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## Pattern of allergic rhinitis among children in Ekiti, Nigeria

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## ABSTRACT

**Background:** Allergic rhinitis is a chronic and recurrent nasal condition. It is often neglected in children with late presentation. This study aimed at determining the prevalence, sociodemographic features, comorbid illnesses, complications and quality of life in children with allergic rhinitis in the study institution.

**Materials and methods:** This is a prospective hospital based study of children with allergic rhinitis in Ekiti state university teaching hospital, Ado Ekiti. The study was carried out in ENT department over a period of two years (between June 2015 to May 2017). Informed consent was obtained from the parents/guardian/patients and consented patients were enrolled into the study. Data were obtained by pretested interviewers assisted questionnaire. Details of their history, physical examination and investigations were carried out and findings were documented. All data obtained were descriptively analysed using SPSS version 18.0 and presented in simple tables and charts. Ethical clearance was sought for and obtained from the ethical committee of the hospital.

**Results:** A total of 4341 patients were seen out of which 265 were children with allergic rhinitis. Prevalence of allergic rhinitis in children in this study was 6.1%. There were 63.0% males with male to female ratio of 2:1. Allergic rhinitis was peaked at preschool age group (1–5 years) accounted for 47.9%.

A total of 42.3% participants were living in urban setting while 57.7% were from rural setting. Majorities (40.4%) of the patients were in nursery and parent's major occupation was mainly farming in 27.2%.

There was positive family history of allergy in 54.7% patients. Perennial allergic rhinitis were noted in 63.8% patients while seasonal allergic rhinitis were noted in 36.2% patients. Major form of allergens was inhalant 81.8% and the least form of allergen was ingestant 5.7%.

The commonest identified trigger factors among the study population were as follows: dust, cold weather and smoke which were accounted for 59.6%, 37.4% and 18.9% of the study patients respectively. Other noted triggering factors were soap and perfume which accounted for 4.2% and 1.1% respectively.

Major associated comorbid illnesses among the patients were tonsils hypertrophy, adenoid hypertrophy and inferior turbinate hypertrophy which accounted for 55.5%, 46.4% and 40.4% respectively. Clinical presentations of allergic rhinitis in this study were mainly 75.8% nasal blockage, 65.3% runny nose and 8.5% recurrent sneezing.

Commonest complications of allergic rhinitis were 35.1% pharyngitis, 32.1% otitis media and 28.3% headache.

Treatment of allergic rhinitis leads to improvement on the clinical features in 90.1% patients. No significant improvement in clinical features were noticed in 9.8% patients. None of the studied patients reported worse clinical condition after treatment of allergic rhinitis. No mortality was recorded from allergic rhinitis in this study.

**Conclusion:** Allergic rhinitis affect all paediatric age group and there were delayed presentation in the participants. There were associated comorbid illnesses, complications and affectation of quality of life at presentation in majority of the patients.

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## 1. Introduction

Allergic rhinitis happens when aeroallergens trigger the release of histamine in the nose and it results from nasal congestion, rhinorrhea, sneezing and itching. Symptoms in the eyes, ears and throat are frequently associated [1–5].

Majority of the available data in the literature has focused on adults with allergic rhinitis and very little data is available about prevalence, burden, quality of life, complications, effects and comorbidities in children especially in developing countries [6]. In an American survey, 61% of children were diagnosed with allergic rhinitis by 6 years of age, and most of these children were diagnosed by pediatricians [7–11]. Allergic rhinitis was previously classified as seasonal and/or perennial. New Allergic Rhinitis and Its Impact on Asthma (ARIA) classification system was designed to better classify the disorder and include the categories of intermittent and persistent allergic rhinitis [12–16]. In allergic rhinitis the allergens include house dust mites, grass pollen, tree pollen, cockroaches, rodents, weed pollens, cat, dog, and molds [17–21]. Nonallergic triggers such as weather, fumes, odours, and exercise were commonly reported [15,16]. Allergic rhinitis may be due to local IgE production in the nose if no allergen was identified [22–24]. The role of histamine in allergic diseases is well defined [25–27]. Histamine mediates its effects via an established set of histamine receptors. In the nose this results in sneezing, itching and rhinorrhea. Risk factors for pediatric allergic rhinitis include genetic predisposition, prenatal as well as early-life environmental exposures (infections, indoor and outdoor air pollution, tobacco smoke, and diet) at a critical time when the immune system is still undergoing development, atopy, high socioeconomic status, and positive family history [28,29].

Complications of allergic rhinitis include the following: acute or chronic sinusitis, otitis media, sleep disturbance or apnea, dental problems (overbite). Morbidity/mortality from allergic rhinitis is not a life-threatening unless it is accompanied by comorbid illnesses such as severe asthma or anaphylaxis, eczema, and food allergies.

There is increase in prevalence rate of allergic rhinitis in recent time. Despite this increment there is still paucity of literature on allergic rhinitis in the developing countries. This study aimed at determining prevalence, sociodemographic features, comorbid illnesses, complications and quality of life of patients with allergic rhinitis in the study institution.

## 2. Materials and methods

This is a prospective hospital based study of the patients with clinical diagnosis of allergic rhinitis in children seen, reviewed and managed in the Ear, Nose and Throat department of the Ekiti State University Teaching Hospital, Ado Ekiti, Nigeria. This included all children aged 18 years and below at the time of this work. This tertiary health institution is the only state owned health facility serving over two millions populations in the state and 4 neighboring states of Ondo, Osun, Kogi and Kwara. The study was carried out over a period of two years (from June 2015 to May 2017). All consecutive patients who presented to the department were enrolled into the study. Informed consent was obtained from patients/guardian/parents before patients were enrolled into the study. Interviewer assisted questionnaire (pre-tested) were given to consented patients/parents/guardians to obtain detailed data on sociodemographic features of patients. Their detailed otorhinolaryngological history including their past medical, surgical and social history was also taken. Also history of allergens exposure and drugs usage were taken.

All the patients that were recruited into this study had detailed ENT examination done using endoscopes. Detailed nose, ear, throat, head and neck examination were done and documented. Detailed rhinological examination includes anterior rhinoscopy, nasal cavity and posterior rhinoscopy with nasoendoscopy. Oropharyngeal examination performed and findings were documented. General physical and

systemic examination was performed.

Limitations of this study include the absence of allergy testing and failure of estimating the measure of quality of life based on a standardized and validated (generic or disease-related) questionnaires.

Mucopurulent sino nasal discharge (specimen) was aseptically taken examined and sent for microscopy, culture, and sensitivity in case of any super imposed bacterial infection. Further investigations such as x ray, computerized tomographic (CT) scan of the paranasal sinuses were requested based on clinical findings.

All the patients were educated based on the findings on the line of management of allergic rhinitis. Treatment modalities were avoidance of allergens, antibiotic therapy (such as amoxicillin/clavulanic acid to treat superimposed infection), antihistamines, topical corticosteroids, systemic steroids and surgery (adenoidectomy with or without tonsillectomy) depending on clinical findings. Participants were followed up in the ear, nose and throat clinic for possible outcome and complications.

All data obtained were documented, collated and analysed. The data analysis was done by using SPSS version 18. The analyzed data were presented in simple descriptive tables and charts.

Ethical clearance was sought for and obtained from the ethical committee of the hospital.

## 3. Results

A total of 4341 patients were seen in the ENT department over the study period. There were 265 paediatric patients (characterised by rhinorrhoea, nasal obstruction, epiphora, and nasal and eye itching) enrolled into the study. Prevalence of allergic rhinitis in children in this study was 6.1%. Allergic rhinitis affects all the paediatric age group with a peak at preschool age group (1–5) years accounted for 47.9%. This was demonstrated in Fig. 1. There were 167 (63.0%) males 98 (37.0%) females with male to female ratio of 2:1. A total of 112 (42.3%) participants were living in urban setting while 153 (57.7%) were from rural setting. Majority (40.4%) of the patients were in nursery, 26.8% were in secondary school level while 9.4% are in post-secondary level of education. Parent's major occupation were mainly farming (27.2%), teaching (25.9%) while 10.6% are health worker. This was illustrated in Table 1.

There were positive family history of allergy in 145 (54.7%) while 120 (45.3%) did not have. From the patients history perennial allergic rhinitis were noted in 169 (63.8%) patients while seasonal allergic rhinitis were noted in 96 (36.2%) patients. Using ARIA classification as shown in Table 2, majority 145 (54.8%) of the patients were moderate-

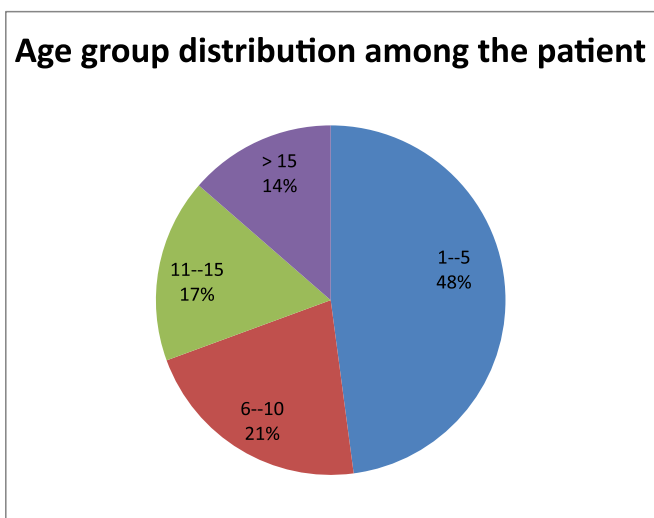


Fig. 1. Age group(years) among patients.

**Table 1**  
Sociodemographic features of the patients.

Sociodemographic features	Number	Percentage (%)
<b>Sex</b>		
Male	167	63.0
Female	98	37.0
<b>Residential</b>		
Urban	112	42.3
Rural	153	57.7
<b>Education level</b>		
Nursery	107	40.4
Primary	62	23.4
Secondary	71	26.8
Post secondary	25	9.4
<b>Parental occupation</b>		
Business	55	20.8
Teaching	69	25.9
Industrial worker	41	15.5
Farming	72	27.2
Health worker	28	10.6

**Table 2**  
Features of Allergy among the patients.

Features of Allergy	Number	Percentage (%)
<b>Family history of Allergy</b>		
Present	145	54.7
Absent	120	45.3
<b>Type of Allergy</b>		
Perennial	169	63.8
Seasonal	96	36.2
<b>ARIA Classification</b>		
Mild-Intermittent	26	9.8
Moderate-Severe intermittent	51	19.2
Mild-Persistent	43	16.2
Moderate-Severe Persistent	145	54.8
<b>Form of Allergy</b>		
Inhalant	217	81.8
Ingestant	15	5.7
Contactant	33	12.5
<b>Trigger factor</b>		
Dust	158	59.6
Cold weather	99	37.4
Smoke	50	18.9
Perfume	11	4.2
Vehicle exhaust	24	9.1
Soap	3	1.1

severe persistent allergic rhinitis and 51 (19.2%) had moderate-severe intermittent allergic rhinitis. Major form of allergens was 217 (81.8%) inhalant and the least form of allergen was 15 (5.7%) ingestant. In this study, self-reported allergy were based on the trigger factors. The commonest identified trigger factors among the study population were as follows: dust, cold weather and smoke which were accounted for 158 (59.6%), 99 (37.4%) and 50 (18.9%) of the study patients respectively. The less common trigger factors were soap and perfume which accounted for 11(4.2%) and 3 (1.1%). This was showed in Table 2.

Major associated comorbid illnesses among patients with allergic rhinitis in this study were tonsillar hypertrophy, adenoid hypertrophy and inferior turbinate hypertrophy which accounted for 147 (55.5%), 123 (46.4%) and 107 (40.4%) respectively. Minor associated comorbid illnesses in this study were sinusitis, allergic dermatitis and ear discharge which accounted for 14 (5.3%), 14 (5.3%) and 22 (8.3%) respectively. This was showed in Table 3.

Clinical presentation of allergic rhinitis in this study were mainly nasal blockage in 201 (75.8%) of our patients, runny nose in 173 (65.3%) and 155 (58.5%) had recurrent sneezing. Permanent nasal obstruction were noticed in 172 (64.9%) while recurrent nasal obstruction were noticed in 29 (10.9%). Trigger factors for sneezing were identified in 146 (55.1%) patients. Less common presentation of

**Table 3**  
Comorbid illnesses among the patients.

Comorbid illnesses	Number	Percentage (%)
Asthma	63	23.8
Allergic conjunctivitis	84	31.7
Allergic dermatitis	14	5.3
Recurrent tonsillitis	147	55.5
Adenoid hypertrophy	123	46.4
Inferior turbinate hype	107	40.4
Nasal polyps	25	9.4
Ear discharge	22	8.3
Sinusitis	14	5.3

**Table 4**  
Symptoms of allergy among the patients.

*Symptoms	Number	Percentage (%)
Blocked nose	201	75.8
Runny nose	173	65.3
Recurrent sneezing	155	58.5
Nasal itching	141	53.2
Itchy throat	103	38.9
Itchy ear	93	35.1
Watery eyes	88	33.2
Itchy nose	87	32.8
Eye itching	86	32.5

\*NB.

\*Some patients has more than one symptoms.

allergic rhinitis in this study were 86 (32.5%) itchy eye and 87 (32.8%) itchy nose. This was illustrated in Table 4.

Clinical findings in this study were mainly oedematous nasal mucosa, enlarged turbinate and reduced nasal patency and they accounted for 193 (72.8%), 178 (67.2%) and 140 (52.8%) respectively.

Common complications which were associated with allergic rhinitis includes pharyngitis in 93 (35.1%), otitis media in 85 (32.1%) while 75 (28.3%) has headache. Fig. 2.

Microscopic, culture and sensitivity were requested for patients with mucopurulent discharge. There was no growth in 9 (3.4%) of the nasal specimen taken. There were growths of streptococcus in 64 (24.2%), *Staphylococcus aureus* in 49 (18.5%) and *Hemophilus influenzae* in 31 (11.7%) of the patients.

Treatment approach was by combination of allergens avoidance, medical treatment and surgery was reserved for patients with adenoid

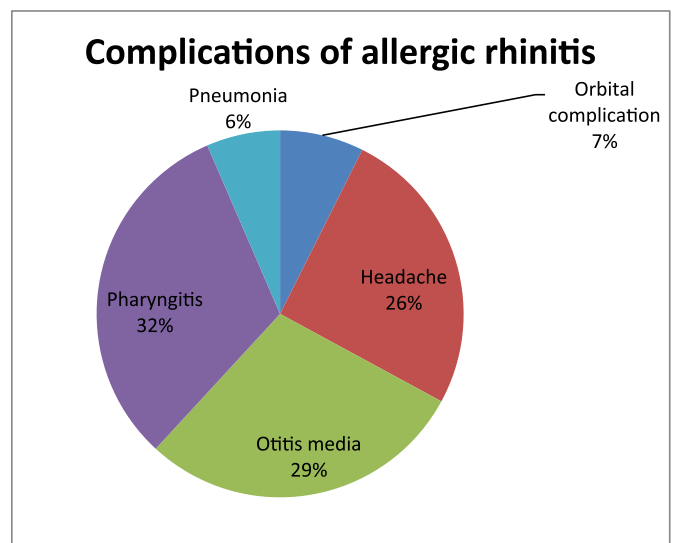


Fig. 2. Complications of allergic rhinitis.

and/or tonsils hypertrophy. Treatment of allergic rhinitis and comorbid illnesses leads to improvement and recovery on the clinical features (not cure) in 239 (90.2%) patients. There was no significant improvement in clinical features in 26 (9.8%) of our patients. None of the studied patients reported worse clinical condition after treatment of allergic rhinitis and comorbid illnesses. No mortality was recorded from allergic rhinitis, comorbid illnesses, complications or treatment intervention in this study.

#### 4. Discussion

Allergic rhinitis in children is still a global healthy problem with little or no recognition. In most cases children allergic rhinitis is commonly under-diagnosed because the symptoms are frequently attributed to a viral or recurrent flu. As a result of this most parents do not seek medical intervention. Some parents use available medication or local herbs without doctors prescription and such symptoms treatment are suboptimal [30].

Prevalence of allergic rhinitis in children in this study was 6.1% this is lower than prevalence rate in other previous studies [7–9]. This low prevalence of allergic rhinitis in children may be due to underestimate as majority of patients with this condition are treated by their family physician or paediatrician at peripheral hospitals. Majority of the patients in this study were with severe symptoms, complicated cases or associated co-morbidities were referred to otorhinolaryngologist, head and neck surgeon. A true prevalence of allergic rhinitis among paediatric in this region requires comprehensive community-based study. The study population were mainly civil servant from low industrial state in a developing part of the world compared to study in developed part of the world with higher prevalence of allergic rhinitis. There is higher prevalence in some developing region such in African countries includes 29.6% in Nigeria and 30% in Cape Town in South Africa [31,32]. Factors responsible for high prevalence of allergic rhinitis in children includes climatic factors, dietary changes, environmental factors and industrial pollution were very low in the study population.

In this study, male gender preponderance was observed which is in agreement with other study [33]. This however differs from other studies with female preponderance [34]. There are some studies with equal sex preponderance [35]. This gender proportions is found to be inconsistent in different study. Gender parity findings may likely be by chance.

Majority of the paediatric patients in this study were preschool children this is comparable with other previous studies [36,37]. This may be due to increased number of associated comorbid illnesses such as adenoid with tonsillar hypertrophy of allergic rhinitis at this age group which prompted parent to attend specialist medical services in this study. Allergic rhinitis is also associated with severe and troublesome symptoms which are exacerbated by acute viral infections forcing parents or guardian to seek specialist medical cares. Common chronic symptoms of allergic rhinitis are commonly ignored in older aged patients in this study except when complicated.

In this study environmental factors that were responsible for increase risk of allergic rhinitis in children were dusts, fumes exhausts from vehicle, environmental tobacco smoke exposure and moulds and perfume and this is similar to findings in other studies [38–40]. Many patients in this study had family history of allergy. Similar findings were discovered in previous study [41].

Inflammation of the nasal mucosal lining and contiguous structure from allergens results in sneezing, rhinorrhoea, nasal congestion, with itching of the nose, ear, palate, throat and eyes [42]. Nasal obstruction usually worsen with comorbid inferior turbinate hypertrophy, nasal polyps and adenoid hypertrophy among our patients. Blocked nose showed significant association with adenoid hypertrophy in children in this study. Rhinorrhoea is the resultant effects of nasal mucosal goblet cell stimulation by the allergens. In our study, high percentage of patients had runny nose (rhinorrhoea), nasal blockage, bout of sneezing

and these findings are similar to other studies on allergic rhinitis [43]. Consequently qualities of life are grossly affected in some of our patients. Qualities of life that are often affected include impaired social life (especially in the older ones), sleep disruption, daytime sleepiness, absenteeism and irritability [43]. Nasal obstruction and nasal congestion were responsible for the sleep disturbances [43]. Nasal blockage and rhinorrhoea when severe may cause interference with daily activities and embarrassment to allergic rhinitis patients [44].

In this study population, allergic rhinitis in children has significant comorbid illnesses such as asthma, sinusitis, otitis media, adenoid hypertrophy and allergic conjunctivitis in different percentages. Many other studies reported different percentage of associated comorbid illnesses [30].

In the management of the patients with allergic rhinitis in children in this study multidisciplinary approach was used. This is because of the associated comorbid illnesses and complication with allergic rhinitis in the studied children. The health team included general practitioner, paediatricians, allergists and otorhinolaryngologists, head and neck surgeon [30]. The treatment of approach were allergen avoidance, medical intervention and surgical treatment of comorbid illnesses and complications. Allergens control requires aggressive environmental control which is effective [45]. Medical treatment includes intranasal steroid, antihistamines and antibiotics to treat superimposed infection and depending on the presenting clinical features. Surgical therapy was reserved for adequate treatment of comorbid illnesses, complications and refractory to medical treatment [46,47]. Surgical treatments are for patients with adenoid hypertrophy, tonsillar hypertrophy and turbinate hypertrophy. Other form treatments such as Immunotherapy, desensitization are not used in this study due to available facilities in the study [48]. Montelukast a leukotriene receptor antagonist used for the maintenance treatment of allergy and asthma is not available in our center.

There was no associated mortality to allergic rhinitis in children in our study. Common cause of death due to comorbid illnesses, surgical complications were recorded in other study [49].

Findings in this study was due to some potential limiting factors which includes to performed allergy testing, hospital based study and measurement of quality of life without the use of standardized and validated (generic or disease-related) questionnaires. Despite these limitations this study provide hospital information which can serve as bases for community based study and may help health care workers to develop guideline in management of allergic rhinitis in children.

#### 5. Conclusion

Allergic rhinitis is very common and affect all paediatric age group usually neglected and delayed presentation in the participants. Prevalence of allergic rhinitis was low in this study compare to previous study. There were associated comorbid illnesses, complications and affection of quality of life before presentation to the otorhinolaryngologist in majority of the patients. Early referral is highly recommended to the specialist to avoid on toward effect.

#### Conflicts of interest

None.

#### Appendix A. Supplementary data

Supplementary data related to this article can be found at <http://dx.doi.org/10.1016/j.ijporl.2018.01.014>.

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