

## Prevalence of Allergic Disorders among University Students in a Tertiary Institution in Nigeria

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**Abstract:** Background: Various epidemiological survey have reported an increase in allergic diseases all around the world. The urbanization and globalization in the developing countries have resulted in drastic environmental changes and increased allergens present in the environment. Nevertheless very few studies have been done on young adult Nigerians.

**Objective:** This study aimed to find out the prevalence of allergic disorders (asthma, allergic rhinitis, allergic dermatitis) among university students in Nigeria.

**Design:** A prospective cross sectional study.

**Setting:** Tertiary Institution.

**Methods:** A self-administered structured questionnaire adapted from the European Community Respiratory Health Survey was used as research instrument for data collection. The demographic data and the allergy characteristics collected were analyzed using SPSS version 19.

**Results:** A total of 746 students were included in the study with their ages ranging from 14 - 34years (mean +/- SD=19+/-1.6years). There were 290 males and 456 females. Prevalence of wheeze within the past 12 months and physician diagnosed asthma for this group of subjects was 18.4% and 13.1% respectively. Prevalence of allergic rhinitis was 35.1% and of eczema was 15.3%. Presence of allergic rhinoconjunctivitis was significant risk factor for asthma. Family history of allergy was significantly associated with wheezing and allergic rhinoconjunctivitis.

**Conclusion:** This study shows that allergic rhinoconjunctivitis as a risk factor for asthma. There was a strong evidence of association between family history of allergy and these allergic disorders (asthma, allergic rhinoconjunctivitis)

**Key Words:** Allergic diseases ·Allergic rhinitis· University students ·Nigeria

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### I. Introduction

Allergy disorders have a multiorgan character<sup>1</sup>, they include allergic rhinitis, urticaria, food allergy, allergic conjunctivitis, drug allergy, insect allergy, and asthma<sup>2,3</sup>. These disorders are common in the population and many recent studies have demonstrated the increasing prevalence of these diseases in many countries<sup>2,3,4</sup>. The symptoms occur with different intensity, manifesting at various stages of personal development<sup>1</sup>. According to Debor's theory, the 'allergy march' can be observed<sup>1</sup>. At infant age and in early childhood, the symptoms of food allergy and dermal allergy are most often observed. At later age, allergic conjunctivitis, rhinitis, and asthma predominate<sup>1,5</sup>. These allergic diseases impose heavy social and economic burdens on the general population<sup>6</sup>. Allergies during college years impact the quality of life by interfering with the daily activities, causing poor class attendance, sleep disturbances, and inability to perform academic as well as extracurricular activities<sup>2,6</sup>. Studies have also documented that allergic diseases are more frequent in students of high social-economic status and in those from the urban and industrialized societies than the less industrialized regions<sup>7</sup>. Von Hertzen and Haahtela from Finland, reported an increase in the occurrence of allergies among individuals living in the city<sup>8</sup>. The cause of these disorders is an interaction between genetic factors (e.g. race, allergic predisposition, family history) and environmental factors (e.g. outdoor and indoor allergens, air pollution, water, lifestyle, diet, and exposure to cigarette smoke)<sup>9</sup>. In order to address if the prevalence of allergic diseases is increasing, as reported elsewhere<sup>2,3,4,10</sup> and due to non availability of adequate data on prevalence of allergic disorders in young adults in Nigeria, the need to conduct this study to determine prevalence of asthma-related symptoms among university students in Nigeria and to determine prevalence of other related allergic disorders, i.e. allergic rhinitis and eczema in the same population utilizing standard questionnaire. The availability of such data is necessary, not only for epidemiological purposes, but also for determining the pharmaco-economic extent of allergic disorders to the society.

## II. Materials And Methods

The subjects were recruited from the student (undergraduate) population of Babcock University, Ilesha, Ogun State, Nigeria. An ethical clearance for the conduct of the study was obtained from Babcock University Teaching Hospital Ethical Review Board. The objectives of the survey were explained to the participants and informed verbal consent was obtained. All students that were willing to participate in the study were included until the sample size was achieved while those who were not willing to participate and those who were absent during the administration of questionnaire were excluded from the study.

Students from selected classes were then asked to complete the written questionnaires. In total, 746 university students participated in the survey. The study was done in accordance with the Helsinki Declaration of 1975 as revised in 1996. A standardized self-administered questionnaire adapted from the European Community Respiratory Health Survey (ECRHS)<sup>11</sup> was developed and pre-tested for validity. Every item in the questionnaire was clearly explained to the students prior to their responses. Trained research assistants were available to provide further clarification of the questionnaires during the session to ensure the most reliable information possible. The questionnaire was modified to include participants' socio-demographic characteristics (age, gender, ethnicity, department and level in the university), symptoms of allergic rhinitis, asthma, conjunctivitis and allergic dermatitis.

Allergic rhinitis was defined as having 2 or more recurrent nasal symptoms such as excessive sneezing, nasal itching, nasal discharge, or nasal congestion or obstruction that were reversible either spontaneously or with treatment in the preceding 12 months<sup>10,12</sup>. Asthma was defined as symptom of recurrent attacks of wheezing for 12 months or physician diagnosed asthmatics<sup>13</sup>. However, other asthmatic symptoms were coughing, or shortness of breath when exercise or during night time. Allergic Conjunctivitis was defined as frequent itching and irritation with or without lacrimation<sup>2</sup>. Allergic dermatitis means one or more episodes of generalized rash with pruritus for a period of 12 months<sup>2</sup>. History of cigarette smoking and family history of allergy were also sought.

Data collected were collated, presented in descriptive format, tables, diagrams and graphs where appropriate. Analysis was done using Statistical package for social sciences (SPSS) version 17. Diseases prevalence were calculated as percentage of total study population. Odds ratio of association with covariate and 95% confidence interval was calculated and chi-square test was used to determine the statistical significance where appropriate.

## III. Results

A total of 746 students with 290 (38.9%) males and 456 (61.1%) females) were included. Their ages ranged from 14 to 34 years with mean age of 19+/- 1.6 years. Fifty seven percent of the subjects were of Yoruba ethnicity and all colleges of the university were well represented in this study sample. Sixteen percent of the subjects have a positive family history of allergy and about 4% of them were involved in cigarette smoking for at least 1 year. Prevalence of wheeze within the past 12 months and of physician diagnosed asthma were 18.4% and 13.1%. Other asthma related symptoms like attack of shortness of breath and waking up with the feeling of chest tightness were 19.8% and 24.3% respectively.

The effect of gender and age upon prevalence of wheeze within the past 12 months and physician diagnosed asthma were then further investigated. Among male students, prevalence of wheeze within 12 months and diagnosed asthma were 8.5% and 6.6%, whereas, the respective percentages for female students were 9.9% and 6.8%. The differences between gender were not statistically significant ( $P=0.398, 0.825$ ) both for wheeze within 12 months and for diagnosed asthma respectively. The prevalence of nasal symptoms (runny nose, nasal congestion and sneeze without a fever or a cold) was high in this population, i.e. 40.6%; with 35.2% reporting symptoms within the last 12 months (Table 3). However when symptoms were limited to those with concomitant eye symptoms, the prevalence decreased to 26.0%. Symptoms interfered with daily activities in 21.9%. The pattern of nasal symptoms was of a perennial type with a peak from November to January. The effect of rhinoconjunctivitis on asthma prevalence was found to be significant. Subjects with rhinoconjunctivitis who reported wheeze within 12 months were 26.4% and those that were physician diagnosed asthmatics were 21.0% of the cases ( $p < 0.0001$ ;  $p < 0.0001$ ) respectively. This indicated that the presence of rhinoconjunctivitis increases the risk for asthma. This study revealed that family history of allergy was significantly associated with history of wheezing ( $\chi^2=14.760$ ,  $p$  value =0.001), allergic rhinitis ( $\chi^2=26.231$ ,  $p$  value =0.000) and symptom suggestive of rhinoconjunctivitis ( $\chi^2=48.170$ ,  $p$  value =0.000). The positive responses of subjects to ever had rash, itchy rash that was on and off for at least 6 months and rash within 12 months were 42.5%, 18.6%, and 15.3%, respectively (Table 4).

#### IV. Discussion

The results of this present study, which was performed on a population of university students, showed the prevalence of wheezing in the last 12 months, physician diagnosed asthma, attack of shortness of breath and waking up with the feeling of chest tightness to be 18.4%, 13.4%, 19.8% and 24.3% respectively without significant differences between males and females. This result is higher than the findings of Erhabor et al<sup>14</sup> in a similar study carried out in 2005 among undergraduates in a public university in Nigeria, a 12-month prevalence of wheezing, nocturnal orthopnea with cough, and chest tightness in the morning was 9.0%, 9.4%, and 8.0%, respectively<sup>16</sup>. The reason for this difference may be due to increased urbanization and industrialization process that is occurring in developing countries. In addition, our study was conducted in a private university in Nigeria where most of the students are from rich and affluent families as opposed to public universities with students from mixed backgrounds (poor and rich) families. In other countries like Turkey, Costa Rica and Bangkok, the prevalence of wheezing in last 12 months among their university students were 9.7%, 10.6% and 10.1%<sup>15-17</sup> respectively. In the NHANES III study done in the United States among 3780 young adults (aged 20–29 years), the prevalence of wheezing in the previous 12 months (wheezing) was 16.4%, even though the prevalence of current asthma (asthma) was 4.5%<sup>18</sup>.

We detected a prevalence of 35.1% for symptoms of allergic rhinitis in our study group of young adult Nigerian undergraduates. This rate is higher than that of 29.6% observed in adult Nigerians aged 18 to 45 years in a study carried out in Ilorin, Nigeria<sup>10</sup>. Possible explanations for this difference is the fact that our study population is more educated, urbanized, and has higher socioeconomic status as compared to the general Nigerian population of same age group. It is noteworthy that a rate of 39.7% was observed in Nigerians aged 13 to 14 years old by the International Study of Asthma and Allergies in Childhood (ISAAC) study in Nigeria<sup>19</sup>. Our finding is comparable to the observation of Ogino in a study carried out on medical students in Japan, where intradermal skin test and nasal provocation test were also performed showed the high incidence of nasal allergy as 32.7%.<sup>21</sup> In other parts of the world, the prevalence of allergic rhinitis varied - Thailand (57.4% %), Bangkok (61%), Turkey (27.1%), Sweden (20.5%), and the USA (20.4%)<sup>21-26</sup>. The reason for this difference may be due to varying environmental factors that influence an individual's genetic susceptibility to developing this disease, in addition to variations in methodologies and age groups studied. The combination of eye and nose symptoms was considered to have a high positive predictive value for the diagnosis of allergic rhinitis. The prevalence of allergic rhinoconjunctivitis in the present study was about 26%; this is comparable to findings in previous studies; United Arab Emirates (21%), Bangkok (26%)<sup>17,27</sup>. Rhinoconjunctivitis in our study was shown as a high risk factor for asthma, this is similar to the observation of Vichyanond et al<sup>17</sup> who reported a 3.2 fold increase of asthma patients in the rhinoconjunctivitis group. This is in keeping with the fact that there have been epidemiological, pathophysiological and clinical studies showing a strong relationship between rhinitis and asthma<sup>28-30</sup>.

The prevalence of eczema among undergraduate students was 18.6%. According to the ISAAC's reports, the prevalence of AD surveyed in several European countries ranged from 13.5% to 21.4%<sup>31-32</sup>. However, our finding is higher than some of the results gotten from other countries; Bangkok 9.4%<sup>17</sup>, United Arab Emirate 14.9%<sup>27</sup> and Lebanon 12.8%<sup>33</sup>. Meanwhile a high rate of 35.8% was reported in Tehran<sup>34</sup>. Family history of allergies was strongly associated with occurrence of wheezing in the chest, allergic rhinitis and allergic rhinoconjunctivitis supporting previous publications on allergies which supported the association of occurrence of allergic diseases in subjects with family history of allergic disease<sup>35-36</sup>. This finding may be affirming that there is a genetic influence on the development of allergies among the students.

#### V. Conclusion

We have demonstrated the prevalence of allergic diseases in a group of university students in Nigeria. There has been some changes from the previous study done in Nigeria among these young adults. The prevalence of asthma symptoms has increased, meanwhile allergic rhinoconjunctivitis is observed to be a risk factor for asthma. There is a strong evidence of association between family history of allergy and these allergic disorders (asthma, allergic rhinoconjunctivitis).

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**Table1: Demographic Information And Personal Characteristics Of Surveyed Students**

Variables	Frequency	Percentage(%)
Age (years)		
<15	2	0.3
15 -19	547	73.3
20 -24	167	22.4
25 - 29	25	3.4
>30	5	0.7
Sex		
Male	290	38.9
Female	456	61.1
Ethnicity		
Yoruba	427	57.2
Igbo	187	25.1
Hausa	24	3.2
Others	108	14.5
Level		
100	318	42.6
200	150	20.1
300	194	26.0
400	81	10.9
500	3	0.4
Family history of atopy		
Present	119	16.0
Absent	627	84.0
History of cigarette smoking for as long as 1 year		
Yes	34	4.6
No	712	95.4

**Table2: Prevalence Of Asthma Related Symptoms Among Surveyed Students**

	Frequency	Percentage (%)
Wheezing or whistling in the chest	137	18.4
Woke up with a feeling of tightness in your chest	181	24.3
Had an attack of shortness of breath	148	19.8
Physician diagnosed asthma	98	13.2

**Table3: Prevalence Of Rhinitis Symptoms Among Surveyed Students**

	Frequency	Percentage(%)
Any nasal allergies, including hay fever	137	18.4
Had problem with sneezing, running /blocked nose when you did not have cold or flu	303	40.6
Had problem with sneezing, running/blocked nose when you did not have cold or flu in a year	262	35.1
Nose problem accompanied by itchy or watery eyes	194	26.0

**Table4: Prevalence Of Eczema-Related Symptoms In The Same Population**

	Frequency	Percentage(%)
Ever had eczema or any kind of skin allergy	317	42.5
Ever had an itchy rash that was coming and going for at least 6 months	139	18.6
Had this itchy rash in the last 12 months	114	15.3