The impact of bronchial asthma on quality of life among affected children and adolescents in Taif city, Saudi Arabia

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Abstract: Asthma is one of the most common chronic illnesses in Saudi Arabia, with substantial regional variations. It can severely affect the health-related quality of life (HRQL) of children. There is a gap in knowledge regarding the impact of asthma on life style of children and adolescents especially in Taif city, KSA. Moreover, little is known about asthma control status in Saudi asthmatic children & adolescents. This study aimed to evaluate asthma control status in Saudi asthmatic children and adolescents. Also, to compare health-related quality of life in children and adolescents with impaired and controlled asthma, in Taif, KSA, and to identify some trigger risk factors associated with impaired asthma control. A cross section study was conducted in which 200 Saudi asthmatic boy children, aged 7 -17 years, were included. Each participant completed two tools; the first was a self administered questionnaire containing PAQLQ-A Adapted- Arabic version; and the second tool is ACT. Only 12% of studied sample had controlled asthma, while 88% had impaired asthma control. The impact of asthma in both children and adolescents with impaired control asthma was significantly higher than for controlled asthma children and adolescents respectively. The most common asthma aggravating factors were physical activity-induced asthma, parental tobacco smoke, and perfumes & household detergents. Children and adolescents with impaired asthma control were found to have more impaired HR-QoL compared with children and adolescents with controlled asthma. Activity limitation domain was more affected in children and adolescents. Further research should focus on which factors are responsible for the greatest burden on asthmatic children's health related quality of life and their caregivers' health related quality of life and how such risk factors should be prevented and managed.
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1. Introduction:

Asthma is a chronic inflammatory disorder of the airways in which the chronic inflammation is associated with airway hyper responsiveness that lead to episodes of wheezing, breathlessness, chest tightness, and coughing especially at night or in early morning. These episodes are usually associated with variable widespread airflow obstruction within the lung that is often reversible either spontaneously or with treatment. Asthma is a serious public health problem globally, with an estimated 300 million affected individuals, with great variation between countries (To, *et al.,*2012)[1]. The prevalence of asthma is increasing in most countries especially among children and adolescents (Global Initiative for Asthma (GINA), 2013)[2].

Asthma is a significant burden, not only in terms of health care costs, but also of lost productivity and reduced participation in family life. When it uncontrolled, can place sever limits on daily life and sometimes fatal. Annual worldwide deaths from asthma have been estimated at 250000, and mortality does not appear to correlate well with prevalence (Masoli *et al.,*2004)[3].

Asthma is one of the most common chronic illnesses in Saudi Arabia, where the prevalence of asthma is higher than in other Arab countries and in Europe, with substantial regional variations [Al-Dawood, 2001[4]; Al-Frayh *et al.,*2001[5]).Local reports suggest that the prevalence of asthma is increasing over the last three decades (Al Ghobain *et al.,*2012[6]; Al-Ghamdi *et al.,* 2008[7]). Al Frayh *et al.,* 2001[5], conducted epidemiological studies to investigate the changing in prevalence of asthma in KSA. They reported that it affected more than two million Saudis, and showed that the prevalence of asthma in both adults and children increased from 8% in 1986 to 23% in 1995. The study also revealed that there was increased exposure to environmental factors such as tobacco smoke and indoor animals in Saudi houses, which can play a role. Other studies in KSA have shown that the burden of asthma might be significantly higher than previously estimated (Rabe *et al.,*2004[8], Abudahish and Bella,2006[9]). One of the main factors for this result is poor diagnosis. Primary health care physicians who care for asthma patients in KSA demonstrated poor knowledge and lack of awareness in controlling of the disease.

Consequently, many asthma patients continue to be under-diagnosed, under-treated, and are at a risk of acute exacerbations resulting in its impact in patients, their families, and the community as a whole in terms of lost work and school days, poor quality of life, increased use of expensive emergency healthcare services, hospitalizations, and deaths (Al-Mobeireek, 2003)[10]. An asthma control survey showed that only 5% of Saudi patients were controlled, 31% were partially controlled, and 64% were uncontrolled(Al-Jahdali, 2008)[11].

Because asthma puts a serious burden on children's health related quality of life,(Global Initiative for Asthma, 2010[12]), the recent focus in asthma management is to achieve optimal disease control and health related quality of life improvements (HR-QoL) (Pedersen *et al.,* 2011)[13]. Quality of life on children has been defined as a measure of how a child views his or her life relationship to how they could reasonably expect or desire it to be.(Collier *et al.,* 2000)[14]. Thus, quality of life measures can provide information on how asthma interfere in the physical, emotional, and social domains of the asthma affected children and adolescents from their own perspectives. In clinical practice, measurement of HR-QoL facilitates identification of the children with the greatest need for improved asthma treatment. According to the Global Initiative for Asthma, 2010[12], a child's asthma is under control when he or she can play without troublesome symptoms or limitations, sleep without awakening from coughing and avoid serious attacks or declined lung function. Poorly controlled asthma symptoms impair health related quality of life in children (Guilbert *et al.,* 2011)[15]. Other studies have found that poor health related quality of life is predictive of subsequent asthma-related emergency department visits, which implicates poor asthma control (Magid *et al.,* 2004)[16]. A recent research from Riyadh, KSA reported that children experience asthma as an interruption in daily life that influences them physically, emotionally and socially (Ahmed *et al.,* 2014)[17]. There are various tools for evaluating a patient's asthma control, one is to use validated questionnaires e.g. Asthma Control Test (ACT) (Al Moamary *et al.,* 2012)[18], another is to evaluate symptoms in patient history based on recommended characteristics from the Global Initiative for Asthma (GINA,2013) [2].

Most previous studies have focused on severity of symptoms to examine the impact of asthma symptoms on children's health related quality of life; the results are conflicting (Everhart & Fiese,2009)[19]. For example, disease severity is not consistently associated with children's health related quality of life in some studies (Erickson et al., 2002[20]; Vila *et al.,* 2003[21]), whereas others reported that children with moderate or severe asthma have a worse level of functioning in several domains of their health related quality of life compared to children with mild asthma (Merikallio *et al.,* 2005[22]) suggesting there may be a 'dose-response' relationship between the frequency and intensity of children's asthma symptoms and their health related quality of life. Mohangoo *et al.,* 2007[23] evaluated health related quality of life in adolescents with asthma-like symptoms, such as attacks of wheezing and shortness of breath. The presence of at least four wheezing attacks during the past year was associated with impaired adolescents' health related quality of life. Previous studies have also found that wheezing attacks more often have a physical impact than a psychosocial impact (Merikallio *et al.,* 2005)[22].

With childhood asthma, the family and especially the caregiver may face a considerable burden. Whereas some studies find no association between caregiver's health related quality of life and children's asthma symptoms (Annett *et al.,* 2003) [24], duration of asthma illness and asthma pre-treatment severity (Vila *et al.,* 2003)[21], other studies report that caregiver's and child's health related quality of life are significantly associated with each other (Dean *et al.,* 2010)[25]. Caregivers of children with uncontrolled asthma report significantly higher absenteeism than their controlled counterparts (Dean *et al.,* 2010)[25].

Where activity limitation seems to be the most impaired domain in children, asthma symptom perception and emotional health appear to be the most affected health related quality of life domains in parents.

In a recent Saudi study, researchers reported that bronchial asthma greatly affects the QOL of affected children and their families. It has recently been recognized as the most common cause of school absence, thus affecting children's educational potential and adversely affecting a child's quality of life (Al Ghobain *et al.,* 2012)[6]. When a child has asthma he may cause psychological difficulties for his/her parents or other family members, and may affect their interpersonal relationships (Al Ghobain *et al.,* 2012)[6].

Recently, there are a few studies which have assessed asthma control during childhood (Nordlund, 2013)[26]. In addition, there is a gap in knowledge regarding the impact of asthma on life style of children and adolescents especially in Taif city, KSA. Taif is a city which located 1700-2500m above sea levels in Saudi Arabia. It is characterized by its dry climate almost all the year round, and cultivation of roses, grapes, grenades, and olives. Moreover, little is known about asthma control status in Saudi asthmatic

children & adolescents, and factors associated with impaired asthma control among these cases.

Aims of study:

1. To evaluate asthma control status in Saudi asthmatic children and adolescents.
2. To compare health-related quality of life in children and adolescents with impaired and controlled asthma, in Taif, KSA.
3. To identify some trigger risk factors associated with impaired asthma control compared with controlled asthma in these children and adolescents.

2. Research Methodology:-

This study was a cross section study which was conducted during a period of seven months (August, 2013 till February,2014) in Taif,Saudi Arabia. Data was collected from two settings. The first was six randomly selected primary health care centers (PHCCs) from a total of 105 health centers of Taif province representing the different geographic regions of the city. The second setting was the pediatric clinics of Pediatric Hospital, Taif. All asthmatic boy children and adolescents who visited the two selected settings for follow-up visits during the study period and fulfilled the inclusion criteria were included. The inclusion criteria were: Saudi boy child or adolescents, diagnosed with asthma according to the Saudi Initiative for Asthma (SINA) group, a subsidiary of the Saudi Thoracic Society (Al-Moamary *et al.,* 2012)[18], aged 7 to 17 years, and accompanied with his parents or caregiver who gave oral consent for participating in this study. Exclusion criteria for children were: age below 7 years or above 17 years; concomitant illnesses other than asthma that could affect QOL; suspicion of having an alternative cause for recurrent wheezing other than asthma; illiterate; or refusal to participate. Participants in this study were interviewed by the research team, and after explaining the importance,objectives of this study, and obtaining their verbal consent on participating, they were invited to complete the tools of the study.

Tools of the study

Two tools were used for this study.The **first** was a questionnaire designed by the researchers for asthmatic children and adolescents. It was consisted of three parts: the first part included demographic data as age, residence, type of school, social level, and family history of asthma. The second part included the pediatric asthma quality of life questionnaire (PAQLQ-A) Arabic version (Abdel Hai, *et al.,* 2010)[27]. The translated PAQLQ-A consists of 23 questions divided over 3 domains: activity limitation (5 questions), symptoms (10 questions) and emotional function (8 questions). It uses a 7-point Likert scale with maximum possible score for each item is 7 (good HRQOL) and the minimum score is 1 (poor HRQOL). The contribution of each item in the questionnaire to the 3 domains of activity limitation, symptoms and emotional function was evaluated by calculating the mean response to all its items for each domain. In addition, the overall score was calculated as being the average of the means of the 3 domains. The third part included a list of factors that may lead to their asthma trigger such as smoke, perfumes, household detergents, playing with cats, …ect, and children were asked to choose the first 3 most distressing items. Also this part was included some dichotomy questions about school absent, admission to hospital last year due to asthma,…ect. PAQLQ have been well validated and is perhaps the most widely recognized measure for pediatric asthma quality of life to date (Juniper *et al.,* 1996) [28]. Children had an overall good understanding of the PAQLQ-A. For the younger patients, a longer explanation and some kind of assistance by the designated member of the research team was needed, but no help was given by the parents in the replies. The **second tool** was the Asthma control test (ACT) which the Saudi initiative for asthma (SINA) panel has reached a consensus of using its score to simplify the initiation and adjustment of asthma therapy, as there are variations in the qualifications of health professionals dealing with asthma (SINA, 2012 updated)[29]. In this study the ACT- Arabic version was used (Lababidi et al, *et al.,* 2008)[30]. This tool consists of five items that cover a patient's activity limitations, shortness of breath, frequency of night symptoms, use of rescue medication and a rating of overall control of the disease over the past 4 weeks. Each question's answer is graded from one (poor control) to five(good control). The total score range was 5 to 25, and was used to assess asthma control in studied participants. Scores ≤19 considered uncontrolled asthma, scores 20 – 24 considered partially controlled, and scores of 25 were considered controlled asthma. The number of uncontrolled asthma was small, therefore the data presented as impaired asthma control which included both partially controlled asthma and uncontrolled asthma.

Sample size:

Sample size calculation was conducted using the *Power and Sample Size* software, version 3.0.43[31], and were based on the following inputs: power = 90%, significance level = 0.05, an equal proportion of children with controlled asthma / impaired asthma (partial and uncontrolled asthma), an ability to detect difference of mean scores between these two groups of children = 0.2 and standard deviation within each group = 0.6. A sample size of 190 participants was

found to fulfill these inputs, and was adjusted up to 200 for data losses.

Administrative approval and ethical issues.

This study was approved by the scientific research committee of the Faculty of Applied Medical Sciences, Taif University, as well as Taif Directorate of Health, Ministry of Health, KSA. All applicable institutional and governmental regulations concerning the ethical use of human individuals were followed during data collection of this research. All the study subjects were given their verbal consent to be included in the study.

Data analysis:

Statistical analyses were performed with IBM SPSS statistics software versions 16 (Chicago, IL, USA). Qualitative data was presented as frequencies and percentages and continuous variables as means with standard deviation (SD). Differences between normally distributed continuous data were analyzed using the independent t-test, while non-parametric data were assessed using the Mann-Whitney U test. Differences in Qualitative variables were analyzed with the chi-square test, however, if expected value of any cell of the table was < 5, Fisher exact test was used. A *p*-value ≤ 0.05 was considered significant (Altman, 2006)[32].

3. Results:

All Children and their caregivers, who agreed to their child's participation in the study, were counseled and assured that the data collected would be handled confidentially.

Table1: General characters of studied asthmatic children and adolescents

Characters	Frequency	
	N0.	%
Age(years):	88	44%
Children (7 – 12 years)	112	56%
Adolescents (13 -17 years)		
School:	78	39%
Primary (Grade 1 – 6)	122	61%
Intermediate (Grade 7 – 9)		
Social level:	24	12%
High	168	84%
Moderate	8	4%
Poor		
Family history:	93	46.5%
Yes(father-mother-brothers)	19	9.5%
Yes(Uncles)	88	44%
No		
Total	200	100%

NB: 138 out of 200 (69%) of studied sample were living in urban areas.

Almost two thirds of our sample were adolescents (56%), in Intermediate school(61%), and had family history of asthma (56%), whereas 84% of families were moderate social level (Table1).

Table2: Distribution of asthma control status among children and adolescents

Studied groups	Asthma control status						Total		*P* value of difference
	Controlled Asthma N0.	%	Partially controlled asthma N0.	%	Uncontrolled asthma N0.	%	N0.	%	
Children (7-11years)	6	6.8%	56	63.6%	26	29.5%	88	100%	χ^2= 9.9 P=0.001 Sig.
Adolescents (12 - 17 years)	18	16.1%	80	71.4%	14	12.5%	112	100%	
Total	24	12%	136	68%	40	20%	200	100%	

It is worth noting that only 12% of studied sample had controlled asthma, while 88% had impaired asthma control (68% partially controlled +20%uncontrolled). There was significant difference between children and adolescents regarding the asthma control groups. Children showed lower percentages in both control and partially controlled asthma (6.8% and 63.6% vr 16.1% and 71.4% respectively). However, they showed higher percentage in uncontrolled asthma (29.5% vr12.5% respectively)Table2.

The prevalence of impaired control asthma was significantly higher in children (93.2%) than in adolescents (83.9%)(χ^2 = 3.97, *p*=0.04).The impact of asthma in both children and adolescents with impaired control asthma was significantly higher than for controlled asthma children and adolescents respectively. As expected, the impact of impaired control asthma, of all items, was higher in children than in adolescents except in the item wheeze >4 times last year(84.1% vr 89.4%) respectively (Table3).

Table 3: Impact of asthma symptoms on studied patients distributed by asthma control status

Items (Yes)	Children (n=88)			Adolescents (n=112)		
	Controlled N= 6	Impaired control N=82	*P*	Controlled N=18	Impaired control N=94	*P*
Prevalence (%)	6.8%	93.2%	----	16.1%	83.9%	----
Limitation sporting activities as football	6 (100%)	29 (35.4%)	0.02*	16(88.9%)	11 (11.7%)	0.006*
Sleeping interruption	0	82 (100%)	0.000*	0	86 (91.5%)	0.000*
School absent	0	82(100%)	0.000*	0	79(84%)	0.000*
Wheeze > 4 times last year	0	69(84.1%)	0.68*	0	84(89.4%)	0.04*
Admitted hospital last year due to asthma	0	28 (34.1%)	0.17*	0	19(20.3%)	0.04*

*Fisher exact test.

Table 4: Asthma triggers risk factors that associated with impaired asthma control among children and adolescents.

Items (Yes)	Children (n=88)			Adolescents (n=112)		
	Controlled N= 6	Impaired control N=82	*P*	Controlled N=18	Impaired control N=94	*P*
	N(%)	N(%)		N(%)	N(%)	
Tobacco smoke	2(33%)	57(70%)	0.08*	9(50%)	83(88%)	0.0001
Perfumes &household detergents	2(33%)	48(59%)	0.39*	10(56%)	87(93%)	0.0002
®Physical activity-induced asthma	2(33%)	66(81%)	0.02*	0	94(100%)	0.000*
Cats inside houses	2(33%)	32(39%)	1.0*	0	59(63%)	0.000*
Seasonality of asthma (Winter-cold air)	1(17%)	35(43%)	0.39*	2 (11%)	83(88%)	0.000*
**Food allergens	0	4 (5%)	1.0*	1(6%)	7(7%)	0.000*

*Fisher exact test. ** Peanut and milk allergens, ® Exercise-induced asthma

Table 5: Assessment of Pediatric Asthma Quality of Life Questionnaire–adapted (PAQLQ-A) domains scores and asthma control test score in children and adolescents.

PAQLQ-A domains	Children (n=88)			Adolescents (n=112)		
	Controlled N= 6	Impaired control N=82	*P*	Controlled N=18	Impaired control N=94	*P*
	Mean score (±SD)	Mean score (±SD)		Mean score (±SD)	Mean score (±SD)	
Symptoms	3.97±1.02	3.46 ±1.03	0.001	4.42±0.92	3.82±1.02	0.001
Activity limitations	4.23±0.91	3.43±0.51	0.01	4.49±0.78	3.54±0.58	0.01
Emotional function	4.72±0.82	4.54±0.65	0.43	4.68±1.03	4.12±0.64	0.01
Total score	4.31±0.89	3.80±0.76	0.001	4.43±0.91	3.83±0.86	0.001
Asthma control test, ACT	22.5±1.2	17.1±2.4	0.01	23.2±1.1	18.3±1.91	0.01

The most common aggravating risk factors reported as inducing asthma symptoms among both children and adolescents with impaired control asthma were physical activity-induced asthma (81% and 100% respectively), parental tobacco smoke (70% and 88%, respectively) and perfumes & household detergents (59% and 93% respectively). In addition, triggers from cold air in winter, cats inside houses, and food were also more pronounced among impaired asthma children and adolescents (Table4). In comparison, all trigger items occurred more often in both impaired asthma children and adolescents compared with both controlled asthma children (not significant, $p>0.05$) and adolescents (significant, $p<0.000$) Table 4.

The mean PAQLQ-score (including the total score as well as three sections covering symptoms, activity limitation and emotional function) was significantly lower for children and adolescents with impaired asthma than for those with controlled asthma (3.80 versus 4.31, $p=0.001$; and 3.83 versus 4.43, $p=0.001$ respectively). The mean ACT score followed the same trend (Table 5). Activity limitations was the most affected domain in both impaired asthma children and adolescents(3.43 and 3.54 respectively). Spearman correlation coefficient of asthma control test score of impaired asthma participants with their HR-QoL score was $r = 0.81$, $p < 0.001$ (data not presented).

4. Discussion:

This study investigated asthma control status in Saudi asthmatic children and adolescents, their health-related quality of life, and finally trigger risk factors associated with impaired asthma control in Taif, KSA. In an asthma control survey, implemented by Al-Jahdali *et al.,* 2008[11], an unacceptable low percentage of controlled asthma (5%) was reported,

31% of patients were partially controlled, and 64% were uncontrolled. This research found a similar poor asthma control trend among studied participants, although controlled asthma was increased with a slight percentage (12 %).As expected, the frequency of impaired asthma control (partly or uncontrolled) was significantly higher in children than in adolescents, 93% vs. 84% (p = 0.04). In children, 29.5% of 88 with asthma were uncontrolled and 63.6% were partly controlled. The corresponding proportions in adolescents were 12.5% with uncontrolled asthma and 71.4% with partly controlled (of 112 adolescents with asthma).On the other hand, contradicting to this result, is a more recent study in Riyadh by BinSaaed *et al.,* 2014[33], who reported a higher percentage of uncontrolled asthma (59.3%). However, this discrepancy may be due to the difference in studied participants age groups: Riyadh study participants was only among (4-11 years),while in our study was (7-17years).Also, researchers in Riyadh study conducted their research at only pediatric clinic of major teaching hospitals in Riyadh, which may indicates bias in selecting participants from a population who are living in urban area near these major hospitals. While this study was conducted at pediatric clinic of Taif Hospital as well as at six PHCCs distributed all over geographic areas of Taif which may indicates including of a wider population areas (urban and rural). Thirty one percent of our studied sample were living in rural area.

In this study, age-related differences in children's and adolescents asthma control were observed, corresponding to more sporting(football) activities limitations, emergency hospital admissions and sleeping interruption among children, and more severe wheezing (> 4 times last year) in adolescents. Moreover, fewer children (6.8%) fulfilled the criteria of controlled asthma compared with adolescents (16.1%). In spite of that, the overall asthma control cannot automatically be interpreted as improved at adolescents. The reasons for this discrepancy may be due to: 1) the GINA criterion may not be perfectly suited for defining asthma control in childhood asthma due to the natural course of childhood asthma including changes over time in symptoms e.g. in comparison to wheeze during common cold and allergic asthma, 2) some researchers found that parental acceptance of poor asthma control was higher than that outlined in guidelines (Kuehni and Frey, 2002)[34]. Taken together, these findings emphasize why asthma control should be evaluated with reliable and validated instruments to avoid unforeseen changes in health outcomes. Asking children directly, using validated HR-QoL or asthma control tests, puts more focus on the child's own perceived disease burden compared with GINA guidelines (Liu *et al.,* 2010)[35]. In our study, the correlation of asthma control test score of impaired asthma participants was strongly high with their HR-QoL score (r = 0.81, $p < 0.001$). This result confirms the Saudi initiative for asthma (SINA) panel consensus of using the asthma control test score to simplify the initiation and adjustment of asthma therapy, and should as often as possible be incorporated in children health care, and certainly with adolescents.

Although several risk factors are known for development of asthma morbidity, the current understanding of factors associated with impaired asthma control is limited (Nordlund,2013)[26]. In this study, the most troublesome triggers reported in both children and adolescents with impaired asthma control were: physical activity -induced asthma (81% and 100% respectively), parental tobacco smoke (70% and 88%, respectively) and perfumes & household detergents (59% and 93% respectively). Symptoms during physical activity are of major concern as the current recommendations are that all children with asthma should be able to engage in regular physical activity(Nordlund,2013) [26]. Children and adolescents with impaired asthma were more often revealed symptoms during physical activity than children and adolescents with controlled asthma. The important pathogenic role of physical activity (some researchers called it exercise-induced symptoms (EIA)) is bronchial inflammation and for optimal control of it, anti-inflammatory treatment is required (Anderson, and Daviskas,2000)[36]. AL-Jahdali et al,2013[37] reported a surprisingly improper use of asthma inhaler devices in approximately half of Saudi patients and was significantly associated with irregular clinic follow-ups (p= 0.0001). Tobacco smoke was a significantly more common trigger in impaired asthma in both children and adolescents than in children and adolescents with controlled asthma. It is well-known that tobacco smoke reduces the sensitivity to ICS (Ricciardolo,2007)[38], and increases the risk for hospital admission and morbidity compared with the risk among non-smokers with asthma (Thomson, and Chaudhuri, 2009)[39]. As with active smoking, exposure to passive smoke has a number of severe effects on asthma control and severity in children (Atlanta, 2006)[40]. It has been reported that chemicals used in household cleaning products and furniture materials can be asthma triggers (Henderson et al,2008)[41]. The finding of this research confirm this notion as both children and adolescents with impaired asthma control reported perfumes & household detergents (59% and 93% respectively) as troublesome triggers of asthma. However, the immunomodulatory effects of the many

household chemicals have rarely researched (Franklin, and Kusel, 2013)[42].

The recent focus in asthma management is to achieve optimal disease control and health related quality of life improvements (HR-QoL) (Pedersen et al., 2011)[13]. In the present study, children and adolescents with impaired asthma control were found to have more impaired HR-QoL compared with children and adolescents with controlled asthma. However, administration of the PAQoL-A questionnaire allowed us to note that the main domains which were affected in impaired asthmatic children were the symptoms and the activity limitations (while in impaired asthmatic adolescents, the three domains were affected). Children and adolescents are often worried about asthma attacks, and cough and chest tightness might be a cause of concern for them. In addition, those children to a larger extent experience feelings of exclusion and dissatisfaction compared with children with controlled asthma. Such feelings are easily overlooked in clinical practice, and therefore it is recommended to evaluate requirements for psychological support to patients with impaired asthma. They also seem to suffer from limitations in those activities that might exacerbate an asthma attack and make them feel uncomfortable (Guilbert *et al.,* 2011)[15]. Similar to this research findings, other studies have found many destructive effects of bronchial asthma on the life style and quality of life of children and adolescents (Vila, *et al.,* 2003)[21]. Moreover, it is generally believed that the asthmatic children with frequent interruption of sleep, absences from school and overstay in hospitals may have adverse biopsychosocial consequences including educational failures, developmental disorders and a variety of psychological disorders (Guilbert *et al.,* 2011)[15]. Moreover, Dean *et al.,* 2011[25] reported that activity limitation seems to be the most impaired domain in children, asthma symptom perception and emotional health appear to be the most affected health related quality of life domains in parents.

A limitation of this study is that due to cultural reasons, all participants were males. Also it does not take into consideration how childhood asthma affects caregiver's health related quality of life. It would have been interesting to compare the HRQoL of the caregivers with HRQoL of their asthmatic children, and to investigate their expectations and priorities concerning asthma.

In conclusion, despite some limitations, this study highlighted poor asthma control in Saudi children and adolescents. The impact of impaired control asthma was higher in children than in adolescents and affected adversely their sporting activities, sleeping pattern, school attendance, and increase frequency of admission to emergency hospitals last year due to asthma. The most troublesome triggers reported in both children and adolescents with impaired asthma control were: physical activity (exercise)-induced asthma, parental tobacco smoke,and perfumes & household detergents. Children and adolescents with impaired asthma control were found to have more impaired HR-QoL compared with children and adolescents with controlled asthma. Further research should focus on which factors are responsible for the greatest burden on asthmatic children's health related quality of life and their caregivers' health related quality of life and how such risk factors should be prevented and managed.

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