

Knowledge gaps regarding Allergic Rhinitis among the patients visiting community pharmacies of Lahore, Pakistan

Abstract:

Introduction:

Allergic rhinitis is a varied disorder characterized by symptoms such as sneezing, nasal blockage, nasal itching, and a runny nose. This study assessed the knowledge of patients about Allergic rhinitis and to identify knowledge gaps in patient's understanding along with the factors that may impact knowledge regarding the disease.

Methods:

A cross-sectional observational study design was implemented to collect data from patients visiting community pharmacies of Lahore on a structured questionnaire (self-developed) containing 12 items related to knowledge. The questionnaire was distributed to physician diagnosed Allergic rhinitis patients. The questionnaire with closed-ended questions was completed by 240 participants of both genders as sampled through random sampling procedure. The study spanned over a period of eight months.

Results:

Among 240 respondents, 81.3% were students and majority were female (58.3%). It revealed that only 33.3% of respondents demonstrated adequate knowledge about Allergic rhinitis, while 66.7% demonstrated inadequate knowledge. Among demographic variables, female respondents presented better knowledge compared to the male population. Moreover, education status was positively associated with knowledge of respondents. Low education status of study subjects was observed to be the reason for knowledge gap among respondents. The p -values < 0.05 were considered statistically significant.

Conclusion:

This study highlights a significant gap in respondent's knowledge, emphasizing the need for targeted education and intervention. Low literacy rate was the major factor negatively associated with respondents' knowledge of Allergic rhinitis. Improved knowledge is crucial to promoting good practices and achieving desired outcomes. Educational interventions and seminars should be conducted at public health sectors to enhance awareness in the general population.

KEYWORDS: Allergic Rhinitis; Knowledge; Treatment; Prevention; Educational Intervention

1. INTRODUCTION

Allergic rhinitis is a heterogeneous disorder characterized by symptoms such as; sneezing, nasal congestion/obstruction, nasal itching and runny nose.[1] It is an immunoglobulin E (IgE) - mediated immune reaction to inhaled allergens involving mucosal inflammation driven by type 2 cells. Environmental factors play a key role in the expression of the disease.[1] It is a global health burden causing certain co morbidities such as asthma, sinusitis, nasal polyps, and conjunctivitis deteriorating overall health and quality of life.[1] However, it remains an underestimated and frequently dismissed illness, often seen as little more than a minor illness treated by over-the-counter drugs. [2]

It is classified into two major categories allergic and non-allergic rhinitis.[1] Stimuli that are neither allergic nor contagious such as weather changes, exposure to caustic odors or cigarette smoke, variations in barometric pressure are causes of (Non-Allergic Rhinitis) NAR and it also gives negative systemic IgE test results. [3]

Allergic rhinitis is a prevalent condition that impacts as many as 10-20% of people worldwide. [2] Between 1990 and 2010, two significant international studies were done on the prevalence of allergic diseases in adults (European Community Health Survey, ECRHS) and children (International Study of Asthma and Allergy in Childhood, ISAAC).[1]These investigations revealed that AR begins early in life, having a frequency of over 5% at three years of age.[2] According to the phase III study of ISAAC, the prevalence of AR varied from 8.5% in 6-7 years old to 14.6% in 13-14 years old.[1] The incidence of this condition varies widely across Asia, from 27% in South Korea to 32% in UAE. [4] Prevalence of allergic rhinitis symptoms in Pakistan are 28.58% [5] A study in USA reported 62.6% of patients with moderate or severe disease, 47.6% patients with persistent symptoms, 50% patients using two or more AR medications and 38.8% patients with good symptom control (Seasonal Allergic Rhinitis and Perennial Allergic Rhinitis). [6]

Patients frequently report the following traditional symptoms of allergic rhinitis: nasal congestion, nasal itching, rhinorrhea and sneezing. [5]Allergic conjunctivitis manifested by itching, tears, and redness of the eyes is also linked with AR.[6]External cues that could indicate allergic rhinitis consist of persistent mouth breathing, rubbing of the nose or a transverse nasal-crease, sniffing or throat clearing and allergic shiners (dark circles under the eyes that are due to nasal congestion). [4] Nose examination usually reveals swelling and pallor of the nasal mucosa,

clear and thin secretions, structural abnormalities (Turbinate hypertrophy), and nasal polyps (in some patients).[6] The treatment of patients with AR consists of: patient education, allergen avoidance, pharmacotherapy and allergen immunotherapy. [2] Pharmacotherapy includes the following drug categories: Glucocorticoids (Intranasal, Oral-for severe cases), (Second-Generation H1-Antihistamines) (Oral/Intranasal), Antileukotrienes, Ipratropium bromide (Intranasal), α -sympathomimetics (intranasal, oral), Saline solutions (Intranasal) and Anti-IgE antibodies (Subcutaneous)[7].

The clinical diagnosis of allergic rhinitis is done if the patient presents with two or more symptoms in line with the disease. [7] Allergy testing is also recommended to check specific IgE antibodies where causative allergen is needed to target. [8] Performing sino-nasal imaging routinely is not recommended in patients showing a clear diagnosis of AR. [4] If allergic rhinitis symptoms are strongly affecting the patient's quality of life negatively, topical steroids are strongly recommended. [8] For primary complaints of itching and sneezing, non-sedating second generation antihistamines are strongly recommended. [7] Oral leukotriene receptor antagonists LTRAs are not recommended as a primary therapy for AR patients. [8] When pharmacologic monotherapy is insufficient for treating AR patients, combined pharmacologic therapy may be used. [6] Clinicians should provide sublingual or subcutaneous immunotherapy to individuals with AR when pharmacologic therapy, with or without environmental restrictions, is not enough to alleviate their symptoms. [8]

The selection of allergic rhinitis treatment by pharmacist, as recommended in the **ARIA Pocket Guide for Pharmacist (2003)**[9]. is categorized into three groups depending on intensity and frequency of symptoms mild-intermittent, mild persistent/moderate-severe intermittent, and moderate-severe persistent.[8] For mild intermittent symptoms, the recommended treatment options include an oral H1-blocker, a nasal H1-blocker, a decongestant, a nasal chromone, or nasal saline.[6] For mild persistent or moderate-severe intermittent symptoms, the treatment options are similar, including an oral H1-blocker, a nasal H1-blocker, a decongestant, a nasal steroid.[9] If there is no improvement after 7–15 days of treatment, further intervention is advised. For moderate-severe persistent symptoms, the recommendation is to refer the patient to a physician. [9]

A spectrum of environmental allergens includes pollens, ragweed, house dust mite, cockroach droppings, animal allergens, certain chemicals, molds, odors, and passive smoking. [5] A list of

other factors is forthcoming which are nasal polyposis, ciliary dyskinesia syndrome, exercise, pregnancy, and menstrual cycle. [8] **There are also some drug-induced causes of allergic rhinitis which are rhinitis medicamentosa, oral contraceptives and Aspirin. [10]**

The data of patients from 22 countries show that 27.2% of all AR patients with data collected over a 6-day period do not take their medicines as prescribed. Merely 11.3% of these adhered to the prescribed drugs and time intervals (MPR $\geq 70\%$ and PDC ≤ 1.25). Most of the patients discontinue the treatment when feeling better. [11]

Educating the society regarding prevention and treatment of Allergic rhinitis is highly beneficial and would impart significant health benefits in the general population. Educational interventions at public health level would promote the enhancement in quality of life of patients suffering from Allergic rhinitis and ultimately the society. [9]

Self-medication is common among patients suffering from allergic rhinitis.[10] As patients suffering from allergies are unaware of the debilitating effects of the disease once progressed and other comorbidities such as asthma, pharmacist being the most approachable healthcare provider can be the bridge to fill the gaps in patients' knowledge and understanding of the disease.[13] Pharmacists can effectively support patients in managing their intermittent and mild persistent allergic rhinitis, leading to improved quality of life. [9]

2. METHODOLOGY

Study Design&Setting:

This cross-sectional observational study was conducted upon Allergic rhinitis patients visiting different community pharmacies of Lahore, Pakistan. This study was conducted for a duration of eight months from February-2024 to September-2024. 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 **conveyed** to the patients. The personal information of participants was kept confidential. Participants were informed that they could withdraw from the study at any time.

Inclusion& Exclusion criteria:

Physiciandiagnosed Allergic rhinitis adult patients were recruited for the present study. The patients visiting community pharmacies were included the study upon providing their consent to participate in the study, upon informed consent form (ICF). Patients with co-morbidities especially asthma and COPD were excluded along with patients who did not consent to participate in the study.

A total of 240 physician diagnosed Allergic Rhinitis patients were included in the study based on convenient sampling technique.

Data Collection

Data was collected on the well-structured, self-developed questionnaire from the patients visiting community pharmacies. The authors collected the data from each patient and analyzed the data without any biasness.

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 assessing knowledge of the Allergic rhinitis patients. The questionnaire was designed based on the extensive literature review and validated through expert validation, face validation and pilot study. The pilot study was conducted on small number of study subjects and Cronbach's alpha value of 0.76 was attained for knowledge questions. The results of pilot study were not included in the study's results.

Questionnaire contained 12 items for knowledge assessment (marked 1 for correct answer and 0 for incorrect answer). 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 and inappropriate if the correctly answered questions were less than 60% of the total questions.

Statistical Analysis:

For the statistical analysis, (SPSS) version 21.0 was used for analyzing the collected data.

Descriptive and inferential statistics were applied for analyzing the frequencies and association between variables. The p-values of <0.05 were considered statistically significant.

RESULTS

A total of 240 study subjects were included in the current study, the demographic variables are mentioned in the Table 1. However, the knowledge of participants in response to each question is presented in Table-2.

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: Response of participants according to knowledge related questions of Allergic rhinitis

| No | Questions | Incorrect N (%) | Correct N (%) |
|----|--|-----------------|---------------|
| 1 | Is Allergic rhinitis a hypersensitive reaction particularly due to pollen, dust? | 236 (98.3) | 4 (1.7) |
| 2 | Is Allergic rhinitis genetic disease? | 139 (57.9) | 101 (42.1) |
| 3 | Is Allergic rhinitis a contagious disease? | 174 (72.5) | 66 (27.5) |

| | | | |
|----|--|------------|-----------|
| 4 | Are children at high risk of allergic disease? | 198 (82.5) | 42 (17.5) |
| 5 | Does Allergic rhinitis causes sneezing, nasal itching often accompanied with watery eyes? | 236 (98.3) | 4 (1.7) |
| 6 | Does Allergic rhinitis patient experiences redness and swelling with buildup of polyps that causes sinus pain? | 217 (90.4) | 23 (9.6) |
| 7 | Does AR cause nasal discharge thick and green in color in patients with chronic suffering from nasal polyps? | 195 (81.3) | 45 (18.8) |
| 8 | Does allergy skin test help with diagnosis of AR particularly in Pakistan? | 199 (82.9) | 40 (16.7) |
| 9 | Does immunotherapy such as allergy shots help patients with AR in reducing symptoms? | 219 (91.3) | 21 (8.8) |
| 10 | Are antihistamines and intra nasal corticosteroids are the preferred choice for the treatment of AR? | 208 (86.7) | 32 (13.3) |
| 11 | Does long term usage of nasal steroids in treatment of AR cause dependency? | 200 (83.3) | 40 (16.7) |
| 12 | Is Allergic rhinitis more prevalent in urban areas? | 199 (82.9) | 41 (17.1) |

The knowledge of respondents was classified into two categories; Appropriate and inappropriate based upon the response to knowledge related questions in questionnaire. Those respondents who correctly answered 60% and above (7 out of 12 questions) were classified to have appropriate knowledge. While, the respondents who incorrectly answered at least 7 questions were classified to have inappropriate knowledge regarding Allergic rhinitis. The overall knowledge ratio of the respondents is summarized in Table-3.

Table-3: Knowledge of respondents regarding Allergic rhinitis

| Variable | Categories | N (%) |
|-----------|---------------|------------|
| Knowledge | Appropriate | 80 (33.3) |
| | Inappropriate | 160 (66.7) |

Females presented better knowledge as compared to male patients. The association of demographic variables with the knowledge of respondents is summarized in the table-4.

Table-4: The association of demographic variables with respondents' knowledge:

| No. | Variables | Categories | Knowledge Category | | <i>p-value*</i> | η^2 |
|-----|-----------|-------------|--------------------|---------------|-----------------|----------|
| | | | Appropriate | Inappropriate | | |
| 1 | Gender | Male | 14 | 86 | <0.001 | .359 |
| | | Female | 64 | 74 | | |
| 2 | Age | <20 | 14 | 25 | .128 | - |
| | | 20-25 years | 64 | 118 | | |
| | | 26-30 years | 0 | 9 | | |

| | | | | | | |
|---|--|-----------------------------|------|------|-------|------|
| | | >30 years | 2 | 8 | | |
| 3 | Occupation | Student | 70 | 125 | .286 | - |
| | | Corporate job holder | 5 | 18 | | |
| | | Businessman | 0 | 5 | | |
| | | Housewife /jobless | 4/1 | 8/1 | | |
| 4 | Education | Bachelor's | 69 | 108 | 0.002 | .012 |
| | | Secondary | 11 | 36 | | |
| | | Masters | 0 | 16 | | |
| 5 | Marital status | Married | 10 | 22 | .788 | - |
| | | Unmarried | 70 | 138 | | |
| 6 | Healthcare professional in your family | Yes | 49 | 95 | .042 | - |
| | | No | 31 | 64 | | |
| 7 | Source of information | Medical books | 42 | 114 | .026 | .132 |
| | | Seminar / research articles | 2/10 | 4/11 | | |
| | | Workshops | 1 | 1 | | |
| | | Social media | 25 | 26 | | |

4. DISCUSSION

Allergic rhinitis is an allergen induced symptomatic disorder characterized by inflammation of the nasal mucosa due to IgE antibodies directed against specific allergens. Basic disease related knowledge and management play an important role in better disease management [12]

In the current study, knowledge of respondents regarding allergic rhinitis is inadequate at baseline i.e., 66.7% respondents have inadequate knowledge while, only 33.3% respondents presented adequate knowledge by correctly answering 60% of the total questions related to Allergic rhinitis. According to this present study, majority of the respondents (98.3%) did not know that Allergic rhinitis is a hypersensitive reaction particularly due to pollen and dust etc. And 86.7% of the respondents had no clear idea that antihistamines and intra nasal corticosteroids are the preferred choice for the treatment of Allergic rhinitis.

A cross-sectional study was conducted at Zhejiang University School of Medicine, China presented somewhat different results than our study i.e., majority of the respondents (59.3%) had only heard but not sure about avoiding allergens to prevent symptoms [13]. The possible reason could be the lack of educational programs and counselling sessions to enhance knowledge of the patients.

The present study shows that the knowledge of females is better than males, age group between 20-25 have better knowledge than other age groups. The possible reason could be the fact that females are more curious about their health conditions and tend to research more about the management of their health conditions.

These results of our study are in contrast to the study conducted upon 900 Saudi adult allergic rhinitis patients, from primary health care centers across kingdom of Saudi Arabia. The knowledge was found to be inappropriate at baseline, for majority of the respondents. However, no statistical association was observed between gender of participants and their knowledge related to Allergic rhinitis. Similarly, no statistical association of age and knowledge adequacy was observed [2].

A cross-sectional study was conducted in Khartoum state, Sudan in which respondents have adequate knowledge regarding AR and its management [15]. In this study gender does not influence the knowledge of AR but age, qualification, years of practice, and university of graduation effects knowledge.

Similarly, another study conducted in the region of Hangzhou, China recruited 656 Allergic rhinitis patients, and knowledge was accessed through a structured questionnaire, presenting poor knowledge of respondents at baseline. The education status of the study subjects was observed to be positively associated with the adequacy of knowledge, moreover, duration of disease, residence location and allergen testing were the factors that positively associated with the adequacy of knowledge of patients. Similar to the present study, no statistical association of gender was accessed with the adequacy of knowledge regarding Allergic rhinitis [14]

A KAP (Knowledge, attitude and practices) assessment study executed in China exhibited comparatively better knowledge of respondents as compared to the present study [17].

These results could be contributed to the fact that literacy rate of Chinese population is comparatively better than Pakistani population.

The presence of healthcare professional in the family was positively associated with good disease related knowledge in the respondents in our study.

These results are in accordance with the cross-sectional observational study conducted in Lahore, Pakistan, upon the knowledge related to oral health which also depicted the positive association with the knowledge because of presence of healthcare professional in the family [18]. Similarly, another study conducted upon the knowledge of study subjects on Japanese encephalitis also presented that the presence of healthcare professional in family is positively associated with enhancement of disease related knowledge of study subjects [19].

The present study greatly influences the need of educating patients regarding the basic knowledge and specifically the management of Allergic rhinitis. Educational programs at broader level should be conducted to educate the general population regarding the prevention of allergens and management of Allergic rhinitis. Public health awareness campaigns would greatly enhance the knowledge of general population. Personalized patient counselling sessions would also be helpful in prevention (avoidance of allergens and trigger factors) and better management of disease at patient level.

CONCLUSION

This study reveals significant gaps in knowledge regarding allergic rhinitis among patients. Females presented better knowledge as compared to male patients. The results indicate a notable gap in knowing the condition, which ultimately leads to insufficient management and possible aggravation of symptoms. There is a need of educational intervention to increase awareness and knowledge of Allergic rhinitis. Moreover, personalized patient counselling sessions should be arranged to enhance individual disease related knowledge.

Disclaimer (Artificial intelligence):

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used

during the writing or editing of this manuscript.

Ethical Considerations:

The participants were recruited in the study after obtaining informed consent from the patients, after explaining them the purpose and methodology of the study. The data of the study subjects was kept confidential and presented in such a manner that study subjects could not be identified.

REFERENCES

- [1] Wise SK, Damask C, Roland LT, Ebert C, Levy JM, Lin S, Luong A, Rodriguez K, Sedaghat AR, Toskala E, Villwock J. International consensus statement on allergy and rhinology: Allergic rhinitis–2023. *International forum of allergy & rhinology* 2023 Apr (Vol. 13, No. 4, pp. 293-859). DOI: 10.1002/alr.23090
- [2] Alreshidi FM, Alrashidi AS, Alshammari FN, Qadi AB, Alrashidi AG, Alghaythi SM, Alshammari FT, Aleisa SM. Knowledge, attitude and practice about allergic rhinitis in Saudi Arabia, 2017. *The Egyptian Journal of Hospital Medicine*. 2017 Oct 1;69(4):2199-203.
- [3] N. P. Tran, J. Vickery, and M. S. Blaiss, 'Management of Rhinitis: Allergic and Non-Allergic', *Allergy Asthma Immunol Res*, vol. 3, no. 3, pp. 148–156, May 2011, doi: 10.4168/AAIR.2011.3.3.148.
- [4] S. N. Chong and F. T. Chew, 'Epidemiology of allergic rhinitis and associated risk factors in Asia', *World Allergy Organization Journal*, vol. 11, no. 1, p. 17, Jan. 2018, doi: 10.1186/S40413-018-0198-Z.
- [5] S. M. Hasnain, M. Khan, A. Saleem, and M. A. Waqar, 'Prevalence of Asthma and Allergic Rhinitis Among School Children of Karachi, Pakistan, 2007', *Journal of Asthma*, vol. 46, no. 1, pp. 86–90, Feb. 2009, doi: 10.1080/02770900802513023.
- [6] M. Schatz, 'A survey of the burden of allergic rhinitis in the USA', *Allergy*, vol. 62, no. SUPPL. 85, pp. 9–16, Dec. 2007, doi: 10.1111/J.1398-9995.2007.01548.X.
- [7] A. Emeryk, J. Emeryk-Maksymiuk, and K. Janeczek, 'New guidelines for the treatment of seasonal allergic rhinitis', *Advances in Dermatology and Allergology/Postępy Dermatologii i Alergologii*, vol. 36, no. 3, p. 255, 2019, doi: 10.5114/ADA.2018.75749.
- [8] M. D. Seidman *et al.*, 'Clinical Practice Guideline: Allergic Rhinitis', *Otolaryngology-Head and Neck Surgery*, vol. 152, pp. S1–S43, Feb. 2015, doi: 10.1177/0194599814561600/ASSET/IMAGES/LARGE/10.1177_0194599814561600-FIG3.JPEG.
- [9] Zuberbier T, Bachert C, Bousquet PJ, Passalacqua G, Walter Canonica G, Merk H, Worm M, Wahn U, Bousquet J. GA2LEN/EAACI pocket guide for allergen-specific immunotherapy for allergic rhinitis and asthma. *Allergy*. 2010 Dec;65(12):1525-30.

- [10] D. P. Skoner, 'Allergic rhinitis: Definition, epidemiology, pathophysiology, detection, and diagnosis', *Journal of Allergy and Clinical Immunology*, vol. 108, no. 1, pp. S2–S8, Jul. 2001, doi: 10.1067/MAI.2001.115569.
- [11] E. Mendittoet *al.*, 'Adherence to treatment in allergic rhinitis using mobile technology. The MASK Study', *Clinical & Experimental Allergy*, vol. 49, no. 4, pp. 442–460, Apr. 2019, doi: 10.1111/CEA.13333.
- [12] J. Varshney and H. Varshney, 'Allergic rhinitis: An overview', *Indian Journal of Otolaryngology and Head and Neck Surgery*, vol. 67, no. 2, pp. 143–149, Jun. 2015, doi: 10.1007/S12070-015-0828-5/TABLES/2.
- [13] X. Fan and J. Zhang, 'Knowledge, Attitudes, and Practices of Patients with Allergic Rhinitis Towards Allergen-Specific Immunotherapy', *Patient Prefer Adherence*, vol. 18, pp. 1531–1545, 2024, doi: 10.2147/PPA.S468957/FORMAT/EPUB.
- [14] W. Gu *et al.*, 'Knowledge, attitudes, and practice towards allergic rhinitis in patients with allergic rhinitis: a cross-sectional study', *BMC Public Health*, vol. 23, no. 1, pp. 1–7, Dec. 2023, doi: 10.1186/S12889-023-16607-6/TABLES/3.
- [15] I. A. Mohammed, S. W. Shantier, E. A. Elhag, and W. Osman, 'Assessment of knowledge, attitude, and practice of community pharmacists towards allergic rhinitis and its management in Khartoum state: A cross-sectional survey', *Inform Med Unlocked*, vol. 32, p. 101020, Jan. 2022, doi: 10.1016/J.IMU.2022.101020.
- [16] W. Gu *et al.*, 'Knowledge, attitudes, and practice towards allergic rhinitis in patients with allergic rhinitis: a cross-sectional study', *BMC Public Health*, vol. 23, no. 1, pp. 1–7, Dec. 2023, doi: 10.1186/S12889-023-16607-6/TABLES/3.
- [17] L. Lu, J. Feng, L. Zhu, A. Chen, X. Chen, and Y. Lu, 'Knowledge, attitude, and practice toward allergic rhinitis among parents in Ningbo, China', *BMC Public Health*, vol. 24, no. 1, pp. 1–11, Dec. 2024, doi: 10.1186/S12889-024-18581-Z/TABLES/5.
- [18] 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. *Medical Science*. 2024;28:e109ms3424. doi: <https://doi.org/10.54905/disssi.v28i150.e109ms3424>
- [19] 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. *Medical Science* 2024; 28: e57ms3365 doi: doi.org/10.54905/disssi.v28i148.e57ms3365