Niger J Paed 2014; 41 (4): 360 - 364

ORIGINAL

Garba BI
Ibrahim M
Johnson A-WBR

Socio-demographic and clinical characteristics of asthmatic children seen at Aminu Kano Teaching Hospital, Kano, Nigeria

DOI:http://dx.doi.org/10.4314/njp.v41i4,14

Accepted: 25th July 2014

Garba BI (✉)
Department of Paediatrics,
Yariman Bakura Specialist Hospital,
Gusau, Zamfara State. Nigeria.
Email: bgilah@yahoo.com

Ibrahim M
Umaru Musa Yar'adua University,
Katsina, Katsina State. Nigeria.

Johnson A-WBR
Department of Paediatrics and Child Health, University of Ilorin Teaching Hospital, Kwara State. Nigeria.

Abstract *Introduction:* Asthma is a chronic inflammatory disorder associated with variable air flow obstruction and bronchial hyper-responsiveness. It is characterised clinically by recurrent episodes of cough, difficulty in breathing and wheezing which resolves spontaneously or with treatment. The socio-demographic and clinical characteristics of asthmatic children in north western Nigeria have not been reported.
Methods: This was a descriptive study in children with asthma aged 4-15 years carried out over a 3 month period Aminu Kano Teaching Hospital (AKTH), Kano. The aim was to determine the socio-demographic and clinical parameters of asthmatic children. Asthmatic children whose parents or guardian consented to the study were recruited consecutively. Their bio-data, socio-demographic and physical examination were documented.
Results: Seventy asthmatic children were recruited of which 50(71.4%) were males and 20(28.6%) were females, giving a male: female ratio of 2.5:1. Insecticide was the commonest asthma trigger (64.3%) and 26(37.1%) patients belonged to socio economic class III. Mild persistent asthma was the commonest form of asthma severity encountered. There was positive correlation between PEFR and height ($r = 0.577$, $p < 0.0001$).
Conclusion: Most of the asthmatics children seen at AKTH, Kano were males with mild persistent asthma, had positive family history of atopy and belonged to the middle socio economic class.

Key words: Asthma, Children, Socioeconomic class, Asthma severity

Introduction

Asthma is a chronic inflammatory disorder associated with variable airflow obstruction and bronchial hyper responsiveness. It presents with recurrent episodes of wheeze, cough, shortness of breath, and chest tightness[1]. With regard to age at first presentation, approximately 50% present with symptoms by three years of age[2,3] in Caucasians and indeed, 80% by the sixth year of life. However not all children who experience recurrent wheezing will go on to have persistent asthma in later childhood[4]. Aderele[5] reported 63% of asthmatic children seen in Ibadan had their first attack before the age of three years and 97% of study population were under the age of 5years.

In general boys are thrice as affected as girls, but during adolescence, the prevalence becomes equal between the genders. Beyond adolescence however, the prevalence is higher in women than men[3]. Most surveys of childhood asthma suggest that boys are more frequently affected than girls before puberty[5,6].
Mielcket al[7] found prevalence of severe asthma to be significantly higher in the low as compared with the high socioeconomic group. This association could not be explained by established risk factors[7]. As compared with children from the most advantaged homes, children from the least advantaged homes were more likely to present with exercise induced bronchial asthma and to report night cough[8]. Georgy et al[9]demonstrated a significant association between socioeconomic status and symptoms, with both higher prevalence and severity found in the lower socioeconomic group.

Earlier reports on asthmatic children in Northern Nigeria were done in the 1970s, both were from Zaria[10,11]. Asani et al[12] in 2005 reported on childhood asthma in Kano, however their study did not report on socio-economic class and peak expiratory flow rate (PEFR). There is no reported study combining socio-demographic and clinical characteristics including PEFR of asthmatic children in North western Nigeria.

Materials and Methods

This was a descriptive study in 70 children with asthma aged 4-15 years carried out between September and December 2010 at Aminu Kano Teaching Hospital, Kano (AKTH). The aim of which was to determine the socio-demographic and clinical parameters of asthmatic children.
The subjects were children with asthma attending emergency paediatric unit, paediatric outpatient department and cardio-pulmonary clinic of AKTH, Kano. Asthmatic children that have inter current infections and those with chronic respiratory or cardiac diseases were excluded.
Ethical approval was obtained from the Medical Ethics Committee of AKTH, Kano. Informed consent was however obtained from the respective parent or guardian and children > 7 years gave their assent.

Data was collected using a pre-tested interviewer administered questionnaire which was administered by the researcher and trained assistants to the parent/ guardian and the child. The children were recruited consecutively. The bio-data, socio-demographic and physical examination were documented. Physical examination included weight and height measurement, general examination relating to allergy, respiratory examination and peak expiratory flow rate measurement.

Weight was measured using a well calibrated bathroom weighing scale (Hanson®, model 89 C_1 Ireland) to the nearest 0.1kilogramme with the subject wearing light clothing. While height was measured using the Harpenden® stadio metre which measures up to two metre. The PEFR was determined using the mini-Wright Peak Flow Metre® (Aimed Clement Clarke, England). This was calibrated in L/min (litre per minute) up to 900L/min. The subjects were taught how to blow through the meter at the peak of deep inspiration with maximum effort and without air leak around the mouth piece.

The subjects were stratified into age groups as follows: 4 to 5 years, 6 to 10 years and 11 to 15years to ease comparison with a 5year interval. However, PEFR is difficult to obtain in under fives, hence only 4-5 year olds were enrolled. Asthma severity was classified according to GINA guidelines using frequency of symptoms per week, exercise tolerance and nocturnal symptoms.

Assessment of socio-economic class

The socio-economic classes of the patients were assessed according to the method suggested by Oyedeji[13]. The social class of each child was determined from the occupational and educational level of both parents using standard scoring scales on both the occupational and educational level for each parent. The first scale scores the different occupational categories 1-5 from professional to unemployed.

The occupations were scored thus

Class I: Professionals, managers, contractors, big traders and transporters.
Class II: Semi professionals e.g technicians, printers, senior school teachers and senior public servants.
Class III: Medium grade traders, insurance agents, policemen and medium grade public servants.
Class IV: Drivers, artisans, junior public servants and similar grades.
Class V: Petty traders, labourers and similar grades, subsistence farmers, unemployed.
While the second scale scores the educational level from 1-5 from university graduate to no formal education.

The educational levels attained were scored thus

Class I: University and post graduate certificates.
Class II: School certificate (ordinary level GCE) plus teaching or other professional training certificates.
Class III: Ordinary level GCE, West African School Certificate, grade II teachers and equivalents.
Class IV: Modern three and equivalent certificates, pri mary six certificate.
Class V: No formal education.
The social class allocated for the family was the mean of the four scores (two for the father and two for the mother) to the nearest whole number.

Statistical analysis

Data was entered into a Statistical Package for Social Sciences version 16 for cleaning and analysis. Quantitative variables were summarized using mean and standard deviation. Categorical variables were summarized using frequency and percentages. Relationship between continuous variables was described using Pearson correlation co-efficient. A p value of <0.05 was considered statistically significant.

Results

Demographic characteristics of study population
The age ranged from 4 to 15 years with a mean ± SD of 8.97 ± 2.88 years. In table 1, the 6-10 years age-group constituted the highest percentage of subjects, followed by those aged 11-15 years. There were 50 males (71.4%) and 20 (28.6%) females giving male to female ratio of 2.5: 1.

Socio-economic class of study subjects

Twenty six (37.1%) of the subjects belonged to socio-economic class III, followed by class IV with 19(27.1%), then class II with 13(18.6%). Those in class I were 9(12.9%) and only 3(4.3%) belonged to class V.

Age at diagnosis

The youngest child diagnosed was at eight months and oldest was at 15 years. The mean age at diagnosis was 4.68 ± 2.91years. Twenty eight (40%) of the patients were diagnosed asthmatic before the age of three years while 55(78.8%) were diagnosed by age six years.

Table 1: Age and gender distribution of the study population

Age-group (years)	Males n (%)	Females n (%)	Total (%)
4-5	6 (8.6)	6(2.9)	12(17.2)
6-10	24(34.3)	11(18.6)	35(50.0)
11-15	20(28.5)	3(7.1)	23(32.8)
Total	50(71.4)	20(28.6)	70(100.0)

n= number %= percentage.

Trigger factors

Table 2 shows insecticide spray to be the commonest trigger factor constituting 64.3%, followed by exercise which constituted 47.1%.

Table 2: Trigger factors of asthma attack

Trigger factor	Frequency	%
Insecticide	45	(64.3)
Exercise	33	(47.1)
Exposure to Cold	24	(34.3)
Perfume	23	(32.9)
Dust	22	(31.4)

Some of the children had multiple trigger factors

Location of kitchen of the study subjects

Fifty four (77.1%) subjects live in houses with kitchen located within the house and 16(22.9%) outside the house. Types of kitchen fuel used in the various homes included kerosene, firewood, charcoal and gas. Table 3 shows the various types of kitchen fuel used; with kerosene being the commonest fuel used in the homes of asthmatic subjects.

Table 3: Types of kitchen fuel used in homes of study population

Type of fuel	Frequency	%
Kerosene	14	(20.0)
Firewood	12	(17.2)
Charcoal	11	(15.7)
Kerosene and firewood	10	(14.3)
Kerosene and gas	6	(8.6)
Charcoal and firewood	6	(8.6)
Gas	5	(7.1)
Kerosene and charcoal	4	(5.7)
Firewood and gas	2	(2.8)
Total	70	(100.0)

Family history of atopy

Thirty six (51.4%) subjects had first degree relatives with atopic disease. Having a mother, father, brother or sister with atopic conditions were observed in sixteen (41.0%), ten (25.6%), nine (23.1%) and four (10.3%) of the subjects respectively. Some of the first degree relatives had more than one atopic disease. The atopic diseases included asthma in 21(48.8%), allergic rhinitis in nine (20.9%), allergic conjunctivitis in 13(30.2%). None of the subjects had relatives with atopic dermatitis.

Asthma symptoms

Majority of the subjects had multiple symptoms.
Subjects with history of chronic recurrent cough with nocturnal or seasonal exacerbations constituted 55(78.6%), nocturnal wheezing were 39(55.7%), exercise intolerance 33(47.1%), recurrent colds and cough with a slow or protracted resolution of symptoms 30(42.9%), while history of diurnal wheezing was seen in 23(32.9%).

Asthma severity using GINA guidelines

Table 4 shows that mild persistent asthmatics were the majority while severe persistent asthmatics were the least.

Table 4: Asthma severity of study population

Asthma severity	Number (%)
Mild intermittent	26(37.1)
Mild persistent	30(42.9)
Moderate persistent	9(12.9)
Severe persistent	5(7.1)
Total	70(100.0)

Clinical features of atopy

Table 5 shows that allergic conjunctivitis was the commonest of the general clinical stigmata of atopy encountered, while only two subjects had eczema.
PEFR values Mean PEFR was 177.6 ± 57.2 L/min, with a range of 60 to 300 L/min. There was positive correlation seen between PEFR and height in the subjects ($r = 0.577$, $p = 0.0001$).

Table 5: A topic features in study population

Atopic feature	n	%
Allergic conjunctivitis	23	(32.9)
Dennie Morgan's lines	6	(5.7)
Allergic shiners	4	(5.7)
Allergic salute	3	(4.3)
Eczema	2	(2.9)

Not all subjects had atopic features and some had multiple features

Discussion

The highest number of asthmatic subjects recorded in our study was in the 6-10 year age-group which accounted for 50.0% of the study group. This may be partly due to the fact that most children with asthma tend to present with symptoms by six years of age[3,5] and

also children of this age group are of school age with likelihood of exposure to trigger factors at school such as exercise, dust and contagious viral respiratory tract infections. Many of these children may be walking to school which may serve as a form of exercise and hence trigger asthma attack. Previous study by Aderele[5] in Ibadan showed 49% of the asthmatic children were under the age of five years. Reason for this difference is because children less than four years were excluded.

There were more males than females in the present study and male preponderance for asthma before adolescence appears to be a universal finding as similar observations were made by Aderele[5], Abdurrahman[10] and other workers[12,14]. Factors responsible for male preponderance are not clear.

Majority of the subjects belonged to middle socio-economic class which was not in accord with studies reported by Mielcket al[7], Ernst et al[8] and others[9,15] where asthmatics were found to be more in lower socio-economic class. Aderele[5]however found majority of their asthmatic children were in the upper socio-economic class. Reason for this disparity could be explained by the difference in the socio-economic classification used. The asthmatic subjects belonging in the middle socio-economic class are most likely to present to the hospital for accurate diagnosis and management. The lower socio-economic class may be patronizing other hospitals, patent medicine stores or traditional medicine due to cost in our hospital, hence the lower percentage in this study. The asthmatics in high socio-economic class may prefer going to their doctors directly or private hospitals when they have complaints without necessarily attending routine clinic.

Trigger factors identified in this study were similar to those reported by Aderele[5] in Ibadan and Asaniet al[12] in Kano. While 31.4% of patients had asthmatic attack triggered by dust in the present study, Aderele[5] reported 2.5% and Asaniet al[12] reported a higher value of 52.0%. The geographical location of Kano and its neighboring states in the dusty savannah region of northern Nigeria in contrast to Ibadan which is situated in the rain forest belt of southern Nigeria, may account for this remarkable difference. Exposure to cold accounted for 34.3% in this study as compared to 9.0% and 48.0% obtained by Aderele[5]and Asaniet al[12] respectively. However exercise as a trigger factor which constituted 47.0% was similar to 44.0% obtained by Asaniet al[12] but higher than 30% obtained by Aderele[5] and 39.7% obtained by Onazi et al[14]. Reason for this cannot be explained, as we cannot confirm if asthmatic children in Kano engage in more exercise than those in Ibadan and Gusau.

Presence of indoor cooking was higher than 32.5% obtained by Onaziet al[14]. The predominant method of cooking in these homes was combination of kerosene, firewood, charcoal and gas. These emit gases which the children are constantly exposed to at home which may precipitate asthma symptoms. This observation was similar to that reported by Sudhiret al in India[16]. However; exposure to smoke as a possible trigger factor was not assessed in this study.

Family history of atopy was recorded in 51.4% of the subjects which was higher than 40.0% obtained by Aderele[5] in Ibadan and 22% obtained by Warrellet al[11] at Zaria. This may be due to increase in awareness of the disease with more health facilities and also with industrialization, since both studies were conducted decades ago. Family history of asthma was common as also seen by Aderele[5]Asani et al[12] and Onazi et al[14]. On comparing the frequency of which relative is affected, having a mother with asthma was highest and similar to that reported by Godfrey[17]. Majority of the subjects had history of nocturnal wheezing and recurrent cough with nocturnal or seasonal exacerbation. This may be explained by the fact that cough is a major symptom in asthmatic patients. Cough and wheezing were also major symptoms in 96% of children seen at Ibadan.[5]Onazi etal[14] found wheezing to be common amongst school children with exercise induced bronchospasm in Gusau.

Using the GINA classification of asthma severity on follow up of the children, mild persistent asthmatics were the majority, followed by mild intermittent, moderate persistent and then severe persistent asthmatics. Mild persistent asthma was also the commonest form of asthma severity in children at 1 year follow up in Beninas reported by Oviawe et al[18]. This pattern was not in conformity with the findings of Qianet al[19] where severe persistent asthmatic subjects constituted the largest group with 37.0%, followed by mild intermittent with 29.9%, moderate persistent were 22.4% and mild persistent 10.7%. Reason for this difference may be due to a larger sample size used by Qianet al[19] where 281 asthmatic subjects were studied. Another explanation for the difference may be probably because developed countries have high level of industrialization with attendant dusty air and air pollutants which may contribute to severe persistent asthma seen in such countries.

Various clinical stigmata of atopy were seen of which presence of allergic conjunctivitis was the commonest, this was seen in 32.9% of subjects. This is in agreement with earlier work reported by Aderele.[5] Abdurrahman et al[10] and Onazi et al[14]. However, the finding in both ISAAC studies done by Faladeet al[20,21] which reported eczema as a common disorder (10.1% in 6-7year old and 26.1% in 13-14year old respectively) was not in agreement with this study as only 2.9% of asthmatic subjects had atopic dermatitis. This may be due to the difference in sample size where 1,704 6-7year olds and 3,058 13-14 year olds were studied by Faladeet al[20,21] respectively. Present finding is similar to 5% reported by Aderele[5] and no subject was seen by Warrelet al[11]. The reason for their findings may be probably because both studies were conducted when the rate of industrialization was low. Another reason for the small percentage in this study may be due to tendency of atopic dermatitis to improve by two to three years of age and subside in many children before seven years of age[22], however this is not in conformity with Aderele's[5] findings.

The positive correlation between PEFR and height is expected as similar observation of correlation between

PEFR and height was observed by Jaja et al[23] and other workers[24,25]. This is because with increasing height, PEFR values increase as a result of increase in lung volume, hence the force and amount of air expired during PEFR measurement.

Conclusion

In conclusion, most of the asthmatics found in Kano were males, with mild persistent asthma, had positive family history of atopy and belonged to the middle socio economic class.

Author's contributions
Garba BI: Data collection, analysis, introduction, literature review, and discussion
Johnson A-WBR, Ibrahim M: Revised the manuscript
Conflict of Interest: None
Funding: None

Acknowledgements

We wish to acknowledge the contributions of Professor O Oyelami, and Dr Ibrahim Aliyu. We are also grateful to the resident doctors of Paediatric department, Aminu Kano Teaching Hospital, Kano for their assistance.

References

1. International consensus on (ICON) pediatric asthma. Papadopoulos NG, Arakawa H, Carlsen KH, Custovic A, Gern J, Lemanske R et al. *Allergy 2012; 67: 976–997.*
2. Expert Panel Report 3: Guidelines for the diagnosis and management of asthma. NIH publication no. 07-4051. Bethesda, MD: US. Department of Health and Human Services; National institutes of Health; National Heart, Lung, and Blood Institute; National Asthma Education and Prevention Program. 2007. cited 2008 Nov 4. Available from http:// www.nhlbi.nih.gov/ guidelines/ asthma/asthgdln.pdf
3. Wilmott R. In: Polin RA, Ditmar MF.Pediatric Secrets.4th ed. Philadelphia: Elsevier Mosby; 2005. p .576-581.
4. Liu AH, Covar RA, Spahn JD, Leung DYM. Childhood asthma. In; Kliegman RM, Behrman RE, Jenson HB, Stanton BF. Nelson textbook of Paediatrics. 18th ed. Philadelphia: Saunders Elsevier; 2007. p.953-970
5. Aderele WI. Bronchial asthma in Nigerian children. *Arch Dis Child 1979;54:448-453.*
6. Nicolai T, Bliznakova P, Illi S, Reinhardt D, Mutius E.Longitudinal follow-up of the changing gender ratio in asthma from childhood to adulthood: role of delayed manifestation in girls.*Ped All Immunol 2003;14 (4):280-283.*
7. Mielck A, Reitmeir P, Wjst M. Severity of childhood asthma by socioeconomic status. *Int J Epid 1996;25(2)388-93.*
8. Ernst P, Demisse K, Joseph L, Locher U, Becklake MR. Socio-economic status and indicators of asthma in children. *Am J Respir-Crit Care Med 1995;152(2)570-5.*
9. Georgy V, Fahim HI, El Gaafary M, Walters S. Prevalence and socioeconomic association of asthma and allergic rhinitis in Northern Africa. *Eur Respir 2006;28:756-762.*
10. Abdurrahman MB, TaqiAM. Childhood asthma in northern Nigeria. *Clin Allergy 1982;12 (4):379-384.*
11. Warrel DA, Fawcett IW, Harrison BDW, Agamah AJ, Ibu JO, Pope HM et al. Bronchial asthma in the Nigerian savannah region. A clinical and laboratory study of 106 patients with a review of literature on asthma in the tropics. *Qtly J Med 1975;174:325-347.*
12. Asani MO, Adeleke SI, Ibrahim M. Childhood asthma in Kano, Nigeria. *Niger J Basic Clin Sci 2005;2:6-9.*
13. Oyedeji GA. Socio-economic and cultural background of hospitalized children in Ilesha. *Niger J Paediatr 1985;12:111-7.*
14. Onazi SO, OrogadeAA,Yakubu AM. Exercise-induced bronchospasm among school children in Gusau, Nigeria. *West Afr J Med 2012;31(2):76-80*
15. Almqvist C, Pershagen G, Wickman M. Low socioeconomic status as a risk factor for asthma, rhinitis and sensitisation at 4 years in a birth cohort. *Clin Exp Allergy 2005;35(5):612-618.*
16. Sudhir P, Prasad CE. Prevalence of exercise induced bronchospasm in school children: an urban-rural comparison. *J Trop Pediatr 2003;49:104-108.*
17. Godfrey S. Exercise and hyperventilation induced asthma. In: Clark TJH, Godfrey S, Lee TH (eds). Asthma. 3rd ed. London: Chapman and Hall; 1992. p. 73-101.
18. Oviawe O, Osarogiagbon WO. Trend in asthma severity in steroid naive asthmatic children in Benin city, Nigeria. *Niger J Clin Pract 2013;16(3):371-374.*
19. Qian FH, Zhang Q, Zhou LF, Liu H, Huang M, Zhang XL, et al. High sensitivity C- reactive protein:a predicative marker in severe asthma. *Respirology 2008;13 (5):664-9.*
20. Falade AG, Olawuyi F, Osinusi K, Onadeko BO. Prevalence and severity of symptoms of asthma, allergic rhinoconjuctivitis and atopic eczema in 6-to-7yr old Nigerian primary school children: the international study of asthma and allergies in childhood. *Med Princ Pract 2004;13(1):20-25.*
21. Falade AG, Olawuyi F, Osinusi K, Onadeko BO. Prevalence and severity of symptoms of asthma, allergic rhinoconjuctivitis and atopic eczema in secondary school children in Ibadan Nigeria. *East Afr Med J 1998;75(12):695-698.*
22. Leung DYM. Atopic dermatitis (atopic eczema). In; Kliegman RM, Behrman RE, Jenson HB, Stanton BF. Nelson textbook of paediatrics. 18thed. Philadelphia: Saunders Elsevier; 2007. p. 971-75.
23. Jaja SI, Fagbenro AO. Peak expiratory flow rate in Nigerian school children. *Afr J Med Sci 1995;24:379-384.*
24. Onadeko BO, Iyun AO, Sofowora EO, Adamu SO. Peak expiratory flow rate in normal Nigerian children. *Afr J Med Sci 1984;13:25-32.*
25. Agaba PA, Thacher TD, Angyo IA, Agaba EI. Peak expiratory flow rates in healthy Nigerian children. *J Trop pediatr 2003;49:157-9.*