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Clinical Patterns of Allergic Rhinitis Among Paediatric Patients Attending A Tertiary Hospital in Dodoma, Tanzania

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ABSTRACT

Background: Allergic rhinitis is a chronic and recurrent nasal condition, but it has often been given little attention in children with late presentations. Globally allergic rhinitis affects more than 400 million people with prevalence rates being between 10% and 30% among adults and 40% among children. In Tanzania, the overall prevalence of allergic rhinitis is 10.3%, and commonly affected groups are children and adolescents. This study aimed to determine the clinical patterns of allergic rhinitis among paediatric patients attending Benjamin Mkapa Hospital in Dodoma region as there are scare studies on allergic rhinitis in Tanzania especially in central Tanzania.

Methods: A hospital based prospective cross-sectional study at Benjamin Mkapa Hospital recruited 348 children with a clinical diagnosis of allergic rhinitis using convenience sampling technique. Data was collected using a semi-structured questionnaire and analyzed using Statistical Package for Social Sciences version 25. A P-value less than 0.05 was considered statistically significant.

Results: In this study, 86.2% children had a seasonal type of allergy and according to ARIA classification, 50% children had mild-intermittent allergic rhinitis followed by 34.5% children, with moderate to severe allergic rhinitis. The commonest form of allergy was an inhalant, 97.5%. The commonest triggers of allergic rhinitis were dust exposure, 90.8% and smoke, 74.4% and the commonest symptoms were recurrent sneezing, 87.1%, runny nose, 66.4%, blocked nose, 58% and nasal itching, 52.3%. Recurrent tonsillitis, 26.1%, sinusitis, 21.8% and allergic conjunctivitis, 20.7% were the common comorbidities reported.

Conclusion: In this study, seasonal allergic rhinitis predominated and mild-intermittent allergic rhinitis was common as per ARIA classification of allergic rhinitis. The commonest allergen was an inhalant and both dust exposure and smoke were the commonest triggers. The predominant symptoms were recurrent sneezing, runny nose and blocked nose but recurrent tonsillitis, sinusitis and allergic conjunctivitis were the commonest comorbidities. These findings lay emphasis on the importance of early identification of environmental triggers and implementation of appropriate preventive and therapeutic measures, including allergen avoidance and optimized pharmacological management. Future studies should further explore specific allergen sensitization patterns, long-term outcomes, and the effectiveness of targeted interventions to improve the management of allergic rhinitis and its possible associated comorbidities.

BACKGROUND

Allergic rhinitis (AR) refers to a particular inflammatory reaction that immune defence cells on the nasal mucosa have to an allergen. This reaction can result in persistent nasal symptoms such as sneezing, itching, runny nose, and congestion.[1] According to its severity and frequency, allergic rhinitis is categorized under the Allergic Rhinitis and Its Impact on Asthma (ARIA) classification. If symptoms appear less than four days a week or for fewer than four weeks in a row, the frequency may be considered intermittent. Whenever symptoms persist for more than four days or for more than four consecutive weeks, they are considered persistent. There are four degrees of severity: mild intermittent, mild persistent, moderate-severe intermittent, and moderate-severe persistent. Mild symptoms are those that do not substantially interfere with everyday activities or sleep. If the symptoms are uncomfortable they tend to interfere with everyday activities, or interfere with sleep.[2] As its incidence has steadily increased over the past 10 years, it has an increasing impact on routine medical practice.[3] The United States spends more than several billion dollars a year on healthcare for this disease, which results in lost productivity at work or school.[4]

In children, allergic rhinitis is a prevalent chronic ailment that negatively affects quality of life. The severity of the disease's clinical presentation is correlated with the degree of disruption in quality of life.[5]

It is well established that the Th2 type immune response mediates AR. Both genetic and environmental factors contribute to the development and incidence of AR,

however further study is needed to determine its precise pathophysiology. Pharmacology and some immunotherapies can successfully reduce AR symptoms and slow down the disease's progression.[6]

Dust mites, mold, cockroaches, rats, weed pollens, tree pollen, grass, and animal dander are the most frequent causes of AR in children. Similar symptoms to AR can be brought on by things like smoke and strong odors. However, rather than being allergies, these compounds are irritants. Children with other allergic conditions, such as asthma, food allergies, and eczema, are also at risk.[7]

Allergic rhinitis in paediatric population is commonly triggered by exposure to inhalant allergens such as house dust mites, pollen, animal dander, and mold spores. Environmental factors including air pollution, tobacco smoke, and dust exposure also contribute to the development and exacerbation of allergic rhinitis. Genetic predisposition, early-life allergen exposure, and urban living conditions further increase the risk of allergic rhinitis among children.[3]

Globally AR affects more than 400 million people with prevalence rates being between 10% and 30% among adults and 40% among children and therefore constituting a worldwide public health problem.[8,9]

A hospital based study that was done in Nigeria among children found majority to be living in rural area (57.7%). There was a positive family history of allergy in 54.7% of patients and it was perennial in nature in 63.8% of patients and seasonal in 36.2% of patients. The major form of allergens was inhalant (81.8%) and the least form of allergen was ingestant (5.7%). The commonest identified triggering factors were dust, cold weather and smoke which were accounted for 59.6%, 37.4% and 18.9% of patients respectively, others reported triggering factors were soap (4.2%) and perfume (1.1%). Major associated comorbid illnesses among children were tonsils hypertrophy (55.5%), adenoid hypertrophy (46.6%) and inferior turbinate hypertrophy (40.4%). Clinical presentations of allergic rhinitis were mainly nasal blockage (75.8%), runny nose (65.3%) and recurrent sneezing (8.5%) and on the other hand the commonest complications of allergic rhinitis were pharyngitis (35.1%,), otitis media (32.1%) and headache. (28.3%).[10]

A study that was done in Dar es Salaam, Tanzania found the overall prevalence of allergic rhinitis among secondary school children to be 10.3% and with equal male to female ratio. Dust mites were the most common allergens (72.2%) followed by molds (51.3%) then pollens (40.9%) and animal dander being the last (11.4%). Pertaining complications among children, the following were the complications; middle ear effusion (25%), hypertrophy of nasal turbinates (66.7%), sinusitis (2.1%), adenoid hypertrophy (95.8%) and these were mainly for children aged <5year and for those aged 6-15 years the encountered complications of allergic rhinitis were turbinates hypertrophy (77.5%), adenoid hypertrophy (22.5%), and sinonasal polyposis (12.5%).[11]

Studies done in various parts of the world have highlighted patterns of allergic rhinitis among children. A study that was done at Muhimbili National Hospital, Tanzania found majority of the participants to be children aged <5years (24.9%) followed by those aged 6 to 15 years (20.7%) and 16 to 25 years (16.1%). Males accounted for 50.8% the participants while females accounted for 49.2% of the participants.[11] A study that was done in Nigeria among children with allergic rhinitis found the following features; family history of allergy (54.7%), perennial type of allergy (63.8%), seasonal type of allergy (36.2%), inhalant allergen (81.8%), ingestant allergen (5.7%) and contactant allergen (12.5%). The following triggers for allergic rhinitis were also found; dust (59.6%), cold weather (37.4%), perfume (4.2%), vehicle exhaust (9.1%) and soap (1.1%). Pertaining ARIA classification, the following were established; mild-intermittent (9.8%), moderate-severe intermittent (19l.2%), mild-persistent (16.2%) and moderate-severe persistent (54.8%).[10] A study done in Tanzania found that, turbinate hypertrophy (64.7%) was the leading comorbidity of allergic rhinitis followed by adenotonsillar hypertrophy (14.5%), sinusitis (9.0%), nasal polyp (6.7%) and otitis media with effusion (5.1%).[12] In Tanzania a study reported the following symptoms in patients with allergic rhinitis; blocked nose (75.8%), runny nose (65.3%), recurrent sneezing (58.4%), nasal itching (53.2%), watery eyes (33.2%), eye itching (32.6%).[13]

Understanding the clinical patterns of allergic rhinitis is of paramount importance for improving early diagnosis, guiding appropriate management, and identifying common triggers in the paediatric population. Knowledge of these patterns enables clinicians to anticipate associated comorbidities, implement preventive strategies, and design targeted interventions aiming at reducing the burden of the rhinological disorder and consequently improving the quality of life among the affected paediatric patients. On the other hand, studying the patterns of allergic rhinitis among paediatric patients in hospital settings is of great significance as it enables clinicians and public health experts to have in-depth understanding of how the disease presents on common occasions, its triggers, severity, and associated conditions within the paediatric population.

There are scarce studies on allergic rhinitis in Tanzania where the prevalence of allergic rhinitis in Dar es Salaam was found to be 10.3% [11] and in Mwanza it was 14.7%[13] and no other studies were published on this topic despite allergic rhinitis being the commonest otorhinolaryngological disease in paediatric patients attending otorhinolaryngology and paediatrics outpatient clinics. This study has been designed to determine the clinical patterns of allergic rhinitis among paediatric patients attending Benjamin Mkapa Hospital in Dodoma region as there are scare studies on paediatric allergic rhinitis in Tanzania.

METHODS

Study Design, Area and Duration

A hospital based analytical cross-sectional study design was used to determine the patterns of allergic rhinitis among children attending Benjamin Mkapa Hospital. It was conducted from April to September 2025. The study was conducted at Benjamin Mkapa Hospital, which is a tertiary hospital located in the Central zone of Tanzania, in the city of Dodoma. Benjamin Mkapa hospital is a public tertiary, referral and training

institution with a purpose of addressing the need for advanced specialized healthcare services in Tanzania and Africa with more than 12 specialized clinics (Emergency department, renal replacement therapy unit, cardiology, otorhinolaryngology, nephrology, haematology clinic, ophthalmology, neurosurgery, paediatric clinic, orthopaedic surgery, internal medicine clinic, bone marrow transplant, obstetrics and gynaecology, general surgery) which offer services. The study was conducted specifically at paediatric and otorhinolaryngology clinics which provide suitable population for determining patterns of paediatric allergic rhinitis.

The department of paediatrics and child health has both inpatient and outpatient units. It has an approximate over 15 bed capacity where children aged 1 month to 15 years with different paediatric diseases are admitted. The department is served by several general practitioners, nurses, residents and specialists with competence in various fields in paediatrics such as paediatric cardiology, paediatric haemato-oncology as well as general paediatrics. The department has currently launched bone marrow transplantation under the haemato-oncology. Otorhinolaryngology department has also inpatient and outpatient units. The department is run by two general practitioners, nurses and 6 specialists. Both basic and advanced clinical care is provided to patients who are attending otorhinolaryngology department. Surgical services form the core component of patients admitted in this department.

Study Population

The target population was all children under 18 years attending Benjamin Mkapa Hospital and confirmed to have allergic rhinitis by ARIA classification

Sampling Technique

Convenience sampling technique was utilized to recruit the study participants in the department of otorhinolaryngology and paediatric clinic at Benjamin Mkapa Hospital upon fulfilling the children's screening eligibility. Use of such sampling technique may limit the representativeness of the study population as well as generalizability of the study findings to the general paediatric population countrywide. To minimize self-selection bias, all the eligible paediatric patients presenting during the study period were consecutively approached using the standardized inclusion criteria. Parents or caretakers were provided with very clear and relevant information about the study under consideration to encourage their participation but since participation in this study depended on parents or caretakers' act of consenting, some degree of self-selection bias may have been introduced in this study.

Sample Size Estimation

With the allergic rhinitis prevalence of 34.7%[4] and considering a margin error of 0.05 and level of confidence interval of 95%, a sample size of 348 was deemed appropriate. However, taking 10% non-response rate, the sample was increased to 387.[14]

Inclusion Criteria

Children aged <18 years attending Benjamin Mkapa Hospital and with an established diagnosis of allergic rhinitis where eligible for inclusion if presented with two or more recurrent nasal symptoms of excessive sneezing, watery nasal discharge, and nasal congestion and itching of the nose and eyes. Also, if children had already started the use of antihistamines or steroids intermediately then they were recruited in this study. Only children with parental consents were included in the study.

Exclusion Criteria

Very sick children and those who have been on antihistamine for at least 3 days and intranasal steroid for at least 1 week before commencement of the study, those constantly on steroids and antihistamines were excluded.

Data Collection Tools and Methods

Primary data collection tool was a standard semi-structured Swahili electronic questionnaire which was administered by the principal investigator thus was the sole person who conducted the interviews. The questionnaire was pre-tested using 10% of the estimated sample size at Benjamin Mkapa Hospital. Children who participated during pre-testing were not recruited during commencement of actual data collection. The questionnaire was prepared by the use of kobo toolbox and Swahili language was used conduct the interviews.

The collected data include patients' age, sex, nasal symptoms, and eye symptoms, age of onset of symptoms, triggering factors, and presence or absence of a family history of allergic rhinitis. Rhinoscopy findings were recorded in a structured form.

Diagnostic Criteria For Allergic Rhinitis

Diagnostic criteria were persistent sneezing, watery nasal discharge, itching, cough, and nasal congestion. Ocular symptoms including symptoms of allergic conjunctivitis such as itchy eyes, redness, and tearing.[15] Physical features included nasal polyps, nasal mucosal edema, and inferior turbinate hypertrophy.[4]

Data Processing and Analysis

The data was gathered through a semi-structured electronic questionnaire and analyzed using the Statistical Package for Social Sciences version 25 (IBM Corp., Armonk, New York, USA). Descriptive statistics were employed to analyze demographic characteristics, presenting results as percentages and frequencies. The chi-square test was used to examine relationships between variables, with statistical significance determined at a *P*-value of less than .05.

Ethical Considerations

Ethical approval for the study was obtained from the Institutional Research Review Ethics Committee (IRREC) at the University of Dodoma. Additionally, permission to carry out the research was sought from the University of Dodoma's School of Medicine and Dentistry.

Before recruitment, all participants' parents were required to provide informed consent by signing a consent form after receiving detailed information about the study's purpose and significance. They were informed that participation is entirely voluntary and that they are free to decide whether to participate, provided they meet the inclusion criteria.

The data collected during this study was treated with strict confidentiality. Participants' names did not appear on the questionnaires, as coding was used to maintain anonymity. Furthermore, any information gathered from participants was not shared with individuals outside the research team. All data remained confidential and was only used for the purposes of this study.

RESULTS

Socio-demographic Characteristics of Children With Allergic Rhinitis

This study involved 348 children under 18 years of age attending otorhinolaryngology and paediatric clinic at Benjamin Mkapa Hospital who were confirmed to have allergic rhinitis by ARIA classification where majority of children were females, 193 (55.5%) and 155 (44.5%) respondents were males. Majority of them were aged between 0-5 years, 147(42.2%). More than half of children's level of education was primary education, 178(51.1%) and least of all in post-secondary, 4(1.1%). Most of the respondent's parents were aged between 31- 40 years, 111(31.9%) followed closely with the parents aged between 41- 50 years, 89(25.6%). More than two-third were living in urban areas, 238(68.4%) and majority of parents/caretakers, 161(46.3%) were employed (Table 1).

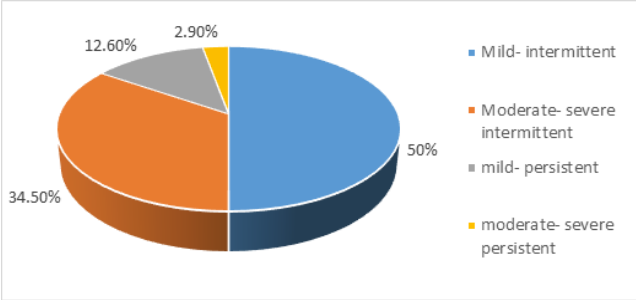
TABLE 1: Socio-demographic Characteristics of Children with Allergic Rhinitis

Variable	n (%)
Age of the child (in years)	
0-5	147 (42.2)
6-10	112 (32.1)
11-15	89 (25.7)
Child's gender	
Male	155 (44.5)
Female	193 (55.5)
Age of their parents (years)	
21-30	74 (21.3)
31-40	111 (31.8)
41-50	89 (25.6)
51-60	74 (21.3)
Education level of the child	
None	76 (21.8)
Nursery	45 (12.9)
Primary	178 (51.1)
Secondary	45 (12.9)
Post-secondary	4 (1.1)
Area of residence	
Urban area	238 (68.4)
Rural area	110 (31.6)
Parent/caretaker occupation	
Employed	161 (46.3)
Self-employed	126 (36.2)
Non-employed	61 (17.5)

Children With Allergic Rhinitis According to ARIA Classification

According to ARIA classification, majority of the respondents had mild-intermittent AR, 174(50%) followed by those with moderate- severe AR, 120(34.5%). Mild- persistent AR and moderate-severe persistent AR were the least among all the children with allergic rhinitis comprising 44(12.6%) and 10(2.9%) respondents respectively (Figure 1).

FIGURE 1: Pie Chart Showing ARIA Classification of Allergic Rhinitis Among Children



Features of Allergy among Children with Allergic Rhinitis

More than half of children with allergic rhinitis had no family history of allergy, 198(56.9%) and majority of them, 300(86.2%) had a seasonal type of allergy. The commonest form of allergy was inhalant related, 339(97.5%), followed by ingestants, 5(1.4%) and least of all, contactants, 4(1.1%). From this study, the commonest triggers of allergic rhinitis were dust exposure, 315(90.8%) and smoke, 258(74.4%) followed by cold weather, 184(52.9%) and perfumes, 96(27.6%). The least common triggers were vehicle exhaust, 49(14.1%), and others 24(6.9%) (Table 2).

TABLE 2: Features of Allergy Among Children with Allergic Rhinitis

Variable	n (%)
Do you have family history of allergy?	
Present	150 (43.1)
Absent	198 (56.9)
Type of allergy present	
Perennial	48 (13.8)
Seasonal	300 (86.2)
Form of allergy (Is the child allergic to any of the following?)	
Inhalant	339 (97.5)
Ingestant	5 (1.4)
Contactant	4 (1.1)
Triggers of allergic rhinitis	
Dust	315(90.8)
Smoke	258(74.4)
Cold weather	184(52.9)
Perfume	96(27.6)
Vehicle exhaust	49(14.1)
Others	24(6.9)

*Others = eggs, grasses/plants, milk, old clothes, rashes and sulphur drugs

Clinical Features of Allergic Rhinitis Among Children

The commonest clinical features seen in the majority of children were recurrent sneezing, 303(87.1%), runny nose, 231(66.4%), blocked nose, 201(58%) and nasal itching, 182(52.3%). The least clinical features reported were hearing loss, 11(3.4%), and autophony, 4(1.4%). Other clinical features of allergic rhinitis reported were skin rashes, 9(2.5%), wheezes, 3(0.9%), itchy skin, 2(0.6%), diarrhoea, vomiting, headache and snoring in 1(0.3%) case (Table 3).

TABLE 3: Clinical Features of Allergic Rhinitis Among Children Attending BMH

Clinical features	n (%)
Recurrent sneezing	303(87.1)
Running nose	231(66.4)
Blocked nose	201(58.0)
Nasal itching	182(52.3)
Itchy throat	122(35.3)
Itchy ear	42(12.1)
Itchy nose	26(7.5)
Redness of eyes	87(25.0)
Eye itching	27(7.8)
Ear fullness	16(4.8)
Autophony	4(1.4)
Hearing loss	11(3.4)
Others	17(4.9)

*Others: Diarrhea/vomiting, headache, itchy skin, skin rashes, snoring, wheezes.

Comorbidity In Children with Allergic Rhinitis

The most frequently reported comorbidities were recurrent tonsillitis, 90(26.1%), sinusitis, 75(21.8%) and allergic conjunctivitis, 75(21.5%). The least common comorbidities among children with allergic rhinitis were otitis media with effusion, 11(3.4%) and inferior turbinates hypertrophy, 2(0.6%) (Table 4).

TABLE 4: Comorbidity In Children With Allergic Rhinitis

Comorbidity	n (%)
Bronchial asthma	30(8.9)
Allergic conjunctivitis	75(21.5)
Allergic dermatitis	20(6)
Recurrent tonsillitis	90(26.1)
Adenoid hypertrophy	18(5.2)
Inferior turbinates hypertrophy	2(0.6)
Nasal polyps	41(11.8)
Ear discharge	11(3.4)
Sinusitis	75(21.8)
Otitis media with effusion	11(3.4)

Association Between ARIA Classification of Allergic Rhinitis and Demographic Characteristics of Studied Patients

The association between ARIA classification and socio-demographic characteristics of children with allergic rhinitis was only statistically significant for age (*P* value=.024), however, it was not statistically significant for sex (*P* value=.130) and area of residence (P value=.692) (Table 5)

Association Between ARIA classification and Comorbidity

The ARIA classification associated with bronchial asthma (*P* value =.0001), ear discharge (*P* value=.038) and otitis media with effusion (*P* value=.017), however, the association was not statistically significant for allergic conjunctivitis (value=.795), allergic dermatitis (*P* value=.172), recurrent tonsilitis (*P* value=.190), adenoid hypertrophy (*P* value=.584), inferior turbinate hypertrophy (*P* value=.281), nasal polyps/sinonasal polyposis (*P* value=.384 and sinusitis (*P* value=.593) (Table 6).

TABLE 5: ARIA Classification of Allergic Rhinitis Among Children with Allergic Rhinitis by Age, Sex and Residence (n=348)

	ARIA classification				*p-value*
	Mild-intermittent	Moderate-severe intermittent	Mild-persistent	Moderate-severe persistent	
Age(years)					.024
0-5	90(85.7)	46(43.8)	10(9.5)	1(1)	
6-10	51(35.7)	40(28)	17(11.9)	4(3.8)	
11-15	33(33)	34(34)	17(17)	5(5)	
Sex					.130
Male	69(44.5)	55(35.5)	26(16.8)	5(3.2)	
Female	105(54.4)	65(33.7)	18(9.3)	5(2.6)	
Area of residence					.692
Urban area	121(50.8)	81(34)	29(12.2)	7(2.9)	
Rural area	53(48.2)	39(35.5)	15(13.6)	3(2.7)	

TABLE 6: ARIA classification According to Comorbidity Among Children With Allergic Rhinitis (n=348)

Comorbidity	ARIA classification				*p-value*
	Mild-intermittent	Moderate-severe intermittent	Mild-persistent	Moderate-severe persistent	
Bronchial asthma	3(9.7)	7(22.6)	13(41.9)	8(25.8)	.000
Allergic conjunctivitis	33(45.8)	26(36.1)	10(13.9)	3(4.2)	.795
Allergic dermatitis	12(57.1)	6(28.6)	1(4.8)	2(9.5)	.172
Recurrent tonsillitis	49(53.8)	33(36.3)	9(9.9)	0(0)	.190
Adenoid hypertrophy	11(61.1)	5(27.8)	1(5.6)	1(5.6)	.584
Inferior turbinate hypertrophy	0(0)	2(100)	0(0)	0(0)	.281
Nasal polyps/Sinonasal polyposis	21(51.2)	17(41.5)	3(7.3)	0(0)	.384
Ear discharge	16(80)	4(20)	0(0)	0(0)	.038
Sinusitis	37(48.7)	30(39.5)	8(10.5)	1(1.3)	.593
Otitis media with effusion (OME)	3(25)	4(33.3)	5(41.7)	0(0)	.017

DISCUSSION

This study aimed at determining the patterns of allergic rhinitis among children attending Benjamin Mkapa Hospital. The female predominance in this study aligns with reports from Dar-es-Salaam (61.2%) and Saudi Arabia (51.3%),[4,8] suggesting a possible gender-related susceptibility towards suffering from allergic rhinitis and may involve hormonal, genetic, or behavioural factors in general. The predominance of urban residence among affected children aligns with previous studies indicating implication of urban environment, with higher exposure to air pollution, dust, and other allergens, may increase the risk towards suffering from allergic rhinitis. Such observation underscores the importance of considering demographic and environmental factors when interpreting patterns of allergic rhinitis in different settings in paediatric patients.

While this study observed female predominance, findings from Bugando Medical Centre in Mwanza showed no gender predilection, although both studies identified younger children as the most affected age group (0–10 years).[13] Similarly, a study in Nigeria reported a male predominance (2:1) and higher prevalence among rural residents, contrasting with our findings depicting female and urban residence predominance.[10] Such differences from the observed findings in both studies may reflect disparities in the study population, healthcare-seeking behaviours, environmental exposure, and socio-demographic factors, and therefore embarking on the need to consider contextual factors when interpreting various patterns of allergic rhinitis across different settings in paediatric patients.

The prevalence of family history of allergic rhinitis observed in this study aligns closely with findings from Saudi Arabia, where 43.4% of children were reported to have a family history of AR.[16] In contrast, a higher prevalence was reported in Nigeria, with 54.5% of respondents having a positive family history of allergic rhinitis.[10] Such observed disparity may be accounted by possible regional or genetic differences in terms of susceptibility towards suffering from allergic rhinitis.

The predominance of seasonal allergies and inhalant allergens observed in this study appear to be in line with findings from Germany, where seasonal allergies were more common (59.0%) than perennial allergies (41.0%).[17] Similarly, a study in Nigeria reported inhalants as the most frequent allergen (81.8%),[10.] Such observed findings highlights the pattern in the types of allergens affecting paediatric population across different regions, despite disparity in prevalence.

The distribution of allergic rhinitis severity according to ARIA classification in this study shows a predominance of mild-intermittent cases, which aligns with findings from Indonesia, where intermittent AR was most common (91%) based on symptom duration. However, the proportion of moderate-severe AR appears lower in the current study compared to the Indonesian study, which reported 71% experiencing moderate-severe AR affecting quality of life,[18] The disparity in the observed findings denotes differences in the population characteristics or assessment methods utilized in both studies under comparison.

The predominance of dust and smoke as triggers of allergic rhinitis in this study is consistent with findings from Mwanza, where dust was reported to be the main trigger in 88% of adolescents.[19] Dissimilar findings can be depicted from the study done in Eastern Ethiopia which identified pets (63.3%) and insecticide use (67.9%) as the commonest triggers, with 87% of students reporting family use of perfumes or deodorants.[20] These findings highlights on regional variations in environmental exposures and lifestyle factors that influence AR triggers.

The symptom profile observed in this study, where sneezing, runny nose, nasal blockage, and itching predominated, aligns with findings from Dar es Salaam, where blocked nose, runny nose, and sneezing were the most common symptoms among secondary school students.[4] Similarly, a study done in Nigeria reported comparable patterns of allergic rhinitis in children,

where blocked nose, runny nose, recurrent sneezing, and nasal itching being were the most frequent comorbid conditions.[10] The similarity in the observed findings highlights that the core symptom profile of allergic rhinitis appear to be similar across different regions, despite the existing minor variations in its prevalence.

The pattern of comorbidities associated with allergic rhinitis in this study appear to be similar to the findings observed in a Nigerian study, where recurrent tonsillitis and allergic conjunctivitis were commonly reported, whereas sinusitis was less frequent.[10] Similarly, a study done at Bugando Medical Centre in Mwanza, Tanzania identified recurrent tonsillitis as the commonest comorbid condition.[13] Such similarity in the observed findings suggest recurrent tonsillitis to be a consistently predominant comorbidity across different study settings, while the occurrence of other comorbid conditions such as sinusitis and allergic conjunctivitis tend to exhibit regional disparity.

Regarding the association between ARIA classification and socio-demographic characteristics of the participants, this was only significant for age (p-value=0.024), however it was not statistically significant for sex (*P* value=.130) and area of residence (*P* value=.692) which is appear to be dissimilar to a study done in Saudi Arabia among children where the association was significant for sex.[8]

There is an observed association between ARIA classification and age, but not sex or area of residence in this study. Such observation highlights severity and type of allergic rhinitis varying with age and possibly depicting differences in maturity of the immune system, exposure patterns, or allergen sensitization at various childhood stages. The reported lack of association with sex and area of residence denotes that these factors may not strongly influence severity of allergic rhinitis in paediatric patients, even though Saudi Arabian study showed a significant association with sex.[8] The observed differences lay emphasis that demographic influence on the severity of allergic rhinitis can be context specific.

Findings emanating from this study lay emphasis on the important implications in the management of paediatric allergic rhinitis. The predominance of seasonal allergies and inhalant triggers such as dust and smoke underscore the role of strict environmental control and allergen avoidance. The predominance of mild-intermittent disease supports the role of prompt diagnosis and treatment on timely basis to halt progression of the course of allergic rhinitis in paediatric patients including administration of antihistamines or intranasal corticosteroids. Moreover, the established association between severity of allergic rhinitis and the age of paediatric patients suggests the role of early treatment of the rhinological disorder while adhering to age-specific context and on the other hand, presence of comorbid conditions underscores the importance of comprehensive evaluation and integrated care to paediatric patients with allergic rhinitis.

Study Limitations

Being a hospital based cross-sectional study conducted at a single tertiary facility, the findings may not be generalized to the general community. The use of convenience sampling techniques in this study may have resulted in selection bias which tends to limit the representativeness and generalizability of the study findings to the general paediatric population countrywide. The symptom profile was mainly derived from the caregivers or parents and therefore subjected to recall bias. In addition, objective allergen testing such as skin prick tests or serum IgE measurement was not performed among the recruited children and therefore limiting the accuracy of identifying specific allergens. Environmental exposure in this study was not assessed quantitatively, and again the sample size may have limited the power of the study to detect possible association between the severity of paediatric allergic rhinitis and some socio-demographic factors such as sex or place of residence. Future studies should employ community-based or multicentre study designs while involving larger sample sizes, incorporate objective allergen testing, and include environmental exposure assessment on a quantitative basis to better elucidate the determinants and progression of paediatric allergic rhinitis.

CONCLUSION

Allergic rhinitis among children attending Benjamin Mkapa Hospital predominantly affects younger children and is more common among females and urban residents. Seasonal allergic rhinitis with inhalant triggers, particularly dust and smoke, and mild-intermittent severity predominated, with recurrent tonsillitis and allergic conjunctivitis being the common encountered comorbidities. Age was significantly associated with ARIA severity, underscoring the importance of early diagnosis, environmental control, and comprehensive management of allergic rhinitis in paediatric patients. These findings highlight the significance of strengthening routine screening and early diagnosis of allergic rhinitis in paediatric and otorhinolaryngology clinics, promoting environmental control measures to reduce exposure to inhalant allergens, and integrating the management of paediatric allergic rhinitis and its associated comorbidities into routine paediatric care. Policymakers and healthcare providers should highly prioritize awareness, early or prompt intervention, and possible preventive strategies to reduce the burden of paediatric allergic rhinitis. However, being a cross-sectional hospital-based design, reliance on parents or caregiver-reported information, and lack of objective allergen testing may limit the generalizability of the established findings.

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