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# Assessment of Asthma Management among Children in Benin Hospitals

Sagbo GG<sup>1\*</sup>, Padonou C<sup>1</sup>, Tohodjede Y<sup>2</sup>, **Bognon G<sup>1</sup>**, Bagnan-Tossa L<sup>2</sup>, Donoumassou N<sup>2</sup> and Zohoun L<sup>2</sup>

### Abstract

**Introduction:** Asthma is the most common chronic diseases in children. Its diagnosis and management are still poorly implemented in Benin.

**Objective:** Assess the management of asthma in children aged six to 18 years according to GINA 2002 criteria in three university teaching hospitals located in the city of Cotonou.

**Patients and methods:** The research work was a case control study with assessment purpose; it was conducted from January 1, 2011 to December 31, 2015.

**Results:** A total of 115 asthmatic children were identified, i.e. a hospital-based frequency of 0.2%. Sex ratio was 1.5 and male predominance was noted. Asthma was diagnosed based on clinic symptoms and peak expiratory flow rate (PEFR) values (peak flow data measurement) in 60.9% of patients. Asthma attack was classified according to GINA criteria in 33.3% of patients and severity sought in 67.8% of cases. The dose of inhaled corticosteroids was compliant with treatment guidelines in 66.1% of children. Follow-up was ensured on a regular basis and adapted to asthma severity in 60.9% of children and 70% of them had a controlled asthma.

**Conclusion:** In the pediatric units of CNHU-HKM and CHU-MEL university teaching hospitals, children with asthma were provided care only during attacks. At CNHU-PP they were adequately followed up and their asthma was controlled in 70% of cases.

### Keywords

Childhood asthma; Peak expiratory flow rate; Inhaled corticosteroids

## Introduction

Asthma is a common chronic disease in children with prevalence oscillating from 8 to 20% globally. It is the leading cause of many medical consultations, hospitalizations and even school absenteeism [1-4]. Asthma control is from now on a core element and the focus of care. Therefore, the High Authority of Health (Haute Autorité de la Santé / HAS) in France and the Global Initiative for Asthma (GINA) [5,6] at international level, have made recommendations for asthma care and assessment of level symptom control. In Benin asthma seems to be underdiagnosed and no previous study has addressed its management although it is a potentially lethal disease

\*Corresponding author: Dr. G. Gratien Sagbo, Deputy Medical Officer of Pediatrics, 06 BP 1692 PK3 Akpakpa, Cotonou, Republic of Benin, Tel : +229 66825117; E-mail: godsagbo@yahoo.fr

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with risk for respiratory failure in case of lack of diagnosis or follow-up either not-performed or poorly done. The condition in Benin which is characterized by exacerbation of the environmental threat shows signs of high frequency of asthma. As there is little information available on diagnosis and management of asthma among children in hospital settings, this study is carried out with the purpose of assessing the management of asthma in children aged 6 to 18 years in three university teaching hospitals of the city of Cotonou according to GINA 2002 criteria. The final objective is to improve medical practice.

## Patients and Methods

### Settings and study population

This study has been conducted in the pediatric units of three university teaching hospitals of Cotonou: HKM University Teaching Hospital (CNHU-HKM), Lagoon Mother and Child University Teaching Hospital (CHU-MEL) and National University Teaching Hospital of Pneumo-phtisiology (CNHU-PP) for asthma. The medical practitioners working in those units were pediatricians or pulmonologists with academic and professional qualifications in asthma and familiar with care provision to asthmatic children. It focused on children aged 6 to 18 years admitted to these three pediatric units.

### Type and Period of study

This investigative work was a retrospective and descriptive study with assessment purpose, from January 1, 2011 to December 31, 2015.

### Inclusion criteria

The criteria used for the assessment of asthma in those children are those adopted by GINA in 2002 [5]. Those criteria are related to asthma diagnosis in child, its classification depending on the severity of attack and asthma disease, and its treatment and monitoring. This study involved children aged 6 to 18 years admitted to one of those three medical units mentioned above; in addition, those children were provided care for asthma.

### Recruitment and data

Recruitment was exhaustive and study variables were epidemiological (hospital-based frequency, children's socio demographic characteristics), diagnostic (asthma diagnosis, asthma classification, triggering / enabling factors), therapeutic (treatment of attack and asthma disease) and outcome-related (assessment of level of asthma control, causes of poor asthma control and frequency of asthmatic child follow-up). The data collected from medical records of consultation and/or hospitalization of those asthmatic children, were reported on the predetermined evaluation grid according to GINA 2002 classification. They were then captured and processed using Microsoft 2013 software. Statistical tables and graphics were used to describe the variables. Authorization was obtained from the unit heads of the different hospitals prior to the implementation of this study.

## Findings

### Epidemiological features

During the period covered by the study, 74553 children were admitted to the pediatric units of the three hospitals. One hundred

and fifteen children were involved, i.e. a hospital-based frequency estimated at 0.2% (115/74553). Among those 115 children, 11 (9.5%) attended CHU-MEL, 34 (29.6%) CNHU-HKM and 70 (60.9%) CNHU-PP. Children's median age was 11.9 months, with extremes from 6 to 18 years. Sex ratio was 1.5.

### Diagnostic features

**Diagnosis of asthma:** Asthma was diagnosed on the basis of clinical signs according to GINA and variable limitation of peak expiratory flow rate (PEFR) in 70 children with asthma who attended CHNU-PP and in the others who attended the other two hospitals on clinical signs according to GINA. Those results are indicated in Table 1. Fifty-seven children out of 115 (49.6%) were presented with an attack and that attack was properly classified according to GINA criteria in one third of cases. We have completed the classification of the remaining two thirds based on the clinical signs mentioned in the medical records. So, five children (4.3%) had presented with mild asthma attack, 36 children (31.3%) with moderate asthma attack and there were 16 cases (13.9%) of severe asthma attack. The factors triggering and/ or enabling attack were investigated in 80 out of 115 children. Among the latter, 68 (85%) were attended by CNHU-PP. Figure 1 shows the different types of triggering and/or enabling factors.

**Comparison of classification of asthma disease with GINA classification criteria:** The severity of asthma disease according to GINA criteria was classified in 78 patients (67.8%) of whom 70

attended CNHU-PP. The different classifications noted were mild persistent asthma (25.6%; 20/78), moderate persistent asthma (51.3%; 40/78), severe persistent asthma (20.5%; 16/78) and two cases of intermittent asthma.

### Therapeutic features

**Comparison of asthma treatment in accordance with GINA guidelines:** All the 57 children who had presented with attack had received an adapted treatment in relation to attack severity according to GINA guidelines. Forty-four out of those patients (77.2%) coming from the two pediatric units were systematically given an additional treatment which consists of antibiotic therapy and nebulized corticosteroids. For asthmatic disease, 78 patients (67.8%) had benefitted from a treatment adapted to classification according to GINA. The remaining 37 patients who had not received a treatment based on GINA guidelines attended CNHU-HKM and CHU-MEL. Seventy children (all attending CNHU-PP) out of the 115 (60.9%) had received in addition a drug prescription that provides details about the first aid to be adopted in case of asthma attack at home before medical consultation.

### Outcome features

**Asthma control:** Seventy children reviewed for their follow-up came from CNHU-PP. In forty-nine (70%) children asthma was controlled according to GINA criteria. Asthma was not controlled in the remaining 21 children and the poor control factors identified are indicated in Table 2.

Table 1: Distribution of children according to diagnostic tools.

Diagnostic tools	Yes		No		Total	
	Size of population	%	Size of population	%	Size of population	%
Clinical signs	115	100	-	-	115	100
Variable limitation of the PEF*	70	60.9	45	39.1	115	100

\*Peak expiratory flow

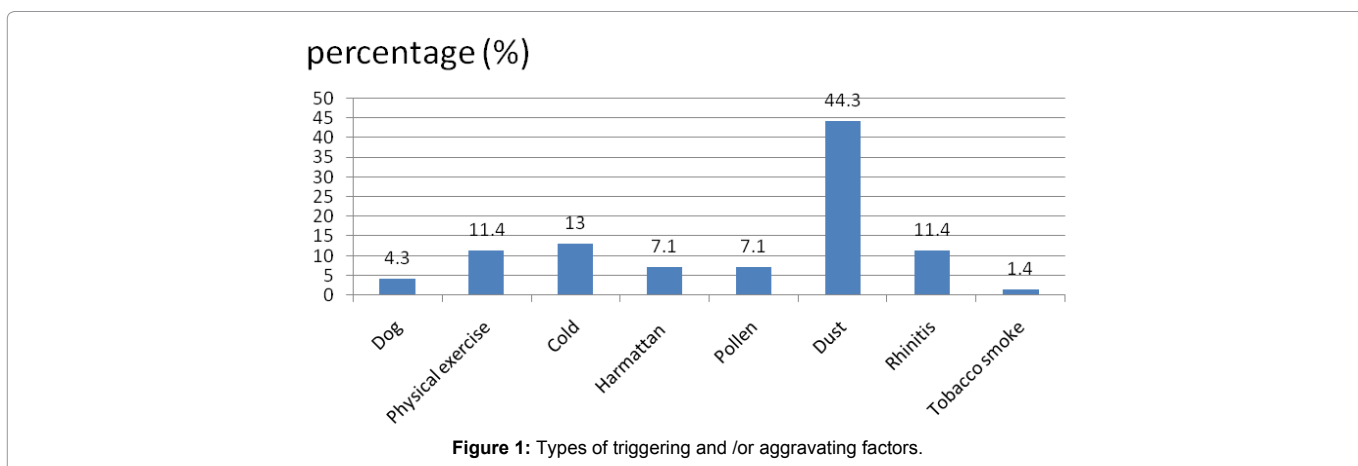


Figure 1: Types of triggering and/or aggravating factors.

Table 2: Main factors of poor asthma control.

Factors of poor control	Size of population	Percentage
Improper use of device	8	13.1%
Poor compliance / adherence	12	19.7%
Ignorance of sign	1	1.6%
Lack of environmental control	8	13.1%

Note: Some children presented with more than one factor of poor control

**Comparison of frequency of asthma disease monitoring with GINA guidelines:** Monitoring frequency was mentioned in 78 children (67.8%); it was compliant with GINA guidelines. Seventy out of those children came from CNHU-PP. The remaining eight children who attended the other two hospitals had been reviewed only once for check-up after attack.

## Discussion

The strengths of this study lie in the fact that it is the first hospital-based study on the assessment of diagnosis and management of asthma among children in Benin. Moreover, the assessment tool used is reliable and recognized at international level. In this research work, the hospital-based frequency of asthmatic disease was 0.2% in the three hospitals. In the sub-region other authors had found hospital-based frequencies varying from 0.5% in Burkina-Faso [7] to 40.9% in Togo [8]. That high frequency found in Togo was due to the fact that the study was conducted in a pediatric pulmonology unit. Besides, the same observation may be made in this study in which most children attended CNHU-PP. That health center had benefitted from the European Union assistance through a project from 2009 to 2012 which enabled to acquire material and drugs for patients at a reduced cost. Median age in the study population was 11.9 years, with extremes from 6 years to 18 years. Two other studies conducted in the sub-region had found out median ages of 6.5 years (extremes of 3 and 15 years) and 8.5 years (extremes of 5 years and 16 years) [7,9]. It can be said that median age depended on the extreme ages considered in each study. There is probably no age of onset of asthma. It would depend on the importance and degree of child exposure to etiologic factors and also on individual predispositions. Sex ratio was 1.5. Another hospital-based study carried out in Burkina-Faso had identified female predominance with a sex ratio estimated at 0.6% [10]. It can be inferred that asthma does not depend on sex.

As clinical manifestations are less specific, it is necessary to search for the presence of a variable and reversible obstructive syndrome by measuring the PEF. In this study, asthma was diagnosed only by the CNHU-PP pulmonologists on the basis of presence of the obstructive syndrome and PEF measure (60.9%). A Nigerian study had pointed out that only 11.5% of medical practitioners made the adequate diagnosis of asthma by combining search for obstructive syndrome and Peak expiratory flow (PEF) measurement [11]. In Côte d'Ivoire, a survey conducted among medical doctors found out that only 41% of the latter knew the peak expiratory flow meter and only 8% of those who know about it actually used it [12].

It is critical to assess the severity of asthma attack. In this study, classification of asthma attack according to GINA was done in one third of patients. A Moroccan study had identified that 69% of asthma attacks were classified according to GINA. The reasons for non-application of that classification that were identified were lack of time, complexity and even uselessness of that classification [12]. The same reasons could be identified in those hospitals. This suggests that there is a need to display that classification at emergencies. In this study, search for the factors triggering and / or aggravating asthma attack was made in 69.9% of cases on first consultation. To establish asthma diagnosis search for history of contact with allergens is important upon first consultation. The study looked at the identification of the main triggering factors the recognition and control of which are one of the key pillars of asthma management. The main factors identified, often multiple in the same individual, were dust (44.3%), cold (13%), rhinitis (11.4%) and physical exercise (11.4%). Two other surveys,

one in schools and the other at hospital, had also identified the same triggering factors [10,13].

Severity of asthmatic disease according to GINA was sought and classified in 67.8% of cases and all the patients were classified persistent asthma. Oviawe [9] had mostly found out intermittent asthma in his study. This suggests that probably there is some delay in the diagnosis and care provided to children involved in this study.

Children suffering from asthma attack involved in the study were systematically given nebulized corticoids and antibiotic therapy in two hospitals of general pediatrics. Using nebulized corticoids for the treatment of asthma attack is not compliant with GINA international recommendations. Corticosteroid therapy is recommended by oral or parenteral route depending on whether the child is capable to swallow or not. It may reduce the length of hospital stay, the number and the duration of relapses. In addition, even antibiotic therapy is recommended only in case of existence of a documented infectious factor [14]. The inhaled corticoids were the basis of maintenance therapy of light to severe persistent asthma. Their prescription was found out in 66.1% of cases to children followed up at CNHU-PP. A study on a cohort of children with asthma had showed the passage from intermittent asthma to persistent asthma in the absence of care with corticoids (48% versus 29% and 37.7% versus 57.1%) [9]. This indicates the existence of a progressive inflammatory process, reason why it is important to put patients on inhaled corticoids according to GINA guidelines in 2014 [15]. Providing therapeutic education and making an action plan available in case of attack have proved to be effective in the management of exacerbations by reducing the number of emergency unit interventions as well as the number of hospitalization. No child coming from the two pediatric units had received drug prescription describing the behavior to be adopted at home in case of attack before going to the emergency units.

For more than a decade, assessing asthma control has become very critical for the follow-up of asthmatic patient on treatment for it helps reduce the number of attacks, ensure the best possible quality of life and avoid airway remodeling. Asthma control had been sought only in children followed up at CNHU-PP according to GINA criteria. Eventually, as regards follow up, only children coming from CNHU-PP had benefitted from it on regular basis in accordance with GINA guidelines. This raises the problem of therapeutic education of the asthmatic child and his family through sensitization about knowledge of the disease and need for maintenance therapy and follow-up. Putting in place a retention strategy in the cohort (phone call, schedule of care appointments, active research) is necessary.

## Conclusion

This study has enabled to assess asthma management in the child aged 6 to 18 years in three university teaching hospitals of Cotonou. Hospital-based asthma frequency in these three teaching hospitals is relatively low (0.2%). Diagnosis, treatment and follow up were essentially performed in accordance with GINA guidelines in only one hospital. It is urgent to develop an action plan for technical upgrading of the other two hospitals in order to improve asthma diagnosis and management in the child.

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### Author Affiliations

[Top](#)

<sup>1</sup>Pediatric Unit, Oueme/Plateau Regional University Teaching Hospital, Porto-Novo, Benin

<sup>2</sup>Pediatric Unit, Hubert K. Maga National University Teaching Hospital, Cotonou, Benin

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