PATTERN AND TRIGGER FACTORS OF ASTHMA EXACERBATION IN CHILDREN SEEN AT USMANU DANFODIYO UNIVERSITY TEACHING HOSPITAL, SOKOTO.

GARBA BI[1], SANI UM[1], ISEZUO KO[1], WAZIRI UM[1], ABUBAKAR FI[1]

1 Department of Paediatrics, Usmanu Danfodiyo University Teaching Hospital, Sokoto

Abstract

Background: Asthma exacerbation can be fatal. It is common and more severe when asthma is uncontrolled but can also occur in patients taking asthma treatment. Knowledge about trigger factors will assist clinicians and parents to adequately manage the condition.

Aim: To determine the pattern and trigger factors of acute exacerbation of asthma in children presenting to Usmanu Danfodiyo University Teaching Hospital (UDUTH), Sokoto, Nigeria.

Materials and methods: A cross-sectional study of children with asthma exacerbation presenting to the Pulmonology clinic and Emergency Paediatric Unit of UDUTH, Sokoto over a one year period. Relevant clinical information was documented in a structured questionnaire. Asthma exacerbation severity was determined using the Global Initiative for Asthma (GINA) guidelines.

Results: There were 53 presentations with 29(54.7%) being males, giving a M:F ratio of 1.2:1. Mean age was 62.43±40.53 months and 31(58.5%) were aged between 1-5 years. Majority 30(56.6%) presented during the rainy season with 46(86.8%) having an identifiable trigger factor with exposure to cold 27(50.9%) and acute respiratory infection (ARI) 21(39.6%) predominating. Only 25(47.2%) took short acting Beta agonist (SABA) before presentation. Most cases 38(71.7%) had mild exacerbation and majority 45(84.9%) were discharged <12 hours. Male gender was not associated with severity of exacerbation (p=0.811) but associated with hospitalisation beyond 48 hours (p=0.020). All patients were discharged with no mortality recorded.

Conclusion: Majority of our patients had mild asthma exacerbation, aged 1-5 years presenting during the rainy season with an identifiable trigger factor. Most of the children stayed for less than 12 hours with no mortality recorded. Knowledge of individual trigger factors can improve allergen avoidance with a resultant good asthma control.

Background

Asthma exacerbation (also called flare up or attack) is common and can be fatal.[1] It is more severe when asthma is uncontrolled but can also occur in patients taking asthma treatment.[1,2] Asthma exacerbations appear to be quite common and may occasionally be the first presentation of asthma in a child.[2]

It may be triggered by a number of atmospheric and other environmental factors.[3] Boys have higher risks of exacerbation in childhood than girls.[3] Seasonal variations of exacerbations requiring hospital treatment have been reported.[3-6]

Trigger factors may be identified of which some may be modifiable which will help in long term management of asthma. Whilst understanding the underlying causes of asthma and its triggers is key to preventive strategies, having clear strategies on how to best manage acute presentations is key to good outcomes.[7] Knowledge about trigger factors will assist clinicians and parents to adequately manage the condition.

The severity of asthma symptoms and the likelihood of exacerbation are also significantly influenced by available medications for use by patients.[3]

Many studies have been reported on historical triggers of asthma exacerbation in Nigerian children,[8-13] with few on current trigger factors requiring acute hospital presentation.[2,4] However none was reported from Northern Nigeria.

Aim

To determine the pattern and trigger factors of acute exacerbation of asthma in children presenting to UDUTH, Sokoto, Nigeria.

Materials and methods

A cross-sectional study of children with acute asthma exacerbation presenting to the Pulmonology clinic and Emergency Paediatric Unit of UDUTH, Sokoto over a one year period (1st April 2018-31st March 2019).

Diagnosis of asthma exacerbation and severity was determined using GINA guidelines.[15] Children with symptoms of asthma exacerbation whose parents/guardians consented and aged > 12 years assented were enrolled. Children who had diagnosis of Bronchiolitis were excluded. Relevant clinical information was documented in a structured questionnaire.

Data was entered into a Statistical Package for Social Sciences version 20 (Chicago Illinois) for cleaning and analysis. Quantitative variables were summarized using mean and standard deviation. Categorical variables were summarized using frequency and percentages. Fisher' exact test were used for association between categorical variables. A p value of <0.05 was considered statistically significant.

Ethical approval was obtained from UDUTH Ethical Committee.

Results

There were 53 presentations of asthma exacerbations, with 29(54.7%) of the cases being males, giving a M:F ratio of 1.2:1. The mean age was 62.43±40.53 months. Thirty-one (58.5%) subjects were aged 1-5 years as shown in table 1. More children presented during the rainy season 30(56.6%) which is from May to September, than during the dry season which is from October to April. More than 30.0% of the patients were newly diagnosed asthmatics at presentation as shown in table 1.

Demographic variable	Number	Percentage
Age range (years)		
<1	4	7.5
1-5	31	58.5
6-10	13	24.5
11-15	5	9.4
Gender		
Male	29	54.7
Female	24	45.3
Season		
Rainy	30	56.6
Dry	23	43.3
Asthma diagnosis		
Known asthmatic	35	66.0
Newly diagnosed	18	34.0

Identifiable trigger factors were found in 46(86.8%) patients. Exposure to cold 27(50.9%) and acute respiratory infections (ARI) 21(39.6%) were the predominant triggers as shown in table 2. ARI was established by history of one or more of cough, nasal discharge or blockage, sneezing and fever. However, some had more than one trigger factor and each was captured as a separate entity.

Trigger	Number	*Percentage
Exposure to cold	27	50.9
Acute respiratory infection	21	39.6
Exercise	4	7.5
Dust	4	7.5
Insecticide	2	3.8
Smoke	1	1.9

All the children (100.0%) presented with history of cough, 45(84.9%) with difficulty in breathing, 20(37.7%) with wheezing and 10(18.9%) with rhinorrhea. Only 25(47.2%) took SABA before presentation, while 42(79.2%) had pulse oximetry on presentation. Most cases 38(71.7%) had mild exacerbation and majority 45(84.9%) were discharged <12 hours. None stayed between 12 and 24 hours. Male gender was not associated with severity of exacerbation (p=0.811) but associated with hospitalization beyond 48 hours (p=0.020) as shown in table 3. Only seven children on controller medications were seen and all presented with mild exacerbation, there was significant association between controller medication and severity (Fisher's exact p=0.036).
All patients were discharged with no mortality recorded.

Variable	Male n(%)	Female n(%)	Total (N=53)	p value
Age range (years)				
<1	3(5.7)	1(1.9)	4(7.6)	0.342
1-5	14(26.4)	17(32.1)	31(58.5)	
6-10	8(15.1)	5(9.4)	13(24.5)	
11-15	4(7.5)	1(1.9)	5(9.4)	
Trigger factor				
Present	24(45.3)	22(41.5)	46(86.8)	0.524
Absent	5(9.4)	2(3.8)	7(13.2)	
Severity				
Mild	21(39.6)	17(32.1)	38(71.7)	0.811
Moderate	6(11.3)	6(11.3)	12(22.6)	
Severe	1(1.9)	1(1.9)	2(3.8)	
Life threatening	1(1.9)	0(0.0)	1(1.9)	
Hospital stay (hours)				
<12	24(45.3)	21(39.6)	45(84.9)	0.020
24-48	0(0.0)	3(5.7)	3(5.7)	
>48	5(9.4)	0(0.0)	5(9.4)	

Discussion

The study showed children aged 1-5 years presented more with exacerbation with subsequent decrease with increasing age. This is consistent with other studies which showed it is commoner in younger age group with decreasing presentation in the older age group. This may be attributable to the fact that older children try to avoid the trigger factors.[4,5,16]
Asthma is more prevalent in boys than girls.[17,18] With exacerbation, the trend is said to persist in early childhood but reverses with increasing age with girls between the ages of 11 to 17 years having more exacerbation than boys of same age group and females almost doubling the number of males by adulthood.[2,3,16,19] However, in this study boys predominated in all age groups reason for this maybe because majority of the subjects were below 10 years of age, hence the trend is unlikely to be observed.
This study shows that there are more asthma visits to the emergency department in rainy season than during dry season, similar to finding from Enugu[2] and Port Harcourt.[4] This may be due to association of high rainfall, increased humidity and decrease temperature with asthma exacerbation.[20,21] There is also an increase in pollen and mold spores with resultant increase allergen.[20] The dry season has the Harmattan period with its characteristic cold and dusty weather that may serve as trigger factors. Seasonality of asthma exacerbation has been demonstrated by other researchers.[2-5]
Most of the children had identifiable trigger factors of which exposure to cold and ARI were the commonest. Most reports demonstrate ARI to be a common trigger.[2-5,8,10,14] Seasonal variation in allergen and viral exposures are said to account for the different patterns of asthma exacerbation seen in various geographic locations.[3,4,5,6,22]

Majority of the children presenting were known asthmatics with 34% newly diagnosed at presentation despite some of them having symptoms for several years, similar to findings by Edelu *et al*[2] and Onubogu *et al*.[4] Delayed presentation is a common problem in the study area, resulting from ignorance, tendency to patronize traditional healers and other medicine vendors and probable wrong diagnosis at other healthcare facilities.

Majority of the children were not on controller medications similar to findings by Edelu *et al*[2] and Dondi *et al*.[5] This may be because majority (76.9%) of the asthmatic children attending our pulmonology clinic have intermittent asthmatics as reported in a previous study from same hospital.[9] Even though controller medications do not prevent exacerbation, they reduce the severity and frequency of exacerbations[2] as shown in this study where the subjects had fewer presentations and mild exacerbation.

Majority of the children were discharged <24 hours similar to findings from Enugu[2] and Port Harcourt.[4] This may be a reflection of good management protocol by the Pulmonology unit using the GINA guidelines. Availability of a treatment protocol poster placed in the Paediatric emergency room, also help to ensure that all patients received prompt and standard treatment irrespective of the time of presentation or cadre of the attending pediatrician.

There was no mortality recorded during the study period similar to what was reported by Edelu *et al*[2] and Onubogu *et al*.[4] Reports have shown decline in mortality[3] with one third of asthma mortality said to occur in hospitals.[3,7]

Conclusion

Majority of our patients were males, had mild asthma exacerbation and aged 1-5 years. Presentation with exacerbation was highest during the rainy season and significant number had an identifiable trigger factor predominantly ARI and exposure to cold. Most of the children stayed for less than 12 hours with no mortality recorded. Knowledge of individual trigger factors can improve allergen avoidance with a resultant good asthma control.

Limitations

Even though identification of trigger factors was based on subjective reporting largely from the patients/caregivers, it is difficult to assess the role of other numerous environmental agents, which might have been the actual triggers of such exacerbation.

References

1. Global Initiative for Asthma. Global strategy for the diagnosis and prevention. Global Initiative for Asthma (updated 2019). Available from: www.ginasthma.org. Accessed 2nd May, 2019.
2. Edelu JO, Eze JN, Ayuk AC, Oguonu T. Prevalence and Pattern of Asthma Exacerbation in Children Seen at the University of Nigeria Teaching Hospital, Enugu. Niger J Paediatr 2016;43(2):78-82.
3. Johnston NW, Sears MR. Asthma exacerbations-1:Epidemiology. Thorax 2006;61(8):722-8.
4. Onubogu UC, Owate E. Pattern of acute asthma in children Emergency Department of Rivers State University Teaching Hospital, Port Harcourt, Nigeria. Open J Resp Dis 2019;9:101-1.
5. Dondi, A, Calamelli E, Piccinno V, Ricci G, Corsini I, Biagi C *et al*. Acute Asthma in the Pediatric Emergency Department: Infections Are the Main Triggers of Exacerbations. BioMed Res Int 2017;35:1-7. Article ID: 9687061.
6. Wisniewski JA, McLaughlin AP, Stenger, PJ, Patrie J, Brown MA, El-Dahr J *et al*. A Comparison of Seasonal Trends in Asthma Exacerbations among Children from Geographic Regions with Different Climates. Allergy Asthma Proceedings 2016;37:475-81.
7. Schauer SG, Cuenca PJ, Johnson JJ, Ramirez S. Management of Acute Asthma in the Emergency Department. Emergency Medicine Practice 2013;15:1-28.
8. 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.
9. Garba BI, Sani UM, Isezuo OK, Waziri UM, Jiya NM. Socio-demographic and clinical profile of asthmatic children as seen in a tertiary health facility in Sokoto metropolis, Nigeria. W J Biomed Res 2019;6(1):22-8.
10. Akhiwu HO, Asani MO, Johnson AB, Ibrahim M. Asthma triggers in primary school pupils aged 6-11 years in a Nigerian population. Trop J Med Res 2017;20:75-9.
11. Asani MO, Adeleke SI, Ibrahim M. Childhood asthma in Kano, Nigeria. Nig J Basic Clin Sci 2005;2:6-9.
12. Abdurrahman MB, Taqi AM. Childhood asthma in northern Nigeria. Clin Allergy 1982;12:379-84.
13. Aderele WI. Bronchial asthma in Nigerian children. Arch Dis Child 1979;54:448-53.
14. Gbadero DA, Johnson AW, Aderele WI, Olaleye OD. Microbial inciters of acute asthma in urban Nigerian children. Thorax 1995;50:739-45.
15. Global Initiative for Asthma. Global strategy for the diagnosis and prevention. Global Initiative for Asthma (updated 2017). Available from: www.ginasthma.org. Accessed 2nd May, 2017.
16. Pauwels RA, Pederesen S, Busse WW, Tan WC, Chen YZ, Ohlsson SV *et al*. Early intervention with budesonide in mild persistent asthma: a randomized double-blind trial. Lancet 2003;361:1071-6.
17. Oguonu T, Ayuk AC, Edelu BO, Ndu IK. Pattern of respiratory diseases in children presenting to the paediatric emergency unit of the University of Nigeria Teaching Hospital, Enugu: a case series report. BMC Pulm Med 2014;14:101.
18. Tan WC. Viruses in asthma exacerbation. Curr Opin Pulm Med 2004;11:1-6.
19. Oviawe O. Asthma in children. In: Azubuike JC, Nkanginieme KEO, editors. Paediatrics and Child health in a tropical region. 2nd ed. African Educational Services; 2007.Pp 460-8.
20. Pike KC, Akhbari M, Kneale D, Harris KM. Interventions for Autumn Exacerbations of Asthma in Children. Cochrane Database of Systematic Reviews, 2018;3. CD012393.
21. Mireku N, Wang Y, Ager J, Reddy RC, Baptist AP. Changes in weather and the effects on Pediatric asthma exacerbations. Ann Allergy Asthma Immunol 2009;103:220-4.
22. Johnston NW, Johnston SL, Norman GR, Dai J, Sears MR. The September epidemic of asthma hospitalization: school children as disease vectors. J Allergy Clin Immunol 2006;117:557-62.