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Original Research Article

Pattern of allergic co-morbidities in children with asthma in Sokoto, North Western Nigeria

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Abstract

Introduction: Childhood allergic diseases are common globally, with 250 million children affected. Over 25% of the world's population suffers from allergic diseases which include asthma, allergic rhinitis, eczema, conjunctivitis and drug reactions. Asthma and allergic co-morbidities affect quality of life of children and also constitute a significant burden to their parents.

Objectives: To determine the allergic co-morbidities associated with childhood asthma in Sokoto and to assess relationship between asthma severity with presence of allergic co-morbidities.

Methods: Descriptive, prospective cross sectional study of asthmatic children attending the Pulmonology and Allergy clinic of Usmanu Danfodiyo University Teaching Hospital (UDUTH), Sokoto over a 1-year period. Relevant information was obtained using a questionnaire and level of significance was set at $p \leq 0.05$.

Results: Of the 78 children enrolled, 45(57.7%) were males, 45(57.7%) were under-fives while 44(56.4%) belonged to the high socio-economic class (SEC). Allergic co-morbidities were seen in 67(85.9%); with allergic rhinitis being the commonest in 84.6%. No significant association was observed between asthma severity and presence of allergic co-morbidities (Fischer's exact p=0.709). Similarly, no significant association was observed between asthma severity and allergic rhinitis, eczema nor with conjunctivitis (p=1.000, 1.000, 1.000 respectively).

Conclusion: Allergic co-morbidities are common in asthmatic children in Sokoto with allergic rhinitis been the most prevalent. Mild intermittent asthma was the commonest form of asthma severity. Even though allergic co-morbidities are common, they were not associated with asthma severity. We recommend thorough assessment of these children and adequate treatment of the concomitant diseases with referral to appropriate specialities if need be.

Keywords: Allergic, Asthma, Co-morbidities, Severity.

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1. Introduction

Childhood allergic diseases have become common globally, with up to 250 million children suffering from such diseases.[1] Over 25% of the world's population suffers from allergic diseases which include asthma, allergic rhinitis, eczema, conjunctivitis and drug reactions.[1,2] The prevalence is increasing[1,3] seriously affecting the quality of life of children, and creating a serious burden on both families and society.[1] If not controlled, allergic diseases can be fatal.[4] Such conditions constitute a challenge for both public health organizations and healthcare providers.[5] Childhood asthma has been shown to be associated with other allergic diseases [2,3], making these children to bear the double burden of the effects of the allergies and that of asthma.[6-10] Asthma and allergic co-morbidities have been shown to affect the quality of life of the child and also constitute a significant burden to the parents and society at large.[1,6,11]

Few studies have been conducted on allergic co-morbidities of asthma in children in Nigeria [6,12-14], with no data from Sokoto, North Western Nigeria.

1.1 Objectives

1) To determine the allergic co-morbidities associated with childhood asthma in Sokoto.
2) To assess relationship between asthma severity and presence of allergic co-morbidities.

2. Materials and Methods

This was a descriptive, prospective cross sectional study of asthmatic children attending the Pulmonology and Allergy clinic of UDUTH, Sokoto, Nigeria over a one-year period from 1st April 2017 to 31st March 2018.

All newly diagnosed and previously diagnosed asthmatic children recently enrolled in the clinic or already on follow up were included in the study. Asthmatic children who assented and whose parents/guardian consented to the study were recruited consecutively. Children whose parents/caregivers refused to give consent and older children who did not assent to the study were excluded.

Relevant information relating to bio-data, socio-demographics and symptoms were collected using a pre-tested interviewer administered questionnaire.

Asthma was diagnosed according to the Global Initiative for Asthma (GINA) 2018 guidelines [15], while asthma severity was classified according to GINA guidelines[16] using frequency of symptoms per week, exercise tolerance and nocturnal symptoms.

The socio-economic classes of the patients were assessed using the Oyedeji[17] method. The social class of each child was determined from the occupational and educational level of both parents using standard scoring scales. 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. The classification is Social class 1 as High, Social class 2 and 3 as middle while Social class 4 and 5 as low.

Ethical approval was obtained from UDUTH Sokoto Ethics and research committee while consent/assent was also obtained from parents or care givers/child.

2.1 Statistical analysis

Data was analyzed using the Statistical Package for the Social Sciences 20 (Chicago Illinois, USA). Quantitative variables were presented as median and inter quartile range (IQR) and presented as tables; while qualitative variables were summarized using frequency and percentages. Qualitative variables were analysed using Chi square and Fisher's exact test where applicable. The level of significance was set at $p \leq 0.05$.

3. Results

3.1 Socio- demographic characteristics of study population

Seventy eight children were enrolled, with a median age of 52.50 months, IQR 67.75 and age range of 7 months to 15 years. There were more males than females as shown in table 1.

Under-fives constituted the highest percentage with 57.7% and majority of the subjects belonged to the high SEC as shown in table 1 below.

Table 1: Socio-demographic profile of study participants

Socio-demographic factor		n(%)
Gender	Male	45(57.7)
	Female	33(42.5)
Age range (yrs)	0.5-5	45(57.7)
	6-10	22(28.2)
	11-15	11(14.1)
SEC	High	44(56.4)
	Middle	24(30.8)
	Low	10(12.8)

n=Number, %=Percentage

3.2 Family history of atopy

Sixty-one (78.2%) of the children had family history of atopic diseases, of which 18(29.5%) had family history of multiple atopic diseases. The diseases included asthma in 50(64.1%), allergic rhinitis in 16(20.5%), allergic conjunctivitis in 14(17.9%) and urticaria in 3(3.9%). There was no family history of relatives with atopic dermatitis.

3.3 Asthma severity using GINA guidelines

Mild intermittent asthma was observed in 60(76.9%), mild persistent asthma in 14(17.9%) and moderate persistent asthma in 4(5.1%). None of the children had severe persistent asthma.

3.4 Allergic co-morbid diseases

Sixty-seven (85.9%) of the children had allergic co-morbidities with 28(41.8%) having multiple co-morbidities. The commonest was allergic rhinitis seen in 66(84.6%), followed by eczema in 23(29.5%) and allergic conjunctivitis in 10(12.8%). None of the children had symptoms of food allergy or drug allergy.

3.5 Comparison of Socio-economic class and allergic co-morbidities

Majority of the subjects belonged to the high SEC and they also had a higher proportion with allergic co-morbidities. However, there was no significant association between SEC and presence of allergic co-morbidity as shown in table 2.

Table 2: Comparison between socio-economic class and allergic co-morbidities

SEC	Presence of co-morbidity n (%)	Absence of co-morbidity n (%)	Total n (%)
High	37(47.4)	7(8.9)	44(56.4)
Middle	22(28.2)	2(2.6)	24(30.8)
Low	8(10.3)	2(2.6)	10(12.8)
Total	67(85.9)	11(14.1)	78(100.0)

Fischer's exact test p=0.587, n=number, %=percentage

3.6 Comparison of asthma severity and allergic co-morbidities

Asthma severity was not associated with presence of allergic co-morbidities as shown in table 3.

Table 3: Comparison between asthma severity and allergic co-morbidities

Asthma severity	Presence of co-morbidity n(%)	Absence of co-morbidity n(%)	Total n(%)
Intermittent	52(66.7)	8(10.3)	60(76.9)
Persistent	15(19.2)	3(3.8)	18(23.1)
Total	67(85.9)	11(14.1)	78(100.0)

Fischer's exact test p=0.709, n=number, %=percentage

There was also no significant association between asthma severity and presence of allergic rhinitis, conjunctivitis nor with eczema as shown in table 4 below.

Table 4: Comparison between asthma severity and various types of allergic co-morbidities

Allergic co-morbidity	Intermittent n(%)	Asthma severity Persistent n(%)	p value
Allergic rhinitis			
Present	51(65.3)	15(19.3)	1.000
Absent	9(11.5)	3(3.9)	
Eczema			
Present	18(231.)	5(6.4)	1.000
Absent	42(53.8)	13(16.7)	
Conjunctivitis			
Present	8(10.3)	2(2.6)	1.000
Absent	52(66.7)	16(20.5)	

p value=Fischer's exact test, n=number, %=percentage

4. Discussion

Allergic co-morbidities were found to be common in asthmatic children attending our Pulmonology and Allergy clinic. This is consistent with findings from other studies.[1,3,6-10] Majority of the children were male, similar to findings from China,[1] Turkey,[3] Enugu[6] and Ilesa.[13] Male preponderance of asthmatic children have been documented by other researchers,[18-21] this is due to the male-related narrower airways, increased airway tone, and higher IgE levels.[22] The increased physical activities seen in boys may likely increase the likelihood of exposure to exercise as a trigger factor.

Even though majority of the children belonged to the high SEC as reported by other researchers,[6,19,23,24] it was not associated with presence of allergic co-morbidities. Reason for lack of association with co-morbid disease cannot be explained.

The observation of these children belonging to the high SEC is in keeping with the hygiene hypothesis which highlights children from high SEC have less likelihood of exposure to viral infections with subsequent up-regulation of T-helper cells 2 leading to increased pro-allergic and pro-asthmatic cytokine release.[25,26]

Positive family history of allergic diseases was seen in 78.2% which is higher than 23.5% reported from Lagos,[12] but with a similar pattern of asthma, followed by rhinitis and then conjunctivitis.

Most of the patients had multiple allergies, similar to findings from China,[1] Turkey,[3] Nigeria.[6,12] However, many factors which include genetic features, environmental influences, and social status have been proposed to affect the prevalence of allergic diseases, thus making it difficult to explain the observed trends.[1,6]

Allergic rhinitis was the commonest co-morbid allergic disease in our subjects, similar to reports by Zhao *et al*[1] from China, Ayuk *et al*[6] from Enugu, Yuksel *et al*[3] from Turkey and Kuti *et al*[13] from Ilesha. This is due to the fact that it has been shown to be common in about 90% of asthmatic patients.[27,28] It has been reported that both upper and lower chronic airway inflammation occur concurrently in some patients which share similar pathological mechanism giving rise to the symptoms of allergic rhinitis and asthma.[27,29]

Conjunctivitis was the second most common co-morbid disease; similar to what was reported from Enugu[6] and Lagos.[12] Most patients with conjunctivitis often present to the eye clinic rather than reporting their symptoms at the Pulmonology clinic. Hence, this may underestimate the true burden of the problem.

The proportion of children having eczema is higher than 7.2% reported form Enugu[6] and 9.8% reported from Lagos[12] but lower than what was reported from China.[1] This may be attributable to the dry and itchy skin resulting from dusty and dry weather of Sokoto during the harmattan season since this was the period when some children were enrolled for the study.

Mild intermittent asthma was the commonest form of asthma severity encountered, similar to findings by Kuti *et al*.[13] However, this is in contrast to mild persistent asthma reported by Odusate *et al*[12] from Lagos, South Western Nigeria and Garba *et al*[18] from Kano, North Western Nigeria. Reason for the difference may be explained by the fact that Lagos and Kano are more cosmopolitan than Sokoto, thus having higher incidence of air pollution which may worsen the asthma symptoms.

There was no relationship observed between asthma severity and presence of allergic co-morbid diseases nor with any specific type of allergic disease; which is similar to findings from Lagos.[12] This lack of association may be attributable to a smaller sample size and to the fact that most of the study patients have mild intermittent form of asthma.

5. Conclusion

This study demonstrated that allergic co-morbidities are common in asthmatic children in Sokoto, Nigeria with allergic rhinitis being the most prevalent. Mild intermittent asthma was the commonest form of asthma severity. Even though allergic co-morbidities were common; they were not associated with asthma severity. We recommend thorough assessment of these children and adequate treatment of the concomitant diseases with referral to appropriate specialities if need be.

References

[1]. Zhao J, Bai J, Shen K, Xiang L, Huang S, Chen A, *et al*. Self reported prevalence of childhood allergic disease in three cities of China: a multicenter study. *BMC Public Health* 2010; 10:551.

[2]. Fu X, Wang Z, Jing C. Comorbidity of allergic rhinitis and asthma in children:a meta analysis. *Int J Clin Exp Med* 2018; 11(9):10166-72.

[3]. Yuksel H, Dinc G, Saker A, Yilmaz O, Yorgancioglu A, Celik P, *et al*. Prevalence and comorbidity of Allergic Eczema, Rhinitis and Asthma in a city in Western Turkey. *J Investig Allergol Clin Immunol* 2008; 18(1):31-5.

[4]. Sullivan SD, Weiss KB. Health economics of asthma and rhinitis, part II: assessing the economic impact. *J Allergy Clin Immunol* 2001; 107:3-8.

[5]. Akinbami LJ, Moorman JE, Garbe PL, Sondik EJ: Status of childhood asthma in the United States, 1980-2007. *Pediatrics* 2009; 123: S131-45.

[6]. Ayuk A, Eze J, Edelu B, Oguonu T. The prevalence of allergic diseases among children with asthma: What is the impact on asthma control in South East Nigeria? *Niger J Clin Pract* 2018; 21:632.

[7]. Hong S, Son DK, Lim WR, Kim SH, Kim H, Yum HY, *et al.* The prevalence of atopic dermatitis, asthma, and allergic rhinitis and the comorbidity of allergic diseases in children. *Environ Health Toxicol* 2012; 27:e2012006.

[8]. Zar HJ, Ehrlich RI, Workman L, Weinberg EG. The changing prevalence of asthma, allergic rhinitis and atopic eczema in African adolescents from 1995 to 2002. *Pediatr Allergy Immunol* 2007; 18:560-5.

[9]. de Marco R, Cappa V, Accordini S, Rava M, Antonicelli L, Bortolami O, *et al.* Trends in the prevalence of asthma and allergic rhinitis in Italy between 1991 and 2010. *Eur Respir J* 2012; 39:883-92.

[10]. Hansen TE, Evjenth B, Holt J. Increasing prevalence of asthma, allergic rhinoconjunctivitis and eczema among schoolchildren: Three surveys during the period 1985-2008. *Acta Paediatr* 2013; 102:47-52.

[11]. O'Connell EJ. The burden of atopy and asthma in children. *Allergy* 2004; 59 Suppl 78:7-11.

[12]. Odusote O, Akinda IJ, Ubuane PO, Ogunleye A, Dike G. Allergic co-morbidities in children with asthma in Lagos, Nigeria: A pilot cross-sectional study. Proceedings of the ALLPAEDS 2018 joint conference of the South African Paediatric Association (SAPA) and The Allergy Society of South Africa (ALLSA).

[13]. Kuti BP, Omole KO. Epidemiology, triggers and severity of childhood asthma in Ilesa, Nigeria: Implications for management and control. *Niger Med J* 2017; 58:13-20. doi:10.4103/0300-1652.218412

[14]. Falade AG, Olawuyi JF, Osinusi K, Onadeko BO. Prevalence and severity of symptoms of asthma, rhiniconjunctivitis and atopic eczema in 6-7 year old Nigerian primary school children in the International study of asthma and allergies in childhood. *Med Prin Pract.* 2004; 13:20-5.

[15]. Global Initiative for Asthma (GINA). The Global Strategy for Asthma Management and Prevention; 2018. Available from url http://www.ginasthma.org

[16]. The Global Initiative for Asthma (GINA). The Global Strategy for Asthma Management and Prevention; 2016. Available from: http://www.ginasthma.org

[17]. Oyedeji GA. Socio-economic and cultural background of hospitalized children in Ilesha. *Nig J Paediatr* 1985; 12:111-7.

[18]. Garba BI, Ibrahim M, Johnson A-WBR. Socio-demographic and clinical characteristics of asthmatic children seen at Aminu Kano Teaching Hospital, Kano. *Nig J Paed* 2014; 41:360-4.

[19]. Akhiwu HO, Asani MO, Johnson AB, Ibrahim M. Epidemiology of pediatric asthma in Nigerian Population. *J Health Res Rev* 2017; 4:130-6.

[20]. Asani MO, Adeleke SI, Ibrahim M. Childhood asthma in Kano, Nigeria. *Nig J Basic Clin Sci* 2005; 2:6-9.

[21]. Onazi SO, Orogade AA, Yakubu AM. Exercise-induced bronchospasm among school children in Gusau, Nigeria. *West Afr J Med* 2012; 31:76-80.

[22]. Gissler M, Jarvelin MR, Louhiala P, Hemminki E. Boys have more health problems in childhood than girls: Follow up of the 1987 Finnish birth cohort. *Acta Paediatr* 1999; 88:310-4.

[23]. 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; 54:606-10.

[24]. Addo-Yobo EO, Woodcock A, Allotey A, Baffoe-Bonnie B, Strachan D, Custovic A. Exercise-induced bronchospasm and atopy in Ghana: Two surveys ten years apart. *PLoS Med* 2007; 4:e70.

[25]. Strachan DP. Hay fever, hygiene, and household size. *BMJ* 1989; 299:1259-60.

[26]. Okada H, Kuhn C, Feillet H, Bach JF. The 'hygiene hypothesis' for autoimmune and allergic diseases: An update. *Clin Exp Immunol* 2010; 160:1-9.

[27]. Leynaert B, Neukirch F, Demoly P, Bousquet J: Epidemiologic evidence for asthma and rhinitis comorbidity. *J Allergy Clin Immunol*. 2000; 106: S201-S205. doi:10.1067/mai.2000.110151.

[28]. Casale TB, Amin BV: Allergic rhinitis/asthma interrelationship. *Clin Rev Allergy Immunol*. 2001; 21: 27-49. doi:10.1385/CRIAI:21:1:27.

[29]. Simons FER. What's in a name? The allergic rhinitis-asthma connection. *Clin Exp All Rev*. 2003, 3: 9-17. doi:10.1046/j.1472-9725.2003.00055.x