

Childhood Asthma: A Clinical Study in Southern Nigeria

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ABSTRACT

BACKGROUND

Childhood bronchial asthma is a major cause of chronic respiratory morbidity and mortality and its worldwide prevalence has been noted to be on the increase. This study determines the hospital prevalence and severity of childhood asthma and some associated risk factors.

METHODS

A cross – sectional hospital / questionnaire – based study carried out on Paediatrics patients attending the respiratory clinic of the University Teaching Hospital from 1st July to 31st December 2013, using a questionnaire.

RESULTS

The hospital prevalence of childhood asthma was 1.2% (40/3318) with a male to female ratio of 3.4:1. The mean age at onset of symptoms of asthma was 4.24 ± 3.36 years. The most common recognized trigger factor for exacerbation of asthmatic symptoms was extreme cold seen in 29 (72.5%) patients, while the most common identified early childhood risk factor for development of asthma was a positive family history of asthma in 21 (52.5%) patients. Thirty five of the subjects (87.5%) had mild intermittent asthma. More males than female ($p = 0.689$) and more adolescents than children under ten years ($p = 0.117$) had persistent asthma. Males had a significantly higher frequency of asthma – related hospital admissions ($p = 0.023$).

CONCLUSION

The low prevalence of asthma of 1.2% seen in this study may be due to the hospital – based nature of the study that may be a poor representation of the prevalence of childhood asthma in the community. The male preponderance and increased frequency of hospital admissions among the males is similar to findings of other studies.

KEYWORDS

Asthma, Childhood, Nigeria, School Absenteeism.

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INTRODUCTION

Asthma is a chronic inflammatory condition of the airways resulting in episodic airflow obstruction that is reversible either spontaneously or with treatment. This chronic inflammation heightens the excitability or irritability of the airways – airways hyper responsiveness (AHR) – to provocative exposures¹. The episodic airflow obstruction presents as recurrent episodes of wheezing, dyspnoea, chest tightness, and cough. Asthma arises from a complex interaction of genetic and environmental factors². Airway inflammation occurs when genetically susceptible individuals are exposed to certain environmental factors.

Asthma affects all age groups, race and sex³. It has been estimated that bronchial asthma affects about 300 million people world-wide⁴.

Studies in Nigeria have estimated the prevalence of bronchial asthma in children and adolescents to be 10.7%⁵ and 14.2%⁶ respectively. The Global Initiative for Asthma (GINA) estimated the prevalence of asthma in Nigeria to be 5.4%, and other countries such as Scotland, Australia, United States of America, Italy and China to be 18.4%, 14.7%, 10.9%, 4.5% and 2.1% respectively⁴.

Studies suggest that the prevalence of asthma among children in developing and developed countries is on the increase⁷⁻⁹. About one in ten children (10%) compared to one in 12 adults (8%) in the United States (US) of America had asthma in 2009¹⁰. The International Study of Asthma and Allergies in Childhood Phase 3 (ISAAC) carried out between 2000 – 2003, indicated that there has been an increase in asthma symptoms in Latin America, Africa and parts of Asia over a five to ten year period when compared to the phase 1 study carried out between 1992 - 1996⁷. The increase in the prevalence of asthma is closely associated with a rise to changes in the environmental determinants of asthma such as higher levels of atopic sensitization, related to urbanisation⁴. It is estimated that the number of people with asthma will grow by more than 100 million by 2025¹¹.

Asthma places a large burden on affected children and their families¹². Frequent hospital visits and admissions account for school absenteeism. More than half (59%) of children and one-third (33%) of adults in the US who had an asthma attack missed school or work because of asthma in 2008. On average, in 2008 children missed four days of school and adults missed five days of work because of asthma¹⁰. Besides causing a major strain on the child's health and physical well being, bronchial asthma affects other aspects of the child's life. Even when asthma symptoms are not severe enough to require urgent care, they can interfere with a child's ability to sleep, play and participate in sporting events and at school¹³. Symptoms are usually worse at night¹, disturbing sleep and therefore, impairing concentration in school activities

during the day. Students with asthma may therefore, be at higher risk for poor performance academically¹⁴ and therefore, have a negative effect on career. It is estimated that asthma accounts for 1 in every 250 deaths worldwide⁴, the majority of which are preventable and are often due to sub-optimal, long-term medical care and delays in obtaining medical help¹⁵.

In Southern Nigeria, current data on the prevalence of childhood asthma and risk factors associated with it are lacking. This study seeks to determine the present prevalence, associated risk factors and severity of childhood bronchial asthma in the University Teaching Hospital in Southern Nigeria.

MATERIALS AND METHODS

This was a hospital / questionnaire – based descriptive cross – sectional study carried out in the Paediatrics Respiratory Clinic of the University Teaching Hospital from 1st July to 31st December 2013 in all patients with a diagnosis of asthma attending the clinic. Children of parents that did not give consent to participate in the study were excluded from the study. Attendance to the Paediatrics Respiratory clinic is usually on referral from the Children's Out Patient Department following the diagnosis of any childhood respiratory condition. The diagnosis of childhood asthma is mostly clinical, based on the medical history and physical examinations. Lung function tests are however unavailable in the study centre to support the clinical diagnosis of asthma. Diagnosis of asthma was based on a history of at least three attacks of breathlessness and wheezing, often associated with cough, and usually supported at the time of initial examination or during subsequent follow-up, by the auscultatory finding of widespread respiratory rhonchi¹⁶. The diagnosis is initially made by the first attending doctor, being the paediatrics resident and is then confirmed by the paediatrics consultant on referral to the Paediatrics Respiratory clinic. A range of 7460 to 8370 children are seen in the Children's Out

Patient Department yearly and a total of 3318 children were seen during the 6 months study period. Most children seen in this clinic live in the city in Southern Nigeria and environs, where there are a lot of industries with their attendant consequence of massive air pollution. The city has a population of 1,382,592 inhabitants (Census 2006)¹⁷. The city is a metropolitan one with a lot of industries. It is the center of oil and gas exploration in Nigeria. The industrial areas are not very distant from the residential areas. A questionnaire was administered to parents/guardians of asthmatic children by the pediatrics respiratory consultant after a diagnosis of asthma had been made. The questionnaire collected demographic data of the patients, trigger and exacerbating factors for acute asthmatic attacks, asthma risk factors, frequency of exacerbations and asthma – related hospital admissions, and treatment the child was currently on.

Data collected was statistically analyzed using Epi info version 7.1.3 software. Comparison of means was done using the student “t” test and chi square for proportions. A p value of less than or equal to (\leq) 0.05 was considered as statistically significant.

RESULTS

During the study period, a total of 3318 patients were seen in the Paediatrics Outpatient department of the University Teaching Hospital and 62 patients were referred to the Paediatrics respiratory clinic. A total of 40 of these patients were diagnosed to have asthma giving a childhood asthma hospital - prevalence of 1.2% (40 out of 3318). About 2/3rd of the respiratory patients (64.5%) therefore were diagnosed with asthma. Of the 40 asthmatic patients seen within the period, there were 31 (77.5%) males and 9 (22.5%) females, giving a male to female ratio of 3.4:1. The ages of the patients ranged from two to 16 years with a mean age of 6.78 ± 3.96 years. The mean age of 6.16 ± 3.69 years for the males was lower than that of 8.89 ± 4.34 years for the females. The difference was not statistically significant ($t = 1.88$, $p = 0.068$). Table 1 shows

the age group and sex distribution of the study subjects. Eighteen (45%) patients fell between five to ten years of age. Fifteen (37.5%) of the patients were from the Ijaw tribe and 15 (37.5%) from the Ibo tribe, while the Yoruba [8 (20%)], Hausa [1(2.5%)] and Efik [1(2.5%)] tribes were less represented.

The mean age at onset of symptoms of asthma among the patients was 4.24 ± 3.36 years. The mean age of onset of symptoms of asthma of 3.78 ± 2.96 years among the males was lower than that of 5.82 ± 4.30 years among the females. The observed difference was not statistically significant ($t = 1.64$, $p = 0.109$). As shown in Table 2, the most common recognized trigger factor to exacerbation of asthmatic symptoms among the patients was extreme cold [29 (72.5%)], followed closely by dust [20 (50%)]. Table 3 shows that the most common identified early childhood risk factor for development of asthma was the presence of asthma in a second degree family member [14(35%)]. Only one of the patients had a history of tobacco smoke exposure. In all, a total of 21(52.5%) had a family history of bronchial asthma.

Based on the days and nights with presence of asthma symptoms, the severity of asthma among the patients was classified into mild intermittent, mild, moderate and severe persistent asthma. Figure 1 shows that majority of the patients [35 (87.5%)] had mild intermittent asthma. Four (12.9%) out of the 31 males compared to one (11.1%) out of the nine females had persistent asthma. The difference was not statistically significant ($\chi^2 = 0.02$, $df = 1$, Fisher exact = 0.689). Three (27.3%) out of the 11 adolescents (age ≥ 10 years) had persistent asthma compared to two (6.9%) out of the 29 children under ten years of age. The difference was also not statistically significant. ($\chi^2 = 3.03$, $df = 1$, Fisher exact = 0.117).

Table 4 shows the frequency of asthma – related hospital admissions among the patients. Twenty two (55%) had not had any asthma – related hospital admissions.

Seventeen (54.8%) of the males compared to one (11.1%) of the females had been admitted in the hospital due to asthma. The difference was statistically significant ($\chi^2 = 5.39$, $df = 1$, Fisher exact = 0.023). Children less than ten years of age had a higher percentage of hospital admissions compared to adolescents (48.3% vs 36.4%), but the difference did not reach statistical significance ($\chi^2 = 0.46$, $df = 1$, Fisher exact = 0.377). The patients that had persistent asthma had a higher percentage of hospital admissions compared to those with mild intermittent asthma (60% vs 42.9%), but the difference did not also reach statistical significance ($\chi^2 = 0.52$, $df = 1$, Fisher exact = 0.402) Thirty five (87.5%) of the patients were on only occasional quick relief short – acting beta agonists while five (12.5%) were on inhaled corticosteroids and long – acting beta agonists in addition to quick relief short – acting beta agonists.

Table 1: Age group and sex distribution of study subjects

Age group (Years)	Males No (%)	Females No (%)	TOTAL No (%)
<5	14 (93.3)	1 (6.7)	15 (37.5)
5 to 10	13 (72.2)	5 (27.8)	18 (45)
>10	4 (57.1)	3 (42.9)	7 (17.5)
TOTAL	31 (77.5)	9 (22.5)	40 (100)

Table 2: Frequency of recognized trigger factors to exacerbation of symptoms

Trigger factor	Number	Percentage (%)
Cold (Cold drinks, weather and baths)	29	72.5
Dust	20	50
Exercise induced	11	27.5
Perfumes & strong odours	9	22.5
Smoke	15	37.5
Respiratory infections	1	2.5
Others	7	17.5

Table 3: Frequency of identified early childhood risk factors

Risk factor	Number	Percentage (%)
Allergy	10	25
Second degree family member with asthma	14	35
Low birth weight	2	5
Parental asthma	8	20
Tobacco smoke exposure	1	2.5
Early childhood severe pneumonia	8	20

Table 4: Frequency of asthma – related hospital admissions among the patients

Number of asthma – related hospital admissions	Frequency	Percentage (%)
0	22	55.0
1	10	25.0
2	4	10.0
4	3	7.5
10	1	2.5
Total	40	100.0

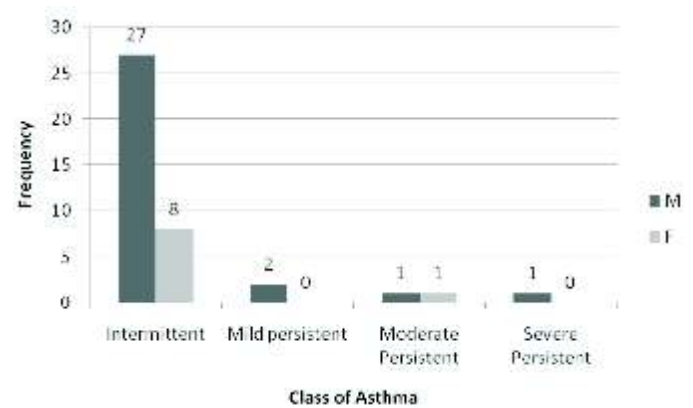


Figure 1: Classification of asthma severity among the patients in relation to gender

DISCUSSION

The prevalence of childhood asthma found in this hospital - based study was 1.2%. This is similar to another hospital – based study¹⁸ carried out in Egypt where the prevalence was found to be 1.4% but lower than the findings of other studies^{6,7,19,20}. The prevalence of

childhood asthma ranges from 4.1%–32.1%, with the lowest rates in India, Indonesia, and Malaysia and the highest rates in Australia, Brazil, Costa Rica, New Zealand and Panama²¹. Unlike the present study that was hospital – based, the other studies with higher prevalence rates were mostly community – based and this may account for the difference seen. Many children in the community with asthma may not eventually present to the hospital due to poor health seeking behaviours of care – givers and other factors.

Besides, a wide variation in the prevalence of asthma from country to country and even within countries have been noted^{7,21}. The studies were conducted in different parts of the world and at different times. In two earlier Nigerian studies conducted among children, the prevalence of doctor – reported asthma were 1.1%¹⁶ and 3.1%¹⁹. Differences in environmental risk factors for asthma such as atmospheric pollution, dietary changes, changes in allergen load, improvements in health and hygiene and lifestyle changes may account for the varying prevalence rates in different regions. The prevalence of childhood asthma of 1.2% noted in this study is lower than a number of previously conducted studies despite the dense population and air pollution of the study area caused by a high presence of industries of the oil and gas sector in Southern Nigeria. This may be as a result of the lack of availability of pulmonary function tests to adequately diagnose asthma in the resource – poor setting of the present study, as is done in other areas.

The finding of about two – thirds of the pediatrics respiratory patients diagnosed with asthma in this study may be because most infective respiratory conditions in the study setting are managed in the paediatrics infectious disease clinic and are not referred to the respiratory clinic. This percentage is markedly different 6.6% found by Oni et al²². This may be because their study was among an adult population who have diverse respiratory conditions. Also, they did not state if infective respiratory conditions were seen in their

respiratory clinic unlike our own hospital – based study.

The male preponderance of childhood asthma observed in this study is in keeping with findings of other studies^{16,18-20}. Falade et al¹⁹ found that symptoms of allergy such as rhinitis and eczema had no significant male preponderance except wheezing which was found to be significantly higher among males than females among Nigerian children aged six to seven years. The finding of the present study was however different from another Nigerian study²² carried out on an adult population. The observed difference may be as a result of the different populations studied (children vs. adults). For unknown reasons, asthma affects more boys than girls, but by the third decade, the prevalence becomes equal and subsequently, more women than men are affected^{1,23}.

While the mean age of onset of asthma symptoms among the patients in the present study was 4.24 ± 3.36 years, majority of the children attending the asthma clinic were five to ten years of age with a mean age of 6.78 ± 3.96 years. The mean age of children attending the respiratory clinic in this study was similar to that of another study[18] in an Egyptian University Medical Centre of 6.1 ± 2.5 years. Aderele[16] however found asthma to be more common in children under five years and most of the children having onset of symptoms before three years in Ibadan. The observed difference may be as a result of differing locations with differing environmental asthma risk factors or differing health – seeking behaviours of care givers and their ability to appreciate symptoms of asthma in the different locations.

The major trigger factors responsible for exacerbation of asthma symptoms noted in this study were cold, dust, smoke and exercise in that order. Aderele[16] in a similar study noted exercise, rainy and cold seasons as trigger factors in that order. Aderele's¹⁶ study however separated cold season, rainy season, cold baths and cold drinks into different

trigger factors which were lumped all together as “cold” in the present study. As found in other Nigerian studies^{16,22,24}, family history of asthma was the most prevalent associated risk factor to developing asthma in the study group. Although family history of asthma was not the most prevalent risk factor in some other studies, it was still a significant risk factor in these studies in addition to upper respiratory and chest infections in the first year of life^{18,20}, allergies^{20,25}, pets and mold in the home²⁰, tobacco smoke exposure^{18,26} among others. This clearly supports the known fact that no one factor is responsible for asthma aetiology and that the condition is probably multi-factorial in aetiology.

In the present study, majority (87.5%) of the patients had mild intermittent asthma, with only one (2.5%) having severe persistent asthma. This finding is corroborated by another study in Jamaican children²⁰ where a smaller percentage (5.5%) of the study population had severe forms of asthma. The higher hospital admission rates seen among the males and adolescents of this study are similar to the findings of Aderele[16] and Elmoneim et al¹⁸ respectively.

CONCLUSION

The hospital – based prevalence of childhood asthma in this study was 1.2% with a male preponderance of 3.4:1 is low compared to other studies. This may be due to the hospital – based nature of the study that may be a poor representation of childhood asthma in the community. The most common identified trigger factor for exacerbations was extreme cold situations and the most common identified risk factor for asthma was a positive family history of asthma. Majority had mild intermittent asthma and asthma – related hospital admissions were significantly higher among the males. Adequate enlightenment campaigns about childhood asthma in the community will improve presentation to asthma clinics and effective patient and care – giver asthma education will improve asthma control among patients.

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