

Self-reported asthma symptoms among adults aged 20-30 years in a Nigerian university: a cross sectional study

¹Maxwell O Akanbi, ²Obianuju B. Ozoh, ¹Folake O. Akanbi, ¹Christiana O. Ukoli

Abstract

Background: Despite concerns about the increasing incidence of asthma in developing countries, there is insufficient data on burden and risk factors for asthma among adults in sub-Saharan Africa. The aim of this study was to determine the prevalence of asthma among young adults in north-central Nigeria.

Methods: This cross-sectional study was carried among 20-30 year old medical undergraduates of the University of Jos, Nigeria. A modified version of the European Community Respiratory Health Survey stage 1 questionnaire was administered to subjects to obtain bio data, asthma symptoms, and possible risk factors. Factors associated with current asthma symptoms were evaluated using logistic regression models.

Results: A total 177 of 185 questionnaires were returned (response rate 95.7%). Forty two (22.7%) persons reported

at least one asthma symptom in the 12 months preceding the study, with 16.4% (29) reporting episodes of recurrent wheeze. Nine persons (5.1%) had a previous diagnosis of asthma; 24.1% among persons with recurrent wheeze in the 12 months preceding the study ($\chi^2=24.59$; $p<0.01$).

There was no association between asthma and household smoking, cooking fuel and parental level of education.

Conclusions: We found a high frequency of asthma symptoms among persons aged 20-30 years. Risk factors for asthma in this population require further evaluation.

Keywords: Bronchial Asthma, Sub-Saharan Africa, Lung disease, Obstructive lung disease, Respiratory disease

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Introduction

Asthma is a complex syndrome with many clinical phenotypes in both adults and children and is characterized by a variable degree of airflow obstruction, bronchial hyper-responsiveness, and airway inflammation¹. Although the prevalence of asthma is higher in developed compared to developing countries, there is however widespread concern that its prevalence may be rising in developing countries with huge economic and humanitarian effects². Trends in the prevalence of symptoms suggestive of asthma show greater variation than trends in the prevalence of diagnosed asthma³⁻⁵ and this variability among countries may in part be attributable to differences in definitions of asthma symptoms, such as wheezing, shortness of breath, and asthma attacks. Differences in

asthma prevalence among and within countries may provide clues to preventable risk factors⁶, hence warranting asthma surveys within and between countries.

Despite concerns about the increasing burden of asthma in developing countries, most published literature on asthma burden are still from developed countries. A recent review of asthma in sub-Saharan Africa identified 11 publications on the prevalence of asthma on the continent; with only three reporting prevalence rates in adults⁷. In Nigeria, with over 150 million people from diverse ethnic groups, there are still very few studies on the prevalence of asthma in various age groups,⁸⁻¹⁰ with most available studies in south-western Nigeria. The Northern part of the country lies within a different climatic zone (savannah region), as opposed to the rain forest in south-western Nigeria. There is paucity of information on the burden of asthma in the region. In this study, we aimed to determine prevalence of asthma and explore factors associated with it among young adults in a university in north-central Nigeria.

Materials and Methods

This cross-sectional study was carried out between July and October 2011 among 20-30 year old medical

¹Department of Medicine, Jos University Teaching Hospital, Jos, Nigeria ²Department of Medicine, College of Medicine, University of Lagos, Nigeria

Corresponding Author:

Dr Akanbi Maxwell O. MS, FMCP

Department of Medicine, Jos University Teaching Hospital, Lamingo, Jos East LGA, Nigeria

Email: maxwell_akanbi@yahoo.com

undergraduates of the University of Jos, Nigeria.

Sampling Method

For the study, medical undergraduates in their clinical years (4th to 6th year) were randomly selected from the class list using a table of random numbers. These classes were selected because they were more likely to be in our target age group and their medical knowledge obviated the need to for video demonstration of wheeze. The total number of students was 721 (63.3% male).

With an estimated asthma prevalence of $15\pm 5\%$, $\alpha = 0.05$ and a power of 90%, the minimum sample size required was 154. With an estimated non-response rate of 20% a total number of 185 students were selected.

Questionnaire

A modified version of the European Community Respiratory Health Survey (ECRHS) stage 1 questionnaire¹¹ was administered to all subjects to obtain bio data, asthma symptoms, and possible risk factors. This is a validated questionnaire that has been used for asthma survey in various countries, including Nigeria⁸. The main outcome was asthma, which was defined as the occurrence of recurrent wheeze in the 12 months preceding the study. This has been used as an epidemiologic diagnosis in previous studies^{10,11}. The prevalence values were calculated using the total number of responses to each question as the denominator. Possible risk factors for asthma in the study population were evaluated.

Ethical Consideration

Ethical approval was obtained from the Human Research and Ethics committee of the Jos University Teaching Hospital and informed consent obtained from each study participant.

Statistical Analysis

Data analysis was carried out using SPSS version 17 statistical software. Categorical variables were compared using chi square test. Group means were compared using the student-t test. Factors associated with current asthma symptoms were determined by the logistic regressions method. A p value less than 0.05 was considered significant.

Results

A total of 185 students were selected for the study and had the study questionnaire administered to them, of which 177 questionnaires were returned (response rate 95.7%). The study population had a mean age of 23 ± 2 years and comprised of 114 (64.4%) males. The males had a mean age of 23 ± 2 years compared to 22 ± 2 years among the females; $p < 0.01$.

Table 1: Characteristics of adults aged 20-30 surveyed for asthma symptoms at the university of Jos medical school

Variables	Self-reported wheeze in the 12 months preceding the survey		Total
	Yes	No	
Sex, Male, N (%)	20 (68.9)	94 (63.5)	114 (64.4)
Mean Age, years (SD)	23.15 (2.83)	23.18 (2.44)	23.17 (2.53)
Mean Family size (SD)	5.2 (2.2)	5.8 (3.2)	5.7 (3.0)
Predominant household cooking fuel, N (%)			
Gas	1 (5.9)	6 (6.7)	7 (6.0)
Kerosene	9 (67.3)	68 (60.0)	77 (66.4)
Biomass	5 (26.7)	27 (33.3)	32 (27.6)
Cigarette smoker in household, N (%)	5 (17.2%)	21 (14.3)	26 (14.8)
Mother with greater than secondary school education, N (%)	24 (81.4)	114 (82.8)	138 (81.7)
Father with greater than secondary school education, N (%)	21 (72.4)	97 (69.8)	118 (70.2)

About 38% of the study population was born in Jos, while 97.2% were born in Nigeria. The mean duration of residence in Nigeria was 22 ± 3 years. The characteristics of the study participants are shown in Table 1.

Table 2: Prevalence of asthma symptoms in the 12 months preceding the study among 20-30 year old adults at the university of Jos medical school

Symptoms	Sex; prevalence, N (%)		
	Women	Men	Total
Attacks of wheezing over 12 months			
None	59 (92.19)	104 (92.04)	163 (92.09)
1-3	2 (3.13)	7 (6.19)	9 (5.08)
4-12	2 (3.13)	2 (1.77)	4 (2.26)
More than 12	1 (1.56)	0 (0)	1 (0.56)
Sleep disturbed due to wheezing			
Never	61 (96.8)	110 (96.5)	171 (96.6)
< 1 night per week	2 (3.2)	1 (0.9)	3 (1.7)
1 night per week	0 (0)	3 (2.6)	3 (1.7)
Wheezing severe enough to limit speech	2 (3.3)	3 (2.9)	5 (3)
Wheezing during exercise	8 (12.7)	15 (14.0)	23 (13.5)
Dry cough at night not associated with cold	13 (20.6)	23 (20.7)	36 (20.7)

Frequency of asthma symptoms

A total of 42 (22.7%) persons reported at least one asthma symptom (wheeze or dry cough at night not associated with respiratory infection) in the 12 months preceding the study, with 29 (16.4%) reporting more

than one episode of wheeze in the preceding 12 months, thus meeting our epidemiologic definition of asthma. A total of 31 (18.1%) respondents reported a history of wheeze in the past.

Among persons with asthma 64.3% had one to three episodes, 28.6% had four to twelve episodes and 7.1% had more than 12 episodes of wheeze in the preceding year. In the year preceding the study, 22% of persons with asthma had associated sleep disturbance, while 44.6% reported wheeze severe enough to limit speech to one or two words between breaths. Wheeze during exercise was reported by 13.5% (n=23) of the study population, while 20.7% (n=33) reported dry cough at night not associated with a cold or chest infection. The frequency of respiratory symptoms based on gender is shown in Table 2.

Table 3: Logistic regression model of factors associated with recurrent wheeze in the 12 month preceding the study among 20-30 year old adults at the university of Jos medical school

Factor	Univariate analysis		Multivariate analysis	
	Odds ratio	95% CI	Odds ratio	95% CI
Sex; Male	1.27	0.54-3.00	2.21	0.59-8.22
Cooking Fuel				
Gas	1.11	0.11-11.33	0.55	0.05-6.78
Kerosene Stove	0.79	0.09-7.37	0.42	0.04-4.80
Biomass Fuel	1	reference	1	reference
Family size greater than 6	0.27	0.08-0.95	0.65	0.16-2.61
Household Cigarette smoking	1.25	0.43-3.64	0.50	0.13-1.87
Mother with less than secondary school education	0.91	0.32-2.62	0.49	0.07-3.24
Father with less than secondary school education	0.88	0.36-2.15	0.99	0.23-4.23

Frequency of previously diagnosed asthma

A total of nine subjects (5.1%) had been previously diagnosed of asthma. Prevalence of previously diagnosed asthma was 1.7% in females and 7.7% in males. Among persons with wheeze in the year preceding the study, seven (24.1%) had a previous diagnosis of asthma; while two of 135 person (1.5%) without wheeze had a previous diagnosis of asthma ($\chi^2=24.59$; $p < 0.01$). Five (22.7%) of those with wheeze during exercise had a previous diagnosis of asthma, while four of 136 (2.9%) respondents without a history of exercise associated wheeze had a previous diagnosis of asthma ($\chi^2=13.8$; $p < 0.01$). Of 33 persons who reported dry night cough not associated with a cold or chest infection four (12.1%) had a diagnosis of asthma, compared to four of 128 (3.1%) persons without similar symptoms ($\chi^2=4.50$; $p = 0.06$). Eight subjects had the combination of wheeze and dry cough at night in the preceding year of which four (50%) had a diagnosis of asthma.

Factors associated with wheeze in the preceding 12 months

Factors associated with reported wheeze in the 12 months preceding the study are shown in Table 3. A total of 27 (15.3%) respondents reported that an adult in their household smoked cigarette. In respondents with a family size greater than 6 the odds ratio for wheeze in the 12 months preceding the study was 0.27 (95% CI 0.08-0.95; $p=0.04$) in univariate analysis, but was not significant after adjusting for other factors. The cooking fuel used in their homes, presence of an adult smoker in the home, gender and parental educational levels were also not significant determinants of wheeze.

Discussion

The aim of this study was to determine the prevalence of asthma symptoms among young adults in north-central Nigeria and explore factors associated with asthma symptoms in this population. Asthma defined as recurrent wheeze in the 12 months preceding the study was present in 16.4% % of the study population, while 13.5% had possible exercise induced asthma. However, only 5.1% of the study population had a previous diagnosis of asthma, with the prevalence increasing to between 12.1 and 24.1% among persons with symptoms suggestive of asthma.

The prevalence of asthma symptoms in our study is comparable to those reported among young adults in other parts of Nigeria. Erhabor et al⁹ reported a prevalence of 11.6 % among adults aged 15 to 35 years in Ile-Ife, south-west Nigeria in 2006, while Desalu and colleagues⁸ documented a prevalence of 15.2 % among adults in Ilorin, north-central Nigeria. Much higher prevalence rates have been reported in Cape Town, South Africa (20.3%)¹² and Canada (26.5% in men and 28.2% in women)¹³.

The wide variation between physician diagnosed asthma and asthma symptoms found in our study is consistent with findings in a recently published study¹⁴. This gap has been attributed in part to the disparity in access to health care, with the gap being narrower in populations with ready access to health care. In that particular survey the overall prevalence of clinical asthma was 4.9%, which is similar to the 5.1% we found in our study. The lower prevalence of asthma symptoms in our study compared to those reported in developed nations like Canada, is consistent with findings from previous studies^{14,15}. It is hypothesized that exposure to parasites during childhood, believed to be more likely in developing nations, may tilt differentiation of T-helper (Th) cells towards Th cells, which protect against asthma (hygiene hypothesis)¹⁶.

We did not find a significant association between asthma and gender, household cooking fuel, household cigarette smoking and parental level of education. Although a family size greater than six appeared to protect against asthma, this finding was not sustained

after controlling for other factors². Asthma is a heterogeneous disease with conflicting findings on possible initiating environmental factors. Some studies have found an inverse relation between family size and asthma prevalence^{17,18}. Some other potential risk factors explored so far include childhood obesity, exposure to tobacco and other pollutants^{19,23}. Studies on asthma risk factors have mostly been in developed countries, and risk factors in developing countries like Nigeria are yet to be elucidated.

The strengths of this study include the use of a highly medically literate population that may more readily recognize the signs and symptoms of asthma thus providing information on asthma prevalence. We have also provided data on asthma prevalence in a region with sparse data¹⁷. We however also recognize some weaknesses. First we could not make a definitive diagnosis of asthma in our study population and so may overestimate the burden of the disease based on the use of symptoms. Secondly, the study was powered to determine asthma prevalence and not to identify risk factors.

This study has some implications for health care in developing countries. First, a high prevalence of undiagnosed asthma may be present in developing countries. Even among medical students in their clinical years, the presence of typical asthma symptoms did not often warrant a diagnosis of asthma. There is therefore need to increase public awareness on the symptoms of asthma, particularly unproductive nocturnal cough.

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References

1. McFadden ER, Jr., Gilbert IA. Asthma. *N Eng J Med* 1992;327:1928-237
2. Eder W, Ege MJ, von Mutius E. The asthma epidemic. *N Engl J Med* 2006;355:2226-2235.
3. Weitzman M, Gortmaker SL, Sobol AM, Perrin JM. Recent trends in the prevalence and severity of childhood asthma. *JAMA* 1992;268:2673-2677.
4. Senthilselvan A, Lawson J, Rennie DC, Dosman JA. Stabilization of an increasing trend in physician-diagnosed asthma prevalence in Saskatchewan, 1991 to 1998. *Chest* 2003;124:438-448.
5. Braun-Fahrlander C, Gassner M, Grize L, et al. No further increase in asthma, hay fever and atopic sensitisation in adolescents living in Switzerland. *Eur Respir J* 2004;23:407-413.
6. Burney P. Ten years of research on asthma in Europe. The European Community Respiratory Health Survey. *Rev Epidemiol Sante Publique* 1998;46:491-496.
7. van Gemert F, van der Molen T, Jones R, Chavannes N. The impact of asthma and COPD in sub-Saharan Africa. *Prim Care Respir J* 2011;20:240-248.
8. Desalu OO, Oluboyo PO, Salami AK. The prevalence of bronchial asthma among adults in Ilorin, Nigeria. *Afr J Med Med Sci* 2009;38:149-154.
9. Erhabor GE, Agbroko SO, Bamigboye P, Awopeju OF. Prevalence of asthma symptoms among university students 15 to 35 years of age in Obafemi Awolowo University, Ile-Ife, Osun State. *J Asthma* 2006;43:161-164.
10. Falade AG, Olawuyi F, Osinusi K, Onadeko BO. Prevalence and severity of symptoms of asthma, allergic rhino-conjunctivitis and atopic eczema in secondary school children in Ibadan, Nigeria. *East Afr Med J* 1998;75:695-698.
11. Burney PG, Luczynska C, Chinn S, Jarvis D. The European Community Respiratory Health Survey. *Eur Respir J* 1994;7:954-60.
12. Faniran AO, Peat JK, Woolcock AJ. Prevalence of atopy, asthma symptoms and diagnosis, and the management of asthma: comparison of an affluent and a non-affluent country. *Thorax* 1999;54:606-610.
13. Ait-Khaled N, Odhiambo J, Pearce N, et al. Prevalence of symptoms of asthma, rhinitis and eczema in 13- to 14-year-old children in Africa: the International Study of Asthma and Allergies in Childhood Phase III. *Allergy* 2007;62:247-258.
14. Manfreda J, Becklake MR, Sears MR, et al. Prevalence of asthma symptoms among adults aged 20-44 years in Canada. *CMAJ* 2001;164:995-1001.
15. To T, Stanojevic S, Moores G, et al. Global asthma prevalence in adults: findings from the cross-sectional world health survey. *BMC Public Health* 2012;12:204.
16. Masoli M, Fabian D, Holt S, Beasley R. The global burden of asthma: executive summary of the GINA Dissemination Committee report. *Allergy* 2004;59:469-478.
17. Yazdanbakhsh M, Wahyuni S. The role of helminth infections in protection from atopic disorders. *Curr Opin Allergy Clin Immunol* 2005;5:386-391.
18. Goldberg S, Israeli E, Schwartz S, et al. Asthma prevalence, family size, and birth order. *Chest* 2007;131:1747-1752.
19. Wickens KL, Crane J, Kemp TJ, et al. Family size, infections, and asthma prevalence in New Zealand children. *Epidemiology* 1999;10:699-705.
20. Patel S, Henderson J, Jeffreys M, Davey Smith G, Galobardes B. Associations between socioeconomic position and asthma: findings from a historical cohort. *Eur J Epidemiol* 2012;27:623-631.
21. Larsson L. Incidence of asthma in Swedish teenagers: relation to sex and smoking habits. *Thorax* 1995;50:260-264.
22. Strachan DP, Butland BK, Anderson HR. Incidence and prognosis of asthma and wheezing illness from early childhood to age 33 in a national British cohort. *BMJ* 1996;312:1195-1199.
23. Patelis A, Gunnbjornsdottir M, Malinovschi A, et al. Population-based study of multiplexed IgE sensitization in relation to asthma, exhaled nitric oxide, and bronchial responsiveness. *J Allergy Clin Immunol* 2012;130:397-402