

# Trend in asthma severity in steroid naive asthmatic children in Benin city, Nigeria

O Oviawe, WO Osarogiagbon

Department of Child Health, University of Benin Teaching Hospital, Benin City, Edo State, Nigeria

## Abstract

**Background:** Asthma imposes heavy health burden on children and families worldwide. It is a chronic inflammatory airway disease and as such, treatment of the asthmatics is aimed at relieve of bronchoconstriction and inflammation. Until about a decade ago, emphasis was on the bronchoconstriction rather than the inflammation.

**Objective:** To determine the trend in severity of asthma in steroid naive children, in an era when steroid use in the treatment of asthma was uncommon.

**Materials and Methods:** Case notes of patients managed for asthma from 1985 to 1995 and age 5 - 16 years were retrieved and reviewed (these case notes are usually stored in Prof. O. Oviawe's office). Information extracted included age of onset of asthma, severity of asthma and drug medication at presentation and at 1 year. The GINA Guideline (2006) was used in classifying the asthma severity.

**Results:** A total of 77 patients satisfied the criteria for the study. Of these, 53 were males and 24 females. Males: Female ratio was 2.3:1; age range 5 - 16 years; mean age  $\pm$  SD ( $8.5 \pm 3.13$  years). At presentation, 48 (62.3%) patient had intermittent, 29 (37.7%) had persistent asthma, of these, 25 (86.2%) had mild persistent and 4 (13.8%) had moderate persistent. None had severe persistent asthma. At 1 year follow-up, 29 (37.7%) now had intermittent asthma, while 44 (57.1%) had persistent asthma, of these, 23 (52.3%) had mild persistent, 20 (45.5%) had moderate persistent, while 1 (2.3%) had severe persistent. Medication therapy was  $\beta$ 2-agonist in 72 (93.5%) patients.

**Conclusion:** The study supports progressive pathologic process possibly inflammatory in origin. It is opined that steroid naivity led to the trend seen in this study and judicious use of corticosteroids would have arrested the trend.

**Key words:** Asthma, inflammatory, severity, steroid use, trend

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## Introduction

Asthma is a chronic inflammatory disease of the airway, and is a common ambulatory chest disease in children.<sup>[1,2]</sup> The chronic inflammation makes the airways hyperresponsive and labile, leading to variable airway size at different times of the day and in response to various stimuli. This feature of asthma results in periods of exacerbations and remission of symptoms.<sup>[1,2]</sup>

Most commonly, children with asthma presents with episodic cough, wheezing, breathlessness, and chest tightness. The severity of the disease depends on the frequency and

effects of these symptoms and has been classified by Global Initiative for Asthma (GINA) into mild intermittent, mild persistent, moderate persistent, and severe persistent.<sup>[3]</sup>

Chronic inflammation is currently recognized to play a central role in the initiation and propagation of asthma and based on this, several management guidelines are designed with different drugs with and without anti-inflammatory effects. Of all these, corticosteroids have been used worldwide for the treatment of both chronic asthma

### Address for correspondence:

Prof. O. Oviawe,  
Department of Child Health, University of Benin Teaching Hospital,  
Benin City, Edo State, Nigeria.  
E-mail: sonofeto@yahoo.com

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and acute exacerbations, and their benefits are now widely accepted and corticosteroid are now seen as drug of choice.<sup>[3-6]</sup>

Despite the known beneficial effect of steroids, there is an apparent delay in its commencement by physicians treating childhood asthma. This steroid naivety may be due to the fear of side-effects which may include increase in susceptibility to infection, reduction in lung growth,<sup>[7-9]</sup> and most importantly defective linear growth.<sup>[10-14]</sup>

This study sets out to evaluate the practice concerning management of children with asthma in University of Benin Teaching Hospital (UBTH), Benin City at a period when steroid use was uncommon.

### Materials and Methods

Case note of patients aged 5-16 years, managed for asthma and attended the asthma clinic at the UBTH between 1985 and 1995 were retrieved and reviewed in 2010. Information extracted includes age, gender, age of onset of the asthma, drug therapy, and asthma severity level at presentation and 1-year follow-up. Twelve patients that were found to have had corticosteroids during the course of treatment were excluded from the study. Asthma diagnosis and severity level were based on GINA recommendations. The data were entered into Excel version 2007 and later transported to Statistical Package for Social Sciences (SPSS) version 16 for analysis.

### Results

#### Characteristics of the subject

Of the 89 patients reviewed, 77 patients met the criteria for the study. Of these 77, 53 were male patients and 24 female patients, male:female ratio of 2.3:1, whereas the age (Mean ± SD; range) was 8.5 ± 3.13; 5-16 years.

Figure 1 shows the severity of the asthma at presentation and 1 year later. Of 77 subjects at presentation, 48 (62.3%) patients had intermittent, 29 (37.7%) patients had persistent asthma, of these, 25 (86.2%) patients had mild persistent and 4 (13.8%) patients had moderate persistent. None had severe persistent asthma. At 1-year follow-up, 29 (37.7%) patients now had intermittent asthma whereas 44 (57.1%) patients had persistent asthma, of these, 23 (52.3%) patients had mild persistent, 20 (45.5%) patients had moderate persistent, whereas 1 (2.3%) patient had severe persistent asthma.

Figure 2 shows that 48.1% of those patients with asthma got worse and down regulated to other grades. 39% patients showed no change, and only 7.8% patients improved. From the pie chart [Figure 3], 43.8% patients had persistent

asthma, 47.9% patients had no change and 4% patients had incomplete data.

Table 1 shows that majority 72 (93.5%) of the patients at presentation were on β2-agonist alone. At 1-year follow-up, 69 (89.6%) patients were still on β2-agonist alone. From Table 1, other drugs like theophylline were added to the

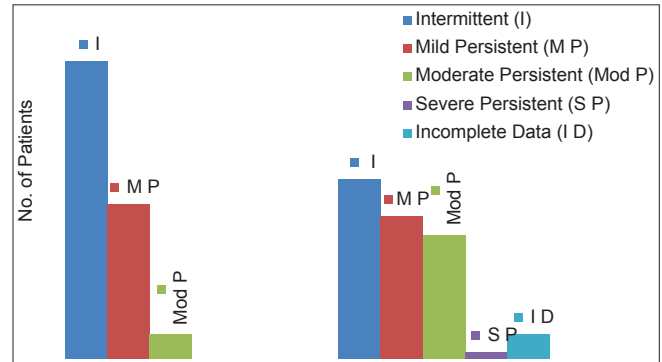


Figure 1: Severity of asthma at various periods

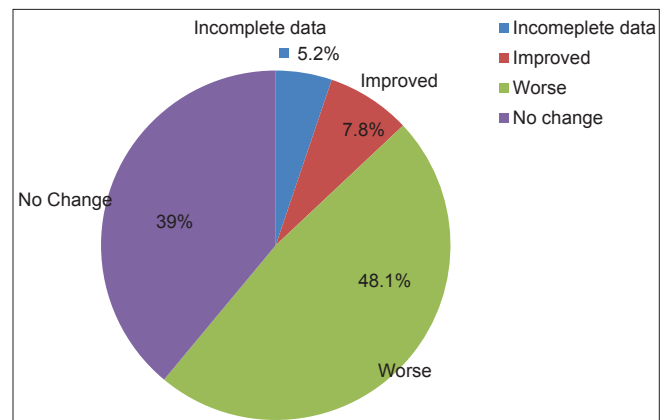


Figure 2: Pattern of change in asthma severity in 77 patients at 1-year follow-up

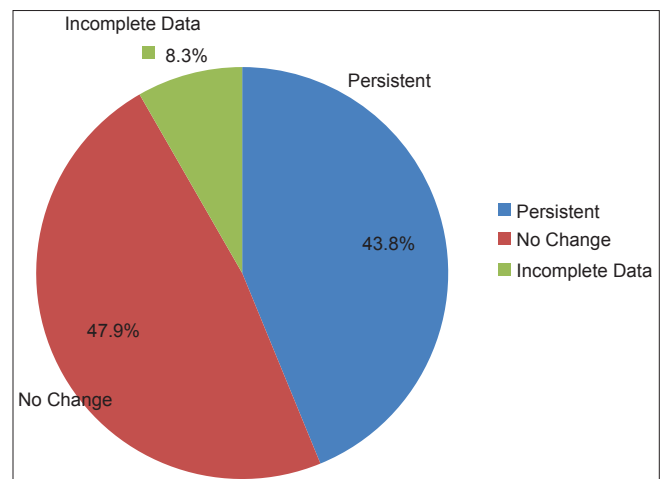


Figure 3: Pattern of change at 1 year in 48 patients who had intermittent asthma at presentation

**Table 1: Medication\* for the asthma at presentation and at 1-year follow-up**

Medication	Onset		1-year follow-up	
	N	%#	N	%#
$\beta_2$ -Agonist	72	93.5	69	89.6
Theophylline	12	15.6	3	3.9
$\beta_2$ agonist plus theophylline	8	10.4	12	15.6
Nil	3	3.9	0	–

\*Multiple medication in some cases, #Based on 77 patients

$\beta_2$ -agonist in 12 (15.6%) at 1-year follow-up compared to 8 (10.4%) patients at presentation.

## Discussion

At presentation, majority of the asthmatic children (48%) of the subjects had mild intermittent asthma, only 29% patients had persistent asthma. It is obvious that at the onset of this evaluation, the intermittent asthma was more common compared to the persistent. However, this changed at 1-year follow-up, with more of the subjects now having persistent type of asthma. What this suggests is that, corticosteroid naïve asthmatic children worsened progressively from intermittent to persistent asthma. Most of these corticosteroid naïve children with intermittent asthma based on the (2002 GINA Guideline) were only given short acting  $\beta_2$ -agonist. From the foregoing, one can speculate that without doing anything about the inflammation, the subjects are likely to down regulate and develop persistent asthma. This trend of progression with or without steroid therapy was demonstrated by Tamesis and coworkers.<sup>[15]</sup> In this study, they claimed that no drug in our current armamentarium, however, has been found to alter the natural progression of childhood asthma nor halt progressive airway damage in the more susceptible children.<sup>[15]</sup>

The index evaluation also revealed that the mode of treatment did not follow the GINA guideline as there was naivety in starting steroids for cases of persistent asthma.<sup>[3]</sup> The reason for this delay in the use of steroids, may be due to fear of known side-effects of steroids. Although topical airway corticosteroid therapy has improved the control of asthma markedly while lessening the risk of corticosteroid side-effects, the use of inhaled corticosteroids continue to be accompanied by a fear of potential adverse systemic effects.<sup>[16-18]</sup> Unfortunately, these fears results in some children being deprived of appropriate and effective treatment or even being exposed to a greater risk of periodic oral corticosteroid treatment.<sup>[16-18]</sup> This finding agrees exactly with our finding in the index evaluation.

Nevertheless, because these agents may be used for a long period of time in a large number of children, safety issues are paramount. Thus, inhaled corticosteroid used

in small doses presents less significant risks for systemic side-effects. Use of higher doses of inhaled corticosteroid and systemic corticosteroids are associated with significant side-effects.<sup>[19,20]</sup>

Furthermore, the finding in this evaluation shows that majority of subjects were on  $\beta_2$ -agonist at onset and at 1-year follow-up, although, some of the subjects that were only on  $\beta_2$ -agonist at onset now had theophylline added at 1-year. This mode of therapy was continued even in the face of worsening severity.

Based on these findings, it is obvious that without doing anything about the inflammation, the subjects are likely to down-regulate and develop persistent asthma. Although, Tamesis and coworkers in their study found that even with steroids, those that are predisposed will still down-regulate,<sup>[15]</sup> some authors have suggested that early intervention with corticosteroids in patients with newly diagnosed asthma is associated with a better preservation of lung function than when steroid treatment is withheld for some years.<sup>[19]</sup> They were of the opinion that if untreated the allergic inflammation would probably lead to chronic changes of the bronchial wall. They argued for an early institution and aggressive treatment with inhaled steroids.<sup>[21,22]</sup> This study showed progressive worsening of the disease over time in steroid naïve patients.

In the management of children with asthma, the beneficial use of steroids in asthmatic children has been known for a long time.<sup>[10-14]</sup> With the increasing knowledge of the side-effects of systemically administered steroids, there has been a steady increase in the use of inhaled steroids, and they are presently considered to be the most important treatment for asthma and have formed the cornerstone for most of the treatment guidelines worldwide.<sup>[10-14]</sup>

It is also shown from this study that more subjects were on  $\beta_2$ -agonist at onset and at 1-year follow-up, even in the face of worsening severity.

## Conclusion

From our study, majority of the children with asthma had mild intermittent asthma at presentation. However, this severity progressed to persistent asthma in majority (57.1%) of patients at 1-year follow-up.

The most common form of persistent asthma from our study is mild persistent asthma at both presentation and at 1-year follow-up. Severe persistent asthma was uncommon in our study.

The severity trend found in this study supported a progressive pathological process which is assumed to be inflammatory in origin.

It is therefore concluded that failure to initiate prompt and sustained corticosteroid therapy may contribute to the severity progression trend.

### Limitation of Study

Due to lack of records, longer periods of follow-up was not possible, this would have enhanced our knowledge on what eventually happened to the subjects in this study.

### Line of Future Research

A possible prospective study designed to compare those that were started on steroids with those on only bronchodilators.

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