Psychosocial Profile and Quality of Life in Children with Bronchial Asthma; A Comparative Study of Self Reports and Parent Proxy Reports of Peds QI™ Inventory

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ABSTRACT *Background:* Health-related quality of life (HRQL) is classically defined as "the functional effects of a disease and of its ensuing therapy on a patient as perceived by the patient himself". It is crucial to be considered in management of chronic diseases; asthma included. Objectives: Evaluation of the psychosocial profile and caregivers' perception compared to children's perception of HRQL of an Egyptian sample of children with bronchial asthma Methodology: The current case control study comprised 8-12 years old 40 Egyptian children and their caregivers (their mothers); 20 known asthmatics of both sexes as Group I and 20 clinically physically healthy children of comparable age and sex and their caregivers (their mothers) as controls (group II). Full clinical assessment, pulmonary function testing, psychometric evaluation, and assessment of Pediatric Quality of Life using an Arabic validated version of PedsQL™ Inventory both Child Self Report and Parent Proxy Report were carried out for all enrolled children. *Results:* Total HRQOL score and all its sub-scores (both child and parental reports) were significantly lower in asthmatics compared to controls. HRQOL total score was negatively correlated with anxiety and depression scores and positively correlated with FEV1 and FEF 25%-75%. Moreover, caregivers reported significantly lower scores of the total HRQOL as well as its all assessed sub-scales compared to their asthmatic children self reports. Conclusion: childhood asthma has lead to significant lowering of the total HRQOL and all its sub scales in the studied Egyptian sample of asthmatic children with worse caregivers' perception compared to their asthmatic children's perception.

1.Introduction

1.1.Background

Asthma is one of the most frequent chronic diseases in children and young people, and it presents an important public health problem as it is a major cause of hospitalization and interferes with the normal activity of families and their quality of life. The prevalence of asthma has doubled in the last two decades in developed countries. The World Health Organization (WHO) estimated that 150 millions of individuals have asthma and that its pathology is responsible for 180,000 deaths every year worldwide [1]**.**

Bronchial asthma impairs not only respiratory functions, but also physical, social, and emotional components of life. The severity of disease is usually assessed using clinical criteria and measuring objective pulmonary functions [2]**.** The Global Strategy for Asthma Management and Prevention states that the integral management of this disease should attempt to control the symptoms, maintain normal lung function, and prevent future complications. Another important objective in the treatment of this pediatric chronic disease is to maintain a good quality of life in patients and their caregivers [3]**.**

Health-related quality of life is classically defined as "the functional effects of a disease and of its ensuing therapy on a patient as perceived by the patient himself". It has become an increasingly important issue in the management of asthma as it is often used to evaluate the effectiveness of antiasthma drugs [4] and it is one of the results that should be considered in clinical trials on asthma

[5]**.** Furthermore, *Hawthorne et al., (1999)* [6] and *Sanjua et al., (2002)* [7] found that HRQOL assessment in asthma is a more responsive outcome measure than spirometry as it facilitates the evaluation of efficacy of medical interventions and also detection of groups at risk for psychological or behavioral problems.

1.2.Problem definition

HRQOL is claimed to be unique to each individual and influenced by his perception of disease. Furthermore, pediatric bronchial asthma represents a special situation in which the sick child is not suffering from his chronic disease, both physically and psychologically, alone but his caregivers are expected to suffer as well.

1.3.Study objectives

The current study was designed to evaluate the psychosocial profile and HRQOL of an Egyptian sample of children with bronchial asthma comparing caregivers' with children's perception of HRQOL as well as with age and sex matched healthy controls.

2.Study design & research methodology

The current case control study was carried out in accordance to the code of ethics of the *World Medical Association (Declaration of Helsinki, 1989)* [8] for experiments involving humans. Written informed consent of legal caregivers of enrolled children was taken and the study protocol was approved by Ain Shams Faculty of Medicine Ethical Committee.

2.1.Participants:
Forty, 8-12 years old, Egyptian children and their caregivers (the mothers) who agreed to participate in the study after explaining its objectives to them, were enrolled. They were consecutively recruited from children attending Children's Hospital, Ain Shams University. They were classified into the following groups:

Group I (Asthmatic children):
It included 20 children, 15 males (75%) and 5 females (25%) and their mothers. The mean age of enrolled children was 10.35±1.39 years. They were consecutively recruited from patients attending the Chest Clinic, Children's Hospital, Ain Shams University for follow up. They were all diagnosed to have asthma according to the definition of *GINA guidelines, (2009)* [9], which are: repeated history of wheezing, shortness of breath, and nocturnal cough. Asthmatic children with any concomitant physical illnesses or handicaps were excluded from the study.

Group II (controls):
It included 20 healthy children and their mothers; consecutively recruited from children attending the Outpatient Clinic, Children's Hospital, Ain Shams University for growth monitoring or regular check-up. They were 12 males (60%) and 8 females (40%) and their mean age was 9.70±1.42 years.

2.2.Procedure:
All enrolled children were subjected to the following:
Thorough clinical history taking laying stress on age at onset of asthma, frequency of acute attacks, nocturnal symptoms, drug therapy, hospitalization frequency, and degree of clinical severity.
Full clinical examination with special emphasis on complete chest and all body systems' examination to settle asthma diagnosis and exclude any concomitant physical illnesses or handicaps.

Questionnaires and instruments:
- **Psychosocial function assessment** using an Arabic validated version of Pediatric Symptom Checklist (PSC) [10]. The PSC is a psychosocial screen designed to facilitate the recognition of pediatric cognitive, emotional, and behavioral problems so that appropriate interventions can be initiated as early as possible. It consists of 35 items that are rated as "Never," "Sometimes," or "Often" present and scored as 0, 1, and 2, respectively. The total score was calculated by adding the score for each of the assessed 35 items. For children ages 6 -16 years, a cutoff score of 28 points from total 70 points or higher indicated psychosocial impairment (PSI). If four or more items were left blank, the questionnaire was considered invalid. A positive total score on the PSC suggests the need for further evaluation by a qualified health or mental health professional as both false positives and false negatives occur [11,12,13].
- **Self- esteem score assessment** using **El-dosoky (2000)** Arabic validated Self Esteem Scale [14] which consists of 25 items covering a variety of domains namely school performance, relation to peers, and relation to family members. Each item was rated on a scale of 0 (no), 1(yes). A cut-off value ≤15 was indicative of the child's poor (negative) self-esteem.
- **Assessment of depression score** using **Ghareeb (1998)** Arabic validated Children depression Inventory (CDI) [15] which consists of 27 items covering symptoms of pediatric depression in five factor areas, including 'Negative Mood,' 'Interpersonal Problems,'

'Ineffectiveness, 'Anhedonia,' and 'Negative Esteem' . Each item was rated on a scale of 0 (not true), 1(sometimes), 2(often true). A cut-off value ≥14 was indicative of the child's clinically manifest depression.
- **Assessment of anxiety score** using **Abd Ellateef and Moustafa (1991)** Arabic validated Anxiety scale [16] which consists of 36 items covering a variety of fields namely social dysfunction, degree of activity, mentality disorders, and physiological dysfunction. Each item was rated on a scale of 0 (no), 1(yes). A cut-off value ≥14 was indicative of the child's clinically manifest anxiety.
- **DSM IV TR (2000)** [17,18] diagnostic criteria were used to settle or exclude the diagnosis of any suspected pediatric mental disorder.
- **Assessment of Socioeconomic Standard** using **Elshakhs (2006)** Arabic validated scale [19] which consists of 5 items including Parents' occupations, educational level , and family income. The scores were interpreted as follows: 10-19= very low, 20-29 = low, 30-39 = sub moderate, 40-48 = moderate, 49-58 = over moderate, 59-68 = high, 69-77 = very high.
- **Assessment of Pediatric Quality of Life** using the Arabic validated version [20] of PedsQL™ Inventory both Child Self Report and Parent Proxy Report [21]. The PedsQL™ Scales include parallel child self-report and parent proxy-report formats. The instructions ask how much of a problem each item has been during the past one month. The PedsQL™ is made up of 23 items covering five health domains: physical functioning, emotional functioning, social functioning, school functioning, and general well-being. There are two summary scores: psychosocial health summary score (emotional, social, and school functioning summary score) and a total summary score. Each item has a 0–4 scale (0 = never a problem; 1 = almost never a problem; 2 = sometimes a problem; 3 = often a problem; 4 = almost always a problem). Items were reverse-scored and linearly transformed to a 0–100 scale (0 = 100, 1 = 75, 2 = 50, 3 = 25, 4 = 0), i.e. higher scores indicate better HRQOL.

Pulmonary function tests:
Pulmonary function tests were performed using MIR Spiro bank [22] which is a multifunction pocket spirometer that can operate as a stand-alone pocket spirometer, or connected with a personal computer. It measures both flow and volumes by infrared mini flow sensors.

Figure (1): MIR Spiro bank [22]

There was an automatic correction of the inspired volumes and flow as the machine has an internal temperature sensor and the body temperature and pressure saturated with water vapor (BTPS) values were then calculated by the set itself. Parameters measured were:

- FVC: Forced vital capacity
- FEV1: Volume expired in the 1st second of test
- FEV1%: FEV1/FVC X 100
- FEF25-75: Mid- flow 25%-75% of FVC.

After switching on the set and selecting the mode of the

spirometry, the participants' data were introduced which included age in years, height in cm, weight in kg, and sex either male or female. The European respiratory society (ERS) predicted values were used in this search [23].

2.3. Data analysis:

Analysis of the obtained data was done by IBM computer using **SPSS (statistical program for social science version 16)** [24] as follows: description of quantitative variables as means, SDs, and ranges and description of qualitative (categorical) variables as numbers and percentages. Chi-square test was used to compare qualitative (categorical) variables between groups. Unpaired t-test was used to compare quantitative variables. Spearman Correlation co-efficient "r" test was used to rank quantitative variables versus each other positively or inversely. At the study sample, the calculated study power was 0.80. Results were considered statistically insignificant at p>0.05, significant at p<0.05, and highly significant at p<0.01.

3. Results

Enrolled asthmatic children (group I) and controls (group II) were well matched as regards age and sex distribution (p> 0.05 for both). The frequency distribution of different socioeconomic standards of studied cases and controls are shown in **Figure (2)**. On the other hand, studied asthmatics had significantly higher prevalence of psychosocial impairment, clinically manifest depression and anxiety, and poor self esteem compared to controls; p<0.01 for all (**Table 1 & Figure 4**). Also, studied asthmatics had significantly lower mean values of socioeconomic standard scale score and self esteem score and higher mean values of PSC, children depression inventory, and anxiety scale scores compared to controls; p<0.01 for all; **Table (2).**

Classification of studied asthmatic children according to disease severity showed 5 of them had mild persistent asthma (25%), 12 had moderate persistent asthma (60%), and 3 had severe persistent asthma (15%); **Figure (3).** Furthermore, asthmatics had lower mean values of all the performed pulmonary function tests but the reduction was statistically significant only for FEV1 and FEF 25%-75%; **Table (2) & Figure 6.**

Mean values of total score of self reported HRQOL was significantly lower in studied asthmatics and their caregivers compared to controls and their caregivers respectively; **Table (3) & Figure (5).** Furthermore, mean values of physical, emotional, social, school, and psychosocial functioning sub scores of HRQOL were all significantly lower in studied asthmatics and their caregivers compared to controls and their caregivers. On the other hand, the asthmatic children proxy reports of the total HRQOL score and all its functioning sub scores were worse compared to their children' self reports; **Table (3).**

FEV1 and FEF 25%-75% of studied asthmatics showed significant positive correlations with total HRQOL score and its social and psychosocial functioning sub scores, i.e. the worse these pulmonary functions, the worse the total HRQOL score and its social and psychosocial functioning sub scores. On the other hand, the total HRQOL score was significantly positively correlated with all its functioning sub scores while it was negatively correlated with both the depression and anxiety scores i.e. the lower the total HRQOL score, the higher the depression and anxiety scores and vice versa. Meanwhile, the older the asthmatic child, the more his depression and anxiety scores, the lower his total HRQOL score and its physical, social, and school functioning sub scores; **Table (4).**

Interestingly, it has been also proven that the more the depression score, the lower the self esteem score, the socio-economic standard score, the total HRQOL score, and its emotional, social, and psychosocial functioning sub scores, the higher the anxiety score, and the more the psychosocial impairment. On the other hand, the more the anxiety score, the lower the total HRQOL score, and its emotional, social, school, and psychosocial functioning sub scores, and the more the psychosocial impairment. Lastly, but by no means least, the lower the self esteem score, the lower the HRQOL school functioning sub score and vice versa; **Table (4).**
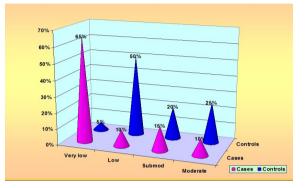

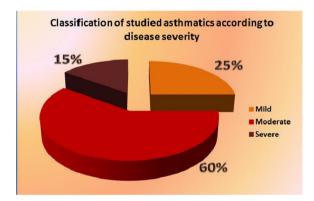**Figure (2)**: The frequency distribution of different socioeconomic standards of studied cases and controls.

Figure (3): Classification of studied asthmatics according to disease severity

Table (1) Statistical comparison between enrolled asthmatics and controls concerning the prevalence of psychosocial impairment, clinically manifest depression and anxiety, and poor self esteem

Group Variables	Group I Asthmatic children (No = 20)		Group II Controls (No =20)		P*
	No	%	No	%	
Psychosocial impairment	18	90	6	30	<0.01
Clinically manifest depression	17	85	7	35	<0.01
Clinically manifest anxiety	17	85	5	25	<0.01
Poor self esteem	20	100	9	45	<0.01

Chi square test* was used for comparison between studied asthmatic children and controls

P< 0.01 = Statistically highly significant

Table (2): Statistical comparison between enrolled groups as regards the mean values of the measured psychometric scores and pulmonary function tests:

Group Variables	Group I Asthmatic children (No = 20) Mean ±SD	Group II Controls (No =20) Mean ±SD	P*
Socioeconomic Standard Score (SESS)	22.92 ± 9.96	30.73 ± 9.29	<0.01
Pediatric Symptom Checklist (PSC) score	35.65 ± 6.94	20.40±10.37	<0.01
Children Depression Inventory (CDI) score	20.45 ± 6.25	12.00 ± 6.18	<0.01
Self-esteem scale (SES) score	9.9 ± 2.60	14.35 ± 11.19	<0.01
Anxiety scale score	19.50±4.03	11.55 ± 4.01	<0.01
Total HRQOL	46.46±11.38	75.87±13.15	<0.01
FEV1	83.10 ± 8.35	90.50 ± 6.38	<0.01
FVC	81.65 ± 9.03	82.75± 8.42	>0.05
FEF 25%-75%	72.55± 17.16	84.75± 13.17	<0.05
FEV1%	86.22±10.65	90.59± 8.99	>0.05

t = independent t-test was used for statistical comparison
P>0.05 = Statistically insignificant
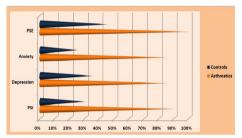P< 0.05 = Statistically significant, P< 0.01 = Statistically highly significant

Figure (4) prevalence of psychosocial impairment (PSI), clinically manifest depression and anxiety, and poor self esteem (PSE) in studied asthmatic children compared to controls
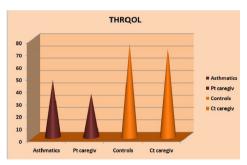

Figure (5) Diagrammatic representation of the mean scores of the THRQOL of studied asthmatics and their caregivers compared to those of controls and their caregivers
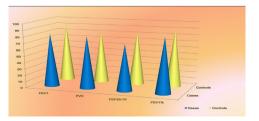

Figure (6): Diagrammatic representation of the mean scores of the measured pulmonary function tests of studied asthmatics compared to controls

Table (3): Statistical comparison between asthmatics, their caregivers, controls, and their caregivers concerning total score and sub scores of HRQOL:

Group Variables	Group I Asthmatic children (No = 20) Mean ±SD	Caregivers of Asthmatic children (No = 20) Mean ±SD	Group II Controls (No =20) Mean ±SD	Caregivers of Controls (No = 20) Mean ±SD
Physical functioning	37.18±12.37	27.65±10.98	76.10±15.78	68.75±22.90
Emotional functioning	51.75±11.84	44.25±8.78	71.50 ± 19.13	66.00±15.86
Social functioning	65.50 ± 15.38	52.50±14.00	79.00 ±12.63	84.50±15.80
School functioning	37.00±21.05	27.25±19.57	77.05±14.50	72.50±18.17
Psychosocial summary score	51.25±13.05	40.23±9.91	75.73±13.24	74.33±12.65
Total HRQOL score	46.46±11.38	35.27±9.48	75.87± 13.15	71.91±15.69

Statistical Significance	Physical P	Emotional P	Social P	School P	Psychosocial P	Total HRQOL P
Asthmatics VS Controls	<0.01**	<0.01**	<0.01**	<0.01**	<0.01**	<0.01**
Asthmatics VS Their caregivers	<0.05*	<0.05*	<0.01**	<0.05*	<0.05*	<0.01**
Caregivers of asthmatics VS caregivers of controls	<0.01**	<0.01**	<0.01**	<0.01**	<0.01**	<0.01**

t = independent t-test was used for statistical comparison,
P>0.05 = Statistically insignificant
P< 0.05 = Statistically significant*, P< 0.01 = Statistically highly significant**

Table (4): Statistically significant recorded correlations between different studied quantitative variables for asthmatic children:

1st variable	2nd variable	r	p	1st variable	2nd variable	r	p
FEV1	social	0.540	0.014*	FEF 25%-75%	social	0.541	0.014*
	psychosocial	0.527	0.017*		psychosocial	0.484	0.033*
	Total HRQOL	0.510	0.022*		Total HRQOL	0.479	0.031*
Age	physical	-0.612	0.004*	Total HRQOL	physical	0.638	0.002**
	social	-0.481	0.032*		emotional	0.450	0.047*
	school	-0.449	0.0*47		social	0.888	0.0001**
	Depression score	0.543	0.012*		school	0.861	0.0001**
	Anxiety score	0.452	0.046*		psychosocial	0.941	0.0001**
	Total HRQOL	-0.556	0.011*		Depression score	-0.590	0.006**
Depression score	PSC score	0.644	0.002**		Anxiety score	-0.561	0.01*
	Self esteem score	-0.546	0.013*	Anxiety score	PSC score	0.793	0.0001**
	Anxiety score	0.578	0.008**		emotional	-0.501	0.024*
	Socioeconomic standard score	-0.508	0.022*		social	-0.602	0.005**
	emotional	-0.584	0.007**		school	-.0490	0.028*
	social	-0.661	0.002**		psychosocial	-0.681	0.001**
	psychosocial	-.0656	0.002**	Self esteem score	school	0.464	0.039*

"r" = Spearman Correlation co-efficient
P < 0.05 = Statistically significant, P< 0.01 = Statistically highly significant

Significant negative correlation
Significant positive correlation

Discussion

In the past, only clinical and physiological measures were used to assess the effects of asthma intervention while its impact on patients' life was not determined. Clearly, regardless of the age, gender, or race, asthma interferes negatively with social life [1]. In fact, not only social life will be negatively affected by bronchial asthma as a chronic illness but also the patient's mental state. The presence of a chronic medical condition appears to increase the likelihood of experiencing a mental health problem, with research demonstrating higher rates of both anxiety and mood disorders in samples of people with medical problems compared to the general population [25,26]. Consequently, asthma negatively influences the quality of life of the patients who suffer from it and the most severe forms of the disease are associated with a worse quality of life [27,28]. So, the current study was designed to investigate the psychosocial profile and HRQOL of an Egyptian sample of children with bronchial asthma comparing asthmatic caregivers' with their children' perception of HRQOL as well as with age and sex matched healthy controls.

Analysis of the collected data of our study showed that enrolled asthmatics had significantly lower mean values of socioeconomic standard scale score and more prevalent very low socioeconomic standard compared to controls taking in consideration that children attending different clinics of Children's Hospital, Faculty of Medicine, Ain Shams University are nearly belonging to the same socioeconomic, environmental, and cultural backgrounds**.** Similarly, in a study of 4,300 7–15-yr-old males in Saudi Arabia, a wealthy gulf country, lower monthly family income was also associated with more prevalence of having asthma and in general the symptom prevalence was lower than that found in Cairo but the prevalence of physician diagnosed asthma was higher. This was attributed to variations in healthcare statistic reports between the two countries [29]**.** Likewise, **Georgy et al (2006)** [30] demonstrated a significant association between lower socioeconomic status and asthma symptoms, with both higher prevalence and severity found in the lower socioeconomic group and also reported that people from lower-income families were 1.5 times as likely to have had wheeze during the last year and twice as likely to have had severe symptoms as people from a higher socioeconomic background.

For further demonstration of the impact of the socioeconomic status and environmental conditions on asthma, asthma studies in Chicago (IL, USA) have found that the disease is more prevalent and severe in inner cities than in the rest of the country [31]. Also, a study in Norway found that markers of low socioeconomic status were associated with asthma in young children [32] and within Israel, comparisons between Arab and Jewish children found that Arab children have double the prevalence rate for current wheeze of Jewish children (20.7 versus 10.1%). This is in an environment where the Arab community tends to be poorer and have worse living conditions than the Jewish community [33].

In the current study, asthmatics had significantly higher prevalence of psychosocial impairment, clinically manifest depression and anxiety, and poor self esteem compared to controls. Also, they had significantly lower mean value of self esteem score and higher mean values of PSC, children depression inventory, and anxiety scale scores compared to controls. Such poor self esteem, psychosocial impairment, and higher depression and anxiety scores in studied asthmatic children (of whom 75% had moderate and severe persistent asthma) could be attributed to repeated hospitalization and absence from school leading to poor academic performance and limited activities because of possible asthmatic attacks during exercise. Consequently, they might fear or refuse to exercise, or feel inadequate when playing sports, and subsequently form a negative self-evaluation and poor self image, which probably impaired their physical and psychosocial development and increased their susceptibility for developing clinically manifest anxiety and or depression.

Studies generally indicated that children with chronic illness (such as cancer, diabetes, and especially asthma) are at a high risk for adjustment problems, such as negative self-concepts [34-37]**.** Even though some studies comparing self-concept in children with asthma and their healthy peers have had inconsistent results but with an overall empirical evidence that children with asthma have poorer self concepts than controls [36].

McNelis and his associates (2000) [38] studied 134 asthmatic children and their results have suggested that some children with severe asthma, especially girls, appear to be at risk for poor self-concept. Similarly, **Shu-Chen and colleagues (2005)** [39] studied 150 subjects, of which 50 had asthma and 100 were healthy. Asthmatic school children in their study showed significantly lower self concepts and had a poorer self image reflection than healthy school children with a significant relationship between physical limitations and self concept in asthmatic school children. The self concept of their studied asthmatic children was related to asthma severity and its effects on daily activities as asthmatic children who experienced shortness of breath (SOB) during heavy exercise had higher self concepts than asthmatic children who experienced SOB during light exercise.

On the other hand, many studies have focused on the association between psychiatric disorders and asthma [40-42] as it has been reported that the patients with asthma were more anxious and more depressed, relative to compared subjects without asthma. **Richardson et al., (2006)** [43] studied 125 asthmatics and found that an anxiety or depressive disorder was highly associated with increased asthma symptom burden. However, **Janson and his associates (1994)** [44] were unable to find significant associations of asthma with anxiety or depression in a general population sample. Some researchers have explained that difference in findings by possible confusion among clinicians, parents, and researchers over differentiating childhood psychiatric and physiological symptoms, such as breathlessness. Such confusion could contribute to possible overlap between asthma and anxiety; the symptoms (e.g., dyspnea) of asthma, panic attack, and separation anxiety are similar, thus making disease classification by symptom reporting only, somehow difficult [45]**.**

Some researchers have raised suggestions that the association between asthma and psychiatric disorders is modified by the severity of asthma [45-47] that might explain the association between symptoms of asthma attacks and anxiety and or depressive disorders manifestations. However, some studies have also observed psychiatric disorders in children with low to mild asthma [48].

FEV1 and FEF 25%-75% of our studied asthmatics were significantly lower compared to controls. FEV1 has been used in the current study to measure changes in lung functions because it has less within-subject variability and reflects a larger proportion of the flow-volume curve. Also,

in practical terms, spirometers are more suitable for testing large numbers of children in a short period of time than peak flow meters which collect moisture and cannot be calibrated accurately [49].

Several generic and specific quality-of-life questionnaires have been developed and validated to assess the functional impact (physical, social, and emotional) of asthma in both children and adults [1]. Using the PedsQL™ 4.0 Generic Core Scales that was used in our study, **Varni et al., (2007)** [50] studied 2,500 pediatric patients and found patients with moderate to severe persistent asthma self-reported significantly lower overall HRQOL, physical health, psychosocial health, emotional functioning, and school functioning in comparison to patients with mild intermittent and mild persistent asthma. Also, they found that parents of patients with mild persistent and moderate to severe persistent asthma, proxy-reported significantly lower than their children overall HRQOL and all its sub scores compared to patients with mild intermittent asthma.

Similarly, in the current study, mean values of total score of self reported HRQOL and all its sub scores were significantly lower in studied asthmatics and their caregivers compared to controls and their caregivers respectively. On the other hand, asthmatic children proxy reports of the total HRQOL score and all its functioning sub scores were worse compared to their children' self reports. In agreement with our findings but with using two different questionnaires [general quality of life (short form 12 Health Survey Questionnaire, SF-12) and asthmatic-specific quality of life (Living with Asthma, LAQ)], **Kullowatz et al., (2007)** [51] studied 88 asthmatic patients and documented that asthma lowered the quality of life and increased the scores of depression and anxiety. **Dean et al., (2010)** [52] assessed the quality of life and productivity of children with uncontrolled asthma and their caregivers using a cross sectional internet based survey and proved that poorly controlled asthma symptoms impaired HRQOL of children, QOL of their caregivers, and productivity of both.

Gonzalez-Barcala et al., (2012) [53] identified some factors to be related to worst quality of life in asthmatic patients, the most significant of which were advanced age, lower education level, greater baseline severity of the asthma, presence of stressful events, poor asthma control, and need to be admitted to hospital. In the current study, FEV1 and FEF 25%-75% of enrolled asthmatics showed significant positive correlations with total HRQOL score and its social and psychosocial functioning sub scores, i.e. the worse these pulmonary functions, the severer the disease, the poorer its control, the worse the total HRQOL score and its social and psychosocial functioning sub scores. On the other hand, the total HRQOL score was significantly positively correlated with all its functioning sub scores while it was negatively correlated with both the depression and anxiety scores i.e. the lower the total HRQOL score, the higher the depression and anxiety scores and vice versa. Meanwhile, the older the asthmatic child, the more his depression and anxiety scores, the lower his total HRQOL score and its physical, social, and school functioning sub scores.

In conclusion; the findings of the present study showed that enrolled asthmatic children were poorer in self-esteem, more anxious ,more depressed, and psychosocially impaired compared to their counterpart clinically healthy children. Also, asthma had a significant negative impact on their quality of life with worse caregiver perception of it.

Future scope
Assessment of HRQOL and psychosocial functioning of asthmatic children and their caregivers is recommended to be an integral part of their management plan. Also, it is advisable to manage asthmatic children by multidisciplinary teams including psychologists and psychiatrists to deal with any possible psychosocial co-morbidity in this vulnerable group of patients and their caregivers. Lastly, identification of factors related to poor asthma control especially those that could be changed by improving health care could lead to a remarkable change in overall prognosis of asthmatic children and their quality of life.

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