do you believe allergic rhinitis is not curable over time?	73 (30.4)	86 (35.8)	41 (17.1)	31 (12.9)	9 (3.8)
3	Are accurate allergen identification tests necessary to combat the disease?	75 (31.3)	51 (21.3)	48 (20)	47 (19.6)	19 (7.9)
4	Do you think living with allergic rhinitis affects quality of life?	90 (37.5)	29 (12.1)	35 (14.6)	68 (28.3)	18 (7.5)
5	Reducing exposure to trigger allergens will help alleviate symptoms	94 (39.2)	47 (19.6)	19 (7.9)	55 (22.9)	25 (10.4)
6	Asthma symptoms may exacerbate due to presence of allergic rhinitis?	64 (26.7)	26 (10.8)	32 (13.3)	78 (32.5)	40 (16.7)
7	Is headache frequent and common, symptom of allergic rhinitis?	70 (29.2)	46 (19.2)	54 (22.5)	51 (21.3)	19 (7.9)
8	Is compliance with medications and precautionary measures necessary?	71 (29.6)	40 (16.7)	44 18.3)	63 (26.3)	22 (9.2)
9	Should AR be treated according to standardized medical protocol?	130 (54.2)	8 (3.3)	30 (12.5)	47(19.6)	25 (10.4)
10	Are Herbal remedies not effective for long term treatment of AR?	60 (25)	46 (19.2)	44(18.3)	35 (14.6)	55 (22.9)

Table 5 presents the association of demographic variables with the participant's attitude. Gender was observed to be positively associated with attitude regarding Allergic rhinitis, presenting that females have better attitudes as compared to male regarding the management of Allergic rhinitis.

Table 4 The response of participants upon practices related questions of AR- N (%)

No	Questions	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
1	I believe that AR can cause serious complication in asthma patient's	123 (51.2)	39 (16.3)	15 (6.3)	39 (16.3)	24 (10)
2	I take precautionary measures for the avoidance of occurrence of symptoms	109 (45.4)	47 (19.6)	15 (6.3)	48 (20)	21 (8.8)
3	In my perception AR is more targeted in immunosuppressed individuals.	61 (25.4)	69 (28.7)	52 (21.7)	37 (15.4)	21 (8.8)
4	I pay visit to physician on occurrence of the symptoms of AR	41 (17.1)	61 (25.4)	59 (24.6)	68 (28.3)	11 (4.6)
5	I use steroid nasal sprays and antihistamine to cure symptoms	72 (30)	66 (27.5)	29 (12.1)	59 (24.6)	14 (5.8)
6	I strictly follow the doctor's instruction during treatment	83 (34.6)	49 (20.4)	26 (10.8)	63 (26.3)	19 (7.9)
7	I do not prefer taking OTC drugs without consulting a physician	47 (19.6)	73 (30.4)	38 (15.8)	43 (17.9)	39 (16.3)
8	I use OTC drugs to combat headache or sinus pain due to AR	95 (39.6)	73 (30.4)	22 (9.2)	36 (15.0)	14 (5.8)
9	I believe vaccines are not available in Pakistan to prevent symptoms of AR	121 (50.4)	55 (22.9)	29 (12.1)	25 (10.4)	10 (4.2)
10	I think there is no specific allergic center in Pakistan for permanent cure of AR	57 (23.8)	71 (29.6)	32 (13.3)	35 (14.6)	45 (18.8)

Table 5 The association of demographic variables with respondents' attitude

No	Variables	Categories	Attitude Category		*p-value*	η2
			Positive	Negative		
1	Gender	Male	14	86	<.001	.305
		Female	57	83		
2	Age	Less than 20	10	29	.420	-
		20-25 years	58	124		
		25-30 years	2	7		
		30 years and above	1	9		
3	Occupation	Student	59	136	.734	-
		Corporate job holder	6	17		
		Businessman	4	5		
		Housewife /jobless	5	8		
4	Education	Bachelor's	62	115	.006	.040
		Secondary	8	39		
		Masters	1	15		
5	Marital status	Married	9	23	.846	-
		Unmarried	62	146		
6	Healthcare professional in family	Yes	42	102	.790	-
		No	29	67		
7	Source of information	Literature brochures	36	120	.024	.135

		Research articles	11	10		
		Workshops	2	0		
		Seminars	4	2		
		Medical magazines	3	1		
		Social media	19	32		

**Pearson Chi-square*

Table 6 presents the association of demographic variables with the practices of participants regarding the management of Allergic rhinitis. According to the results, females presents better practices as compared to male regarding the management of Allergic rhinitis.

Table 6 The association of demographic variables with respondents' practices

No	Variables	Categories	Practices Category		*p-value*	η2
			Good	Poor		
1	Gender	Male	18	82	.016	.158
		Female	49	91		
2	Age	Less than 20	13	26	.501	-
		20-25 years	49	133		
		25-30 years	2	7		
		30 years and above	1	9		
3	Occupation	Student	56	139	.387	-
		Corporate job holder	3	20		
		Businessman	4	5		
		Housewife /jobless	4	9		
4	Education	Bachelor's	54	123	.068	-
		Secondary	10	37		
		Masters	1	15		
5	Marital status	Married	9	23	.887	-
		Unmarried	56	152		
6	Healthcare professional in your family	Yes	37	107	.675	-
		No	28	67		
7	Source of information	Literature brochures	35	121	.304	-
		Research articles	10	11		
		Workshops	2	0		
		Seminars	4	2		
		Medical magazines	2	2		
		Social media	17	34		

**Pearson Chi-square*

4. DISCUSSION

The symptoms of allergic rhinitis, an illness caused by allergens and characterized by inflammation of the nasal membrane caused by IgE antibodies, include sleep disturbance, mood swings, and fatigue, all of which negatively impact quality of life. It can be mistaken for asthma and nasal polyps (Shahid, 2024). A self-developed questionnaire is used in the current study to gather information on patients' attitudes and practices around self-management of allergic rhinitis. Students made up the majority of the study's respondents. At baseline, the respondents in this study had a negative attitude about allergic rhinitis. In terms of self-management of allergic rhinitis, women have a better attitude and practice than men, according to demographics.

In the same way, a cross-sectional study at Zhejiang University School of Medicine in China revealed inadequate attitude and knowledge during the baseline survey (Fan et al., 2024). In Khartoum State, Sudan, a cross-sectional study was carried out, and the participants had sufficient knowledge, attitudes, and practices in managing allergic rhinitis on their own (Mohammed et al., 2022). Age, occupation, and marital status have little impact on the attitudes and behaviors related to allergic rhinitis in the current study. The majority of respondents (49.6%) expressed the belief that avoiding trigger foods won't stop the symptoms of allergic rhinitis.

However, the majority of participants (51.2%) do not think that asthma patients could experience significant effects from allergic rhinitis. 656 patients with allergic rhinitis participated in a similar cross-sectional observational study at Zhangjiagang Hospital in China. The study's mean attitude score was 29.51 ± 3.52, indicating a negative attitude and management practices for the illness, necessitating patient education and counseling (Gu et al., 2023). However, the findings of a different cross-sectional study on parents of children with allergic rhinitis in Ningbo, China, showed that while parents had a lack of knowledge about the condition, they also had positive attitudes and practices for managing it (364 out of 480 participants) (Lu et al., 2024).

Out of the 240 participants in the current study, 27.1% (65) have good practices with allergic rhinitis, whereas 72.9% (175) have bad practices. This indicates that the baseline level of practice about allergic rhinitis is low. Precautionary actions to prevent the emergence of symptoms are not practiced by the majority of patients, 45.4%. However, the majority of patients (34.6%) do not adhere to their doctor's instructions for treating allergic rhinitis. The most likely cause may be the patient's lack of education and counseling from medical professionals. Improving patient satisfaction through counseling and education could greatly improve the patients' adherence attitude (Shahid, 2024).

The current study found no statistically significant correlation between patients' attitudes and practices regarding the management of allergic rhinitis and the presence of a healthcare professional in the family. These findings, however, contradict with a cross-sectional study carried out in Lahore, Pakistan, which showed a statistically significant positive correlation between students' attitudes and practices about oral health and cleanliness and the presence of a healthcare provider in the family (Shahid et al., 2024b). The study presented a statistically significant association between the presence of healthcare provider in family and attitude and practices of individuals (Shahid et al., 2024a).

The results from the current study highlights the importance of patient counselling and education in enhancing the medication adherence, resulting in improved clinical outcomes. According to the current study, patient education and counseling are necessary to improve adherence to doctor's prescriptions. To raise knowledge of allergic rhinitis, public health awareness campaigns need to be carried out. In the meantime, the general public's ability to manage their own allergic rhinitis would be greatly enhanced by these awareness initiatives. When providing over-the-counter (OTC) medications, pharmacists on the front lines may be able to provide important patient education and counseling (Shahid et al., 2022).

5. CONCLUSION

This study shows the levels of attitude and practices regarding allergic rhinitis among the patients. The results indicate a notable gap in knowing the condition, which ultimately leads to insufficient management and possible aggravation of symptoms. For this there is a need of educational intervention to enhance awareness regarding Allergic rhinitis, that would lead to a positive attitude and that ultimately leads to good practices.

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Author Contributions

Author TA, AH and FA collected data from study subjects and performed initial statistical analysis. Author EA, AY, UK, MQ, UY and SS wrote the initial draft of the manuscript. Author MZA and SS performed refined statistical analysis for the final manuscript. All authors contributed in the preparation of the final manuscript.

Ethical approval

The present study has been granted ethical approval by the Institutional Ethical Review Board and the Bio-Ethical Committee (BEC) of Lahore University of Biological & Applied Sciences and allotted a protocol approval number: ERB-PHRMD-DPP/4468-A.

Informed consent

Written & Oral informed consent was obtained from all individual participants included in the study. Additional informed consent was obtained from all individual participants for whom identifying information is included in this manuscript.

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Conflict of interest

The authors declare that there is no conflict of interests.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

REFERENCES

1. Bousquet J, Anto JM, Bachert C, Baiardini I, Bosnic-Anticevich S, Walter CG, Melén E, Palomares O, Scadding GK, Togias A, Toppila-Salmi S. Allergic rhinitis. Nat Rev Dis Primers 2020; 6 (1):95. doi: 10.1038/s41572-020-00227-0
2. Chong SN, Chew FT. Epidemiology of allergic rhinitis and associated risk factors in Asia. World Allergy Organ J 2018; 11 (1):17. doi: 10.1186/s40413-018-0198-z
3. Emeryk A, Emeryk-Maksymiuk J, Janeczek K. New guidelines for the treatment of seasonal allergic rhinitis. Postepy Dermatol Alergol 2019; 36(3):255-260. doi: 10.5114/ada.2018.75749
4. Fan X, Zhang J. Knowledge, Attitudes, and Practices of Patients with Allergic Rhinitis Towards Allergen-Specific Immunotherapy. Patient Prefer Adherence 2024; 18:1531-1545. doi: 10.2147/PPA.S468957
5. Gu W, Yan D, Yuan Z, Jiang X, Qian Y, Dong H, Shen Z. Knowledge, attitudes, and practice towards allergic rhinitis in patients with allergic rhinitis: a cross-sectional study. BMC Public Health 2023; 23(1):1633. doi: 10.1186/s12889-023-16607-6
6. Hasnain SM, Khan M, Saleem A, Waqar MA. Prevalence of asthma and allergic rhinitis among school children of Karachi, Pakistan, 2007. J Asthma 2009; 46(1):86-90. doi: 10.1080/02770900802513023
7. Lu L, Feng J, Zhu L, Chen A, Chen X, Lu Y. Knowledge, attitude, and practice toward allergic rhinitis among parents in Ningbo, China. BMC Public Health 2024; 24(1):1310. doi: 10.1186/s12889-024-18581-z
8. Menditto E, Costa E, Midão L, Bosnic-Anticevich S, Novellino E, Bialek S, Briedis V, Mair A, Rajabian-Soderlund R, Arnavielhe S, Bedbrook A, Czarlewski W, Annesi-Maesano I, Anto JM, Devillier P, De-Vries G, Keil T, Sheikh A, Orlando V, Larenas-Linnemann D, Cecchi L, De-Feo G, Illario M, Stellato C, Fonseca J, Malva J, Morais-Almeida M, Pereira AM, Todo-Bom AM, Kvedariene V, Valiulis A, Bergmann KC, Klimek L, Mösges R, Pfaar O, Zuberbier T, Cardona V, Mullol J, Papadopoulos NG, Prokopakis EP, Bewick M, Ryan D, Roller-Wirnsberger RE, Tomazic PV, Cruz AA, Kuna P, Samolinski B, Fokkens WJ, Reitsma S, Bosse I, Fontaine JF, Laune D, Haahtela T, Toppila-Salmi S, Bachert C, Hellings PW, Melén E, Wickman M, Bindslev-Jensen C, Eller E, O'Hehir RE, Cingi C, Gemicioğlu B, Kalayci O, Ivancevich JC, Bousquet J; MASK group. Adherence to treatment in allergic rhinitis using mobile technology. The MASK Study. Clin Exp Allergy 2019; 49(4):442-460. doi: 10.1111/cea.13333
9. Mohammed IA, Shantier SW, Elhag EA, Osman W. Assessment of knowledge, attitude, and practice of community pharmacists towards allergic rhinitis and its management in Khartoum state: A cross-sectional survey. Inf Med Unlocked 2022; 32:101020 doi: 10.1016/J.IMU.2022.101020.
10. Papadopoulos NG, Guibas GV. Rhinitis Subtypes, Endotypes, and Definitions. Immunol Allergy Clin North Am 2016; 36(2): 215-33. doi: 10.1016/j.iac.2015.12.001

11. Schatz M. A survey of the burden of allergic rhinitis in the USA. Allergy 2007; 62 Suppl 85:9-16. doi: 10.1111/j.1398-9995.2007.01548.x
12. Seidman MD, Gurgel RK, Lin SY, Schwartz SR, Baroody FM, Bonner JR, Dawson DE, Dykewicz MS, Hackell JM, Han JK, Ishman SL, Krouse HJ, Malekzadeh S, Mims JW, Omole FS, Reddy WD, Wallace DV, Walsh SA, Warren BE, Wilson MN, Nnacheta LC; Guideline Otolaryngology Development Group. AAO-HNSF. Clinical practice guideline: Allergic rhinitis. Otolaryngol Head Neck Surg 2015; 152(1 Suppl):S1-43. doi: 10.1177/0194599814561600
13. Shahid S, Ahmed F, Shahnaz G, Saqlain M, Ans M, Sana A, Ali AN, Jamil AK, Khan AF, Naeem S, Ahmad S. The impact of theoretical and practical guidance regarding metered dose inhaler technique on asthma patients. J Young Pharm 2022; 14 (3):327-332. doi: 10.5530/jyp.2022.14.64
14. Shahid S, Ayesha M, Aslam F, Riaz J, Jamil L, Zaman M, Essa S, Rauf SA, Chaudhry M, Mairaj Z, Un-nisa M, Iqbal MZ. Evaluation of knowledge, attitude and perceptions of future health care professionals on Japanese Encephalitis. Med Sci 2024a; 28:e57ms3365. doi: 10.54905/disssi.v28i148.e57ms3365
15. Shahid S, Malik A, Javed E, Ayesha M, Fahad M, Mughal M, Qamar A, Qamar M, Bajwa A, Khan R, Iqbal MZ. Evaluation of knowledge, attitude and practices of oral health and hygiene among the future health care providers. Med Sci 2024b; 28:e109ms3424. doi: 10.54905/disssi.v28i150.e109ms3424
16. Shahid S. The Effect of Pharmacist Involvement Upon the Satisfaction with Inhalers (FSI-10) among Asthma Patients. J Young Pharm 2024; 16(1). doi: 10.5530/jyp.2024.16.15
17. Skoner DP. Allergic rhinitis: definition, epidemiology, pathophysiology, detection, and diagnosis. J Allergy Clin Immunol 2001; 108(1 Suppl):S2-8. doi: 10.1067/mai.2001.115569
18. Small P, Keith PK, Kim H. Allergic rhinitis. Allergy Asthma Clin Immunol 2011; 7 (Suppl 1):S3. doi: 10.1186/1710-1492-7-S1-S3
19. Todorova A, Tsvetkova A, Mihaylova S, Andreevska K, Kondova A, Arnaoudova M. The impact of pharmaceutical care on improving the quality of life in patients with allergic rhinitis. In CBU Int Conf Innov Sci Educ 2017; 5:1022-1027. doi: 10.12955/cbup.v5.1064
20. Tran NP, Vickery J, Blaiss MS. Management of rhinitis: allergic and non-allergic. Allergy Asthma Immunol Res 2011; 3(3):148-56. doi: 10.4168/aair.2011.3.3.148