

Impact of Bronchial Asthma on the Child's Quality of Life

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ABSTRACT

Background: Asthma is a complex respiratory disease characterized by inflammation and reversible obstruction of the airways that can lead to diverse symptoms such as wheeze, breathlessness, chest tightness, and cough. Asthma affects approximately 350 million people from all age groups worldwide.

Objectives: This study aimed to assess the impact of bronchial asthma on the quality of life among children.

Patients and Methods: This study was carried out on 2763 child as a representative sample of children attending eight primary schools in El Menoufiya Governorate. Four schools of them are located inside Shebin El Koum city the capital of governorate and the other four schools are located in villages around the capital. Children were screened for chest symptoms by a questionnaire.

Results: there was significant relationship between asthma severity and eosinophilia. In intermittent asthma, 21.3% of children had eosinophilia, in mild persistent asthma, 50.9% of children had asthma, in moderate persistent, 70.3% of children had asthma and in severe persistent asthma 90% of children had asthma. The same occurred with increased bronchovascular markings in x-ray as 0% of children with intermittent asthma had bronchovascular markings. This percentage increased to reach 100% in children with severe persistent asthma.

Conclusion: pediatric asthma is considered a one of the most common chronic pediatric chest problems, which has its impact on a child's quality of life. By providing the necessary knowledge and skills, patients and family are encouraged to effectively manage the disease process and improve their quality of life.

Key words: Bronchial asthma, Primary school children, Quality of Life.

INTRODUCTION

Asthma is a complex respiratory disease characterized by inflammation and reversible obstruction of the airways that can lead to diverse symptoms such as wheeze, breathlessness, chest tightness, and cough [1]. Asthma affects approximately 350 million people from all age groups worldwide and causes around 350,000 deaths per year. Although asthma is a lifelong disease, it is considered the most common chronic condition in children, where symptoms are usually more severe [2].

In Egypt, the prevalence of asthma among school children in the Nile Delta region is about 7.7%. Asthma are relatively common in Egypt, and probably under diagnosed and under treated, particularly among children from less wealthy families [3]. Almost 80% of all asthmatic patients report the disease onset before age of 6 years. However, from among all young children with recurrent wheeze, only a few have stable asthma at the end of their childhood. Early childhood asthma risk factors are defined for stable asthma [4]. Asthma prognosis includes major (parent asthma, eczema and inhaler allergy) and minor risk factors (allergic rhinitis, cold wheeze, more than 4% eosinophil and food allergen allergy). Allergies in young children with a frequent cough or wheeze are the strongest risk factor for childhood asthma. The prevalence of asthma is well-connected with the incidence of allergic rhinoconjunctivitis and atopic eczema [5].

The ultimate goals of asthma treatment are to achieve and maintain clinical control, reduce future risks to the patient and enable the patient to lead a life without restrictions due to the disease [6]. The concept of asthma control is central to all asthma guidelines and

the level of control is defined as the extent to which features of asthma are controlled by daily therapy, for example exertional symptoms, night awakening, the use of reliever medication and the ability to carry out daily activities. The longer-term risks for the patient with poor control include asthma attacks, impaired development or accelerated decline in lung function, and side-effects of treatment [7].

Despite the availability of effective medication, many children do not have adequately controlled asthma. This has implications for quality of life (QoL) and daily physical activity, and clearly increases the burden of disease in terms of costs to the family and society. Children with asthma frequently report limitations in activities and sports (reported in $\leq 47\%$ of children with asthma), nocturnal awakening due to asthma ($\leq 34\%$) and absence from school ($\leq 51\%$) [8]. The disease, along its course, evokes varying emotions in children, the negative ones are prevailing. Emotional disorders are experienced by 25-40% of asthmatic children, most often consisting of excessive psychological dependence on the parents and increased anxiety level [9]. Parents often tend to act incorrectly in such situations. They are overprotective, assume rigid attitudes, and get too much involved in other family members' lives [10].

Overprotection impedes the child's emotional development, disturbs the development of self-reliance and independence. Excessive family concentration on the affected child leads to the lack of independence, egocentrism, and infantilism [11]. The child starts to exert pressure on the family, whereas, when separated from the family, he is not self-confident and new situations trigger anxiety reactions. Reducing everyday

duties and permanent supervision of the child result in difficulties in adoption to living in the society^[12]. This study aimed to assess the impact of bronchial asthma on the quality of life among children.

PATIENTS AND METHODS

As an epidemiological study this work was carried out on some primary school children attending eight (8) primary schools in El Menoufia governorate as a representative sample of children for our study.

Criteria of diagnosis of asthma: The diagnosis of asthma is based primarily on history and physical examination. The clinical features include patients' complains and the signs noted on physical examination, are usually sufficient to make the diagnosis of asthma. Investigations are mainly used to confirm the diagnosis of asthma and to grade its severity.

Symptoms: The characteristic symptoms of asthma are cough, wheezing, and dyspnea. Dyspnea is the most common symptoms of asthma.

Signs: physical examination of the respiratory system may reveal no apparently abnormality if the patient is not in asthmatic attack. Wheezing predominantly occurs on exhalation.

Laboratory evaluation: Spirometry remains the best test in patients suspected of having asthma. Because asthma is an obstructive airway disease, a decrease in the absolute value and percent predicted of the forced expiratory volume in 1 second (FEV1) to less than 80% of predicted normal may be present.

Detailed history including personal history, patient complaint, aggravating factors, drug administration, grade of asthma, absenteeism from school, family history and social data.

Complete physical examination to detect clinical signs of bronchial asthma and other allergic conditions.

Chest X-ray: Both postero-anterior and lateral views of the chest were done to exclude other pulmonary pathology such as T.B, foreign body inhalation etc.

Pulmonary function tests were assessed pre- and post-bronchodilator by using β_2 agonist by inhalation route using auto link spirometer Zen L.T.D, Germany.

Ethical consideration:

An informed written consent was obtained from all parents before getting them involved in the study. The steps of the study, the aim, and the benefits were explained in detail to the involved parents. Confidentiality of all data was ensured. An approval of the study was obtained from Menoufia University Academic and Ethical Committee. This work has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

Statistical Analysis

Data collected throughout history, basic clinical examination, and outcome measures were coded, entered and analyzed using Microsoft Excel software. Data were then imported into Statistical Package for the Social Sciences (SPSS version 25.0) (Armonk, NY: IBM Corp, 2018). Descriptive statistics included percentage (%), mean (x) and standard deviation (SD) and analytic statistics included Chi-square test (χ^2). P value ≤ 0.05 was considered statistically significant.

RESULTS

There were no significantly difference between cases group and control group regarding different age group, and sex ($p > 0.05$) (Table 1).

Table (1): Different age group, and sex as a risk factor for asthmatic children.

Variable	Studied groups				Total		χ^2	p-value
	Cases		Control		No	%		
	No	%	No	%				
Age groups:							0.27	> 0.05
6- ≤ 8 years	67	37.1	34	34.0	101	35.9		
> 8- ≤ 10 years	58	32.0	33	33.0	91	32.4		
> 10- ≤ 12 years	56	30.9	33	33.0	89	31		
Total	181	100.0	100	100.0	281	100.0		
Sex:							0.01	>0.05
Male	89	49	50	50.0	139	49		
Female	92	50.8	50	50.0	142	50.5		
Total	181	100.0	100	100.0	281	100.0		

The impact of the disease on the quality of life of asthmatic children as missed school days, disturbed sleep and emergency room visit were the most common impact but delayed growth (below 3rd percentile) were present only in 3.8% of asthmatic children (Table 2).

Table (2): Impact of the disease on the quality of Life.

Impact	Number	%
Disturbed Sleep	79	43.6
Missed School days	86	47.5
Delayed growth	7	3.8
Limitation of Activities	23	12.7
Emergent room visits	32	17.6

Asthmatic children affected significantly on their life style as all items showed significant decrease in P-value like missed school days, disturbed sleep, limitation of activities and emergency room visits (Table 3).

Table (3): Comparison between asthmatic children and control for the effect of asthma on the quality of life

Variable	Studied groups				Total		χ^2	p-value
	Cases		Control		No	%		
	No	%	No	%				
Disturbed sleep:								
Present	79	43.6	3	3.0	82	29.2	49.6	<
Absent	102	56.4	97	97.0	199	70.8		0.0001
Missed school days:								
Present	86	47.5	7	7.0	93	33.1	45.9	<
Absent	95	52.5	93	93.0	188	66.9		0.0001
Delayed growth:							1.0	
Present	7	3.9	1	1.0	8	2.8		< 0.05
Absent	174	96.1	99	99.0	273	97.2		
Limitation of activities:							7.8	< 0.005
Present	23	12.7	2	2.0	5	8.9		
Absent	158	87.3	98	98.0	256	91.1		
Emergency room visits:							18.2	< 0.001
Present	32	82.3	0	0	32	114		
Absent	149	17.7	100	100.0	249	88.6		
Total	181	100.0	100	100	281	100.0	-----	-----

Concerning different treatment modalities, 75 (41.4%) were on β_2 agonist, 56 (30.9%) were on theophylline, 35 (19.3%) were on inhaled steroids, 14 (7.7%) were on oral steroids and 3 (1.6%) were on sodium cromoglycate and Leukotriene modifiers (Table 4).

Table (4): Different types of treatment modalities among Asthmatic children

Treatment	Number	%
B2 – Agonist	75	41.4
Theophylline	56	30.9
Inhaled steroids	35	19.3
Oral steroid	14	7.7
Sodium cromoglycate	1	0.5
Leukotriene modifiers	2	1.1
Multidrug therapy	37	20.44

There was significant relationship between asthma severity and eosinophilia. In intermittent asthma, 21.3% of children had eosinophilia, in mild persistent asthma, 50.9% of children had asthma, in moderate persistent, 70.3% of children had asthma and in sever persistent asthma 90% of children had asthma. The same occurred with increased bronchovascular markings in X-ray as 0% of children with intermittent asthma had bronchovascular markings. This percentage increased to reach 100% in children with severe persistent asthma (Table 5).

Table (5): Relationship of the grade of asthma severity and eosinophillia and increase bronchovascular markings in plain chest X-ray

	Eosinophilia		Broncho vascular marking	
	No	%	No	%
Intermittent asthma	19	21.3	0	0
Mild persistent asthma	28	50.9	13	25.45
Moderate persistent asthma	19	70.3	21	77.77
Severe persistent asthma	9	90	10	100
Total	75	41.4	44	24.86

Regarding the effects of severe asthma on the children, 60% of severe cases showed delayed growth, dyspnea was the most presenting symptoms, 30% had severe obstruction in PFTs, 90% had eosinophilia and 100% showed increased broncho vascular marking in plain chest X-ray (Table 6).

Table (6): Relationship between severe cases and its presenting symptoms, pulmonary function tests (PFTs), eosinophilic count and broncho vascular markings in plain chest X- ray

Severe cases	Presenting symptoms	Delayed growth	PFTs	Eosinophilia	Bronchovascular marking
1	Dyspnea	Yes	Severe obstruction	Yes	Yes
2	Dyspnea	Yes	Moderate obstruction	Yes	Yes
3	Wheezes	No	Moderate obstruction	Yes	Yes
4	Dyspnea	Yes	Moderate obstruction	Yes	Yes
5	Dyspnea	No	Moderate obstruction	Yes	Yes
6	Cough	Yes	Severe obstruction	Yes	Yes
7	Wheezes	Yes	Moderate obstruction	Yes	Yes
8	Dyspnea	No	Moderate obstruction	No	Yes
9	Dyspnea	Yes	Severe obstruction	Yes	Yes
10	Cough	No	Moderate obstruction	Yes	Yes

DISCUSSION

In this study, there were no significant deference between cases group and control group regarding age and sex ($p > 0.05$). **Madkour** ^[13] found that the prevalence was 2.4 % among Heliopolis primary school children in the age group of 6-12 years. However, **Mahmoud et al.** ^[14] reported a prevalence of 3.6% in Benha city in school children aged 5-15 years. **Abdel Latif** ^[15], studied the prevalence of asthma among 2321 secondary school students in Misr El Gedida, Shubra and Abbassia and found that it was 5.6% and both sexes were equal candidates to develop asthma. A study of the prevalence rate of bronchial asthma in school children aged 6-14 years in Alexandria was 18% ^[16].

In our study, we followed the impact of the disease on the quality of life of patients, we found that 79 (43.6%) showed disturbed sleep, 86 (47.5%) had missed school days, 7 (3.8%) had delayed growth, 23 (12.7%) had limitation of activities and 32 (17.6%) had recurrent ER visits. This is in agreement with, **Chugh et al.** ^[17] who reported that asthma is the leading cause of school absenteeism. Approximately 43% of asthmatic patients had history of missed school days. Approximately two-thirds of children with asthma have mild condition, but the other third experience moderate to severe condition. Children with severe asthma are more likely to have affected academic performance. School abstinences may be related to nocturnal problems of asthma, corticosteroids side effects, psychological and social problems, dampness problems, inadequate ventilation and excess indoor exposure to substances such as NO₂ and formaldehyde ^[18].

Regarding nocturnal asthma attacks in this study, we found that 79 (43.6%) of studied children showed history of night symptoms and signs (disturbed sleep). This is in agreement with **Leuppi et al.** ^[19] who reported that among children aged 6-12 years with asthma, 46.9 % of children reported disturbed night sleep?

As regard emergency department, in our study we found that 32 child (17.6%) out of 181 had history of emergency room visits. Similarly, **Palfrey et al.** ^[20] stated that asthma is the most common cause of childhood emergency department visits, hospitalization, and school missed days. On the other hand, **Reynolds et al.** ^[21] reported that 43 % of asthmatic attacks lead to ER visits. Females after puberty visit the ER and are hospitalized for acute asthma twice as often as males. The high prevalence of ER visits may be explained by poor treatment compliance, significantly high pollution, mothers' low educational level, poverty and ignorance.

As regards pattern of growth in our study, 7 (3.8%) had delayed growth. **Turkel and Pao** ^[22] estimate elevated incidence of short stature, skeletal retardation and delayed puberty in children with bronchial asthma or atopic dermatitis. As the local growth factor prostaglandin E₂ (PGE₂), which is important for bone metabolism, is also a messenger substance for the immediate and late allergic reaction. The platelet-activating factor (PAF), as one of the strongest mediators in the pathogenesis of allergic disorders, influences PGE₂ synthesis in the osteoblasts. Other study by **Amano and Morita** ^[23] reported that, no significant major effect of asthma on physical growth, apart from skeletal maturation, which was found to be significantly retarded in asthmatics compared to normal children.

Regarding treatment modalities, 75 patients (41.4%) were on B₂ agonist, 56 (30.9 %) were on theophylline, 35 (19.2%) were on corticosteroid inhaler, 14 (7.7%) were on oral corticosteroid, 3 (1.8%) were on other drugs and 94 (52.3%) were on different drugs combinations.

As regard basic laboratory data, 75 patients (41.4%) showed high serum absolute eosinophilic count (AEC) (>700 cells/mm³). This is in agreement with the work of **Zimmerman** ^[24] where eosinophils were found to be essential elements of inflammation in asthmatic

airways, and that permanent airway reactivity may result from inflammation and eosinophilic activation.

Peripheral eosinophilic levels also have been found to correlate with clinical severity in asthma. Elevated AEC in the blood samples of asthmatic children was demonstrated in several other studies. Pulmonary function tests provided a direct assessment of the degree of airflow limitation. Spirometry remains the best test in patients suspected of having asthma. Because asthma is an obstructive airways disease, a decrease in the absolute value and percent predicted of the forced expiratory volume in 1 second (FEV1) to less than 80% of predicted normal may be present [25].

CONCLUSION

From the results of the present study, we concluded that pediatric asthma is considered one of the most common chronic pediatric chest problems, which has its impact on a child's quality of life. By providing the necessary knowledge and skills, patients and family are encouraged to effectively manage the disease process and improve their quality of life.

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