

# Relation of Asthma Control with Quality of Life among a Sample of Egyptian Asthmatic School Children

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## Abstract

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**BACKGROUND:** Asthma is considered a chronic health illness that not only resulted in physical symptoms but also emotional effects. It is; therefore, so important to assess the quality of life of asthmatic patients besides their level of disease control.

**AIM:** To determine the correlation of asthma control with the health-related quality of life (HRQOL) of asthmatic children in Egypt.

**METHODS:** One hundred and twenty-eight asthmatic Egyptian children were enrolled in the study. They were subjected to asthma severity grading, asthma control questionnaire (ACQ) and pediatric asthma quality of life questionnaire (PAQLQ). Studied cases were taken from 6 primary and preparatory schools, Giza governorate.

**RESULTS:** The mean child control score was significantly higher in not well-controlled asthmatics compared to well-controlled asthmatics ( $p < 0.005$ ). The not well controlled asthmatic children showed significantly lower activity limitation score, symptoms score, and overall asthmatic score compared to controlled asthmatic children ( $p < 0.05$ ). The severity of asthma shows significant positive correlation with symptoms score, emotional function score and overall asthmatic score ( $p < 0.05$ ).

**CONCLUSION:** The quality of life for the asthmatic children is strongly correlated with the level of asthma control and severity.

## Introduction

Asthma is a diverse disease characterized by chronic airway inflammation. It is known by history of respiratory symptoms such as wheeze, shortness of breath, chest tightness and cough that vary over time and in intensity, together with variable expiratory airflow limitation [1]. This disease can spontaneously remit or improve with treatment [2].

It is considered a very common disease in

children and adolescents [3]. It becomes a widespread health problem that affects not only high-income countries; but also, all countries regardless the level of development, on the other hand, most asthma-related deaths occur in low- and lower-middle-income countries [4]. The burden of asthma to governments, healthcare systems, families, and patients is increasing worldwide [5]. It is common in Egypt, and probably underdiagnosed and undertreated, particularly among children from less wealthy families [6].

Asthma is considered to have a negative impact on the daily life activity of children. Asthmatic children, especially those suffering from less disease control, show lower activity than normal children [7].

Asthma puts a serious burden on the child's health-related quality of life (HRQOL), despite the availability of effective and safe treatment [8]. Quality of Life (QOL) is a concept widely used to refer to the subjective wellbeing of individuals. This term is used to refer to individuals' subjective satisfaction with important aspects of their life as their physical and mental well-being, social relationships and individual activities [9]. The Pediatric Asthma Quality of Life Questionnaire (PAQLQ) is one of the most widely used instruments for measuring health-related QoL in children with asthma. The standardised version of PAQLQ contains 23 questions in three domains, i.e., activity limitation, symptoms and emotional function [10].

How bronchial asthma affects the quality of life has been the focus of many published types of research. There was a study which had been done in Nigeria concluded that around a quarter of the children attending asthma clinic were psychologically affected beside the interference of asthma with the daily activities [11]. In the Arab world, many studies revealed that psychosocial aspects of asthma had a significant adverse impact on the quality of life of children [12].

In Egypt, Nowadays, it's of utmost importance to study bronchial asthma effects on patients' quality of life, but unfortunately there is still a lack of this type of studies. Therefore, our aim comes to assess asthma control level and its impact on quality of life of asthmatic children.

## Methods

### Study Population

This study was a cross-sectional study. It was conducted on 128 asthmatic children and adolescents, 7-16 years old, from six primary and preparatory schools, Giza governorate as a part of research project, funded by National Research Centre 10<sup>th</sup> research plan, entitled " Effectiveness of health education program on pulmonary functions and quality of life in Egyptian asthmatic children" during the period from September 2016 to April 2018.

### Inclusion Criteria

Both sexes were represented (males and females).

Registered asthmatic and susceptible cases

(who had a family history of atopy and the child had history of atopy and recurrent respiratory tract infections then diagnosed by us as bronchial asthma) were picked up from the school medical records with the help of the school medical staff (school doctors and nurses).

### Exclusion criteria

- The child with an acute disease including upper or lower respiratory tract infections.
- The child with history of congenital heart disease, documented immunodeficiency, rheumatologic disease, cystic fibrosis, renal dysfunction or congenital anomaly.
- Use of systemic steroids for an indication other than asthma.
- Children with mental disease or neurological disability.
- Any child whose parent refuse to give informed consent.

### Site of study

The Pediatric Pulmonary Function Testing Clinic at the Medical Research Centre of Excellence (MRCE), National Research Centre (NRC).

### Each child was subjected to:

- Full medical history and examination are laying stress on sociodemographic characteristics of the children.
- Anthropometric measurements [13] in the form of:
  - Height: was measured using Harpenden stadiometer.
  - Weight: was measured by the Tanita scale.
  - BMI: was calculated according to the equation:

$$\text{BMI} = \text{Wt (kg)} / \text{Ht}^2(\text{cm}^2)$$

- Evaluation of Asthma Control: Validated Arabic version of the asthma control questionnaire (ACQ) was used [14].

### Asthma control questionnaire (ACQ)

The 6-item Asthma Control Questionnaire (ACQ-6) had been used to measure the objectives of asthma treatment as defined by international guidelines (minimisation of day- and night-time symptoms, activity limitation,  $\beta$ 2 agonist use and bronchoconstriction). Responses are given on a 7-point scale, and the overall score is the mean of the

responses (0 = totally controlled, 6 = severely uncontrolled) [15].

Developmental studies have established the cutoff points for controlled asthma  $ACQ \leq 1.5$  and not well controlled asthma  $ACQ \geq 1.5$  [16]

- Assessment of Quality of Life: Validated Arabic version of Pediatric asthma quality of life questionnaire (PAQLQ) [17].

### **Asthma Severity [18]**

Asthma severity is determined before initiating therapy retrospectively by history, spirometer and peak flow by analysis of the following points: symptoms; nocturnal awakenings; rescue medication use; activity limitation; and  $FEV_1$ .

According to EPR-3 divides asthma severity into four groups: intermittent, mild persistent, moderate persistent, and severe persistent.

Intermittent asthma is characterised as follows:

- Symptoms of cough, wheezing, chest tightness, or difficulty breathing less than twice a week;
- Flare-ups are brief, but the intensity may vary with no symptoms in between;
- Nighttime symptoms less than twice a month;
- Lung function test  $FEV_1$  is 80% or more above normal values;
- Peak flow has less than 20% variability.

#### *Mild persistent asthma:*

- Symptoms of cough, wheezing, chest tightness, or difficulty breathing 3-6 times a week
- Flare-ups may affect the activity level
- Nighttime symptoms 3-4 times a month
- Lung function test  $FEV_1$  is 80% or more above normal values
- Peak flow has less than 20-30% variability

#### *Moderate persistent asthma:*

- Daily symptoms of cough, wheezing, chest tightness, or difficulty breathing
- Flare-ups may affect child activity
- Nighttime symptoms five or more times a month
- Lung function test  $FEV_1$  is above 60% but below 80% of normal values
- Peak flow has more than 30% variability
- Severe persistent asthma:

- Continues symptoms of cough, wheezing, chest tightness, or difficulty breathing
- Frequent nighttime symptoms
- Lung function test  $FEV_1$  is 60% or less of normal values
- Peak flow has more than 30% variability

### **Pediatric asthma quality of life questionnaire (PAQLQ)**

It measures the functional (physical, emotional, occupational and social) problems that are most troublesome to children with asthma. PAQLQ has 23 questions in three domains (symptoms, activity limitation and emotional function). Each question had a 7-point scale (7 = no impairment, 1 = severe impairment). The number of questions in each domain is as follow Activity limitation: 5 (2 generics, 3 patient-specific), Symptoms: 10 and Emotional function: 8. The 23 questions in the PAQLQ are divided into 3 domains: Activity limitation: in questions 1, 2, 3, 19, 22. Symptoms: in questions 4, 6, 8, 10, 12, 14, 16, 18, 20, 23. Emotional function: in questions 5, 7, 9, 11, 13, 15, 17, 21. Individual questions were equally weighted. The overall PAQLQ score was the mean of the responses to each of the 23 questions. The resultant overall score would be between 1 and 7. The domains were analysed in the same way (the domain scores were also the mean values for the items in each domain). So that the score of each domain would also be between 1 and 7 [19]

### **Statistical analysis**

Collected data were coded, tabulated, and statistically analysed using statistical package for social sciences software, SPSS version 24. Descriptive statistics were performed for quantitative parametric data as mean  $\pm$  SD, whereas they were performed for qualitative data as number and percentage. Independent sample T-test was used to compare two means. Pearson's correlation was used to correlate variables. The level of statistical significance for all tests was set at  $p < 0.05$ . Otherwise, the tests were considered insignificant.

### **Compliance with ethical standards**

- This study was approved by the Medical Research Ethical Committee of NRC with approval number 16/381. Written informed consent from both parents and oral informed consent from children were taken after full explanation of the study protocol.

- There is no conflict of interest to disclose.

Our study was funded by the National Research Centre as a part of research project 10<sup>th</sup> research plan, entitled "Effectiveness of health

education program on pulmonary functions and quality of life in Egyptian asthmatic children”.

## Results

The total number of asthmatic children was 128. Fifty-eight (45.3%) were males, and seventy (54.7%) were females. They were referred from 6 primary and preparatory schools in Giza governorate and followed up in the Pediatric Pulmonary Function Testing Clinic at the Medical Research Centre of Excellence (MRCE), National Research Centre (NRC).

Table 1 shows the clinical data of asthmatic children. There is a high percentage of potential exposures to smoke (82.8%) and artificial feeding (71.1%) among asthmatic children.

**Table 1: Clinical data of asthmatic cases**

	No	%
Gender		
Male	58	45.3
Female	70	54.7
History of allergy	44	34.4
Potential exposures to smoke	106	82.8
Positive consanguinity	10	7.8
Household pets	0	0
Mode of delivery		
Normal	56	43.7
CS	72	56.3
Type of feeding		
Breastfeeding	10	7.8
Artificial feeding	91	71.1
Mixed	27	21.1

According to the asthma control questionnaire (ACQ), 76 (59.4%) of cases were classified as not well-controlled asthmatics and 52 (40.6%) as well-controlled asthmatic children.

Anthropometric data and quality of life scores in well-controlled asthmatic versus not well controlled asthmatic children are shown in Table 2. No significant difference was found between well-controlled asthmatic and not well controlled asthmatic children in age, weight, height and BMI.

**Table 2: Quality of life scores in well-controlled asthmatic versus not well controlled asthmatic children**

	Well Controlled asthmatic (No = 52)	Not well-controlled asthmatic (No = 76)	t	p
Age in years	9.86 ± 3.51	9.92 ± 3.43	-0.057	0.955
Weight in Kg	39.90 ± 14.66	38.42 ± 14.63	0.382	0.704
Height in cm	140.33 ± 17.92	137.78 ± 19.57	0.517	0.607
BMI	19.31 ± 3.97	19.48 ± 3.74	-0.163	0.871
mean child control score	0.96 ± 0.74	2.83 ± 1.08	2.877	0.000**
Activity Limitation Score	5.48 ± 1.53	4.17 ± 1.06	1.994	0.042*
Symptoms Score	5.28 ± 1.31	4.13 ± 1.69	2.761	0.008*
Emotional Function Score	5.48 ± 1.43	4.61 ± 1.85	1.921	0.060
Overall asthmatic child Score	5.34 ± 1.37	4.26 ± 1.63	2.606	0.012*

\*Significant at  $p < 0.05$ ; \*\*highly significant at  $p < 0.005$ .

The mean child control score was found significantly higher in not well-controlled asthmatics compared to well-controlled asthmatics ( $p < 0.005$ ). The not well controlled asthmatic children showed significantly lower activity limitation score, symptoms

score, and overall asthmatic score compared to controlled asthmatic children ( $p < 0.05$ ).

Table 3 shows the correlations between asthma severity and quality of life scores in asthmatic children. The severity of asthma shows a significant negative correlation with symptoms score, emotional function score and overall asthmatic score ( $p < 0.05$ ).

**Table 3: Correlations between asthma severity and quality of life in asthmatic children**

		Activity limitation score	symptoms score	Emotional function score	overall asthma score
Intermittent Vs. Mild / Moderate persistent	Pearson Correlation	-0.360	-0.275*	-0.434*	-0.423*
	Sig. (2-tailed)	0.091	0.042	0.039	0.044

Table 4 shows the correlations between asthma severity and history of allergy of asthmatic children. The severity of asthma shows a significant positive correlation with history of allergy ( $p < 0.05$ ).

## Discussion

Bronchial asthma prevalence worldwide among children is having a steadily increase during the last two decades. Asthma prevalence among Egyptian children aged 3-15 years was estimated to be 8.2% [20]. It is considered as the most common chronic inflammatory disease in childhood. It is estimated that about 40% of all young children have at least one episode of asthmatic symptoms like wheezing, coughing, and dyspnea [21]. People with asthma report impact on the physical, psychological and social domains of quality of life [22]. The Pediatric asthma quality of life questionnaire (PAQLQ) is fully validated to be used in both clinical trials and clinical practice. It is composed of the daily problems and limitations, which the majority of asthmatic children are suffered from. It contains both discriminative properties (reliability and cross-sectional validity) and strong evaluative properties (responsiveness and longitudinal validity) [23].

In this study, we had found that the not well controlled asthmatic children showed significantly higher mean child control score and lower activity limitation score, symptoms score, and overall asthmatic score compared to controlled asthmatic children. This means that Health-related quality of life (HRQOL) was affected by the level of asthma control especially the physical activity as engagement in sports and exercises. This agrees with El Gendi et al., [24], which was done in Benha, Egypt with a sample size of 125 pair (asthmatic child and his caregiver). On the other hand, we didn't find any significant difference between the two asthmatic groups about the emotional function score which may be due to small sample size this is opposite to what had been

found in study results of La Scala et al., [25] despite their sample was 56 but they were assessed at least twice at different times, their study took place at Department of Pediatrics of Universidad Federal de São Paulo, Brazil. They found a significant difference in the emotional score that means an asthmatic child is in need not only for medical treatment but also needs psychological consultation.

Our study revealed that there was a significant negative correlation between asthma severity and symptoms score, emotional function score and overall asthmatic score ( $p < 0.05$ ) which implies that when asthmatic children suffering from high grades of severity, they had a negative impact on their HRQOL, according to our results, specifically on their emotions and symptoms. Those findings go with Sawyer et al., the study [26] which besides our study they included children with severe asthma then recorded that children in the moderate/severe asthma group had a worse level of functioning in many domains of their HRQL than children in the mild asthma group. This gives a clue that there may be a dose  $\pm$  response' relationship between the frequency and intensity of children's asthma symptoms and their level of functioning in several areas of their HRQL.

This study had shown a significant positive correlation between asthma severity and history of allergy; really this combination has become a common trouble nowadays as most of the studies had confirmed that allergy is always strongly connected with the grade of asthma severity [27], [28]. One of the limitations of this study was the length of our questionnaires which were time-consuming for students; in turn, this affects the number of patients in the present study. Another limitation is related to its cross-sectional design, and hence the long-term effects of asthma on QOL of asthmatic children could not be evaluated.

In conclusion, this study showed that the most affected quality of life scores for asthmatic children was the activity limitation score and symptoms score. Recently, we need to use Pediatric asthma quality of life questionnaire (PAQLQ) more in regular treatment and follow up of children with asthma.

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