ARQUIVOS DE ASMA, ALERGIA E IMUNOLOGIA

Original Article

Quality of life according to asthma control and severity in pediatric patients at a hospital in Belém do Pará, north of Brazil

Qualidade de vida de acordo com o controle e gravidade da asma em pacientes pediátricos atendidos em um hospital em Belém do Pará

Maria Emilia da Silva Coelho[1], Gabriele Arja de Abreu[1], Mariane Cordeiro Alves Franco[1], José Tadeu Colares Monteiro[2], Lilian França dos Santos Monteiro Pereira[3]

ABSTRACT

Background: Asthma is a chronic obstructive inflammatory disease that, even with low mortality, can impair the quality of life (QoL) of children and adolescents. Establishing to what extent asthma severity and control can influence patient QoL may contribute to better patient outcomes. **Objective:** To evaluate the QoL of children with asthma according to disease severity and symptom control. **Methods:** This was a cross-sectional study of asthmatic children aged 7 to 13 years followed up at the pediatric pulmonology outpatient clinic of Hospital Fundação Santa Casa de Misericórida do Pará (FSCMPa). Sociodemographic and clinical data were obtained using an identification form and from medical records. Symptom control was assessed by the Asthma Control Test, and severity was determined using the Global Initiative for Asthma criteria. The Pediatric Asthma Quality of Life Questionnaire (PAQLQ) was used to assess QoL. **Results:** We interviewed 45 patients (57.7% boys) with a mean age of 9.53 ± 1.89 years (median, 9 years). Of these, 19, 11, and 15 were classified as having well-controlled, partially controlled, and uncontrolled asthma, respectively. As for severity, 25, 19, and 1 were classified as having mild, moderate, and severe asthma, respectively. Children with well-controlled asthma had higher scores in total and in all domains of the PAQLQ than those with partially controlled or uncontrolled asthma ($p<0.05$). Regarding treatment adherence, patients with good adherence were approximately 3 times more likely to have minimal or no impairment in QoL than those with poor adherence. **Conclusion:** Asthmatic children have impaired QoL as a result of inadequate symptom control and non-adherence to treatment.

Keywords: Asthma, quality of life, child.

RESUMO

Introdução: A asma é uma doença inflamatória obstrutiva crônica que, mesmo com baixa letalidade, pode prejudicar a qualidade de vida das crianças e adolescentes. Estabelecer o quanto a gravidade da asma e o seu controle podem influenciar na qualidade de vida dos pacientes pode auxiliar em um melhor desfecho para os pacientes. **Objetivo:** Avaliar a qualidade de vida em crianças asmáticas de acordo com o controle de sintomas e a gravidade da doença. **Métodos:** Estudo transversal com inclusão de crianças asmáticas de 7 a 13 anos de idade acompanhadas no ambulatório de pneumologia pediátrica da Fundação Santa Casa de Misericórdia do Pará (FSCMPa). Dados sociodemográficos e clínicos foram obtidos por meio de uma ficha de identificação e do prontuário. O controle de sintomas foi avaliado pelo Teste de Controle da Asma e a gravidade foi determinada com base nos critérios do Global Initiative for Asthma. Para avaliação da qualidade de vida foi utilizado o *Paediatric Asthma Quality of Life Questionnaire* (PAQLQ). **Resultados:** Foram entrevistados 45 pacientes (57,7% meninos) com média de idade de 9,53±1,89 e mediana de 9 anos. Destes, 19, 11 e 15 foram classificados, respectivamente, com asma controlada (AC), asma parcialmente controlada (APC) e asma não controlada (ANC). Quanto à gravidade, 25, 19 e 1 foram classificados, respectivamente, com asma leve (AL), asma moderada (AM) e asma grave (AG). O grupo AC, quando comparado ao APC e ANC, apresentou maiores valores no escore geral do PAQLQ e em todos os domínios ($p < 0,05$). Quanto à adesão ao tratamento, verificou-se que pacientes com adesão terapêutica têm aproximadamente três vezes mais chance de ter prejuízo mínimo ou ausente na qualidade de vida do que pacientes não aderentes. **Conclusão:** Crianças asmáticas têm comprometimento da qualidade de vida relacionado ao inadequado controle dos sintomas e à não adesão terapêutica.

Descritores: Asma, qualidade de vida, criança.

1. Universidade do Estado do Pará, Medicine - Belém, PA, Brazil.
2. Centro Universitário do Pará, Medicine - Belém, PA, Brazil.
3. Fundação Santa Casa de Misericórdia do Pará, Pediatric Pulmonology - Belém, PA, Brazil.

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Introduction

According to the Global Initiative for Asthma (GINA) guidelines, asthma is a chronic obstructive inflammatory disease characterized by lower airway hyperresponsiveness and variable airflow limitation.[1] Clinical manifestations include recurrent episodes of coughing, wheezing, dyspnea, and chest pain, predominantly during the day and at night. Symptoms may be reversed spontaneously or with the use of medications.[2]

Asthma affects approximately 1% to 18% of the population in different countries.[1] Despite therapeutic advances and a better understanding of the pathogenesis of asthma, the global prevalence has been increasing in the last two decades, and one-third of those affected are aged < 18 years.[3]

There are approximately 20 million people with asthma in Brazil, which is one of the countries with the highest prevalence of the disease in children, with high rates of severe asthma.[4] Because asthma is the most frequently treated chronic disease in emergency services in the pediatric age group, it has major economic impacts.[5] According to the Brazilian Unified Health System (Sistema Único de Saúde, SUS) Database (DATASUS), asthma hospitalizations in the age group from 0 to 19 years cost a total of 31,844,124.84 for the public health care system.[6]

Uncontrolled asthma is expensive for the health care system as well as for families. Costs related to severe asthma are estimated to correspond to more than a quarter of family income among SUS users, and disease control would substantially reduce this burden.[7]

Adequate management of drug therapy combined with asthma education for patients and their caregivers are critical for disease control.[8] In addition, follow-up with periodic patient evaluation, aiming at asthma control, is important to determine the level of the disease and whether the treatment plan needs to be adjusted.[7]

Quality of life (QoL) is associated with symptom control and asthma severity. Despite low mortality, asthma can impair the QoL of affected children and adolescents, as well as of their caregivers, due to reasons such as unstable health conditions, need for prolonged treatments, side effects of medications, and constant visits to doctors and emergency services.[9]

The assessment of health-related QoL (HRQoL) using pediatric questionnaires has been encouraged in clinical follow-up to provide a holistic understanding of health in this age group.[10] Knowledge of the extent to which asthma severity and control may affect QoL can help establish therapeutic, behavioral, and environmental strategies in the health care system that could improve the outcomes of patients with asthma.[11]

Although QoL assessment is recommended for an adequate clinical follow-up, studies focused on pediatric patients with asthma are still lacking. The present study aimed to evaluate QoL according to symptom control and asthma severity in pediatric patients with asthma treated at a hospital in Belém do Pará, Brazil.

Methods

This analytical, cross-sectional clinical study was conducted in an outpatient pediatric pulmonology service in Belém do Pará from April to December 2019. All children and adolescents aged 7 to 14 years with a previous diagnosis of asthma who attended outpatient care during the study period were included. Absent patients, patients with comorbidities affecting their general condition, patients undergoing outpatient follow-up due to other pulmonary diseases, and those with cognitive impairment that precluded the application and understanding of tests were excluded.

Parents and legal guardians, as well as children and adolescents, were invited to participate in the study before the medical visit and were properly informed of all study procedures. All participants and their respective legal guardians who agreed to participate signed assent and informed consent forms, respectively.

An identification and basic assessment form was initially applied to parents with the aim of obtaining the following information: participant age, sex, origin (urban or rural area), weight and height (information obtained from the outpatient visit that occurred on the same day), personal morbid history, family history (asthma, rhinitis, sinusitis, current smoking by a caregiver), number of asthma attacks in the last year and in the last 3 months, treatment adherence, and discontinuation of medication in the absence of symptoms or in the presence of any undesirable effects related to medication use.

The Asthma Control Questionnaire (ACT) was subsequently applied, consisting of 5 questions regarding signs and symptoms of asthma, use of

rescue medication in the last 4 weeks, and perception of asthma control. The scores of the 5 questions were summed to obtain the total score, according to definitions by the 2020 Recommendations for Asthma Management of the Brazilian Society of Pulmonology and Phthisiology:

– Scores ≥ 20: controlled asthma.
– Scores 16-19: partially controlled asthma.
– Scores ≤ 15: uncontrolled asthma.

Asthma severity was assessed retrospectively by analyzing the medical records of included patients according to the adopted treatment regimen. Those with mild asthma required mild treatment for asthma control (stage 1 and stage 2), those with moderate asthma required moderate treatment (stage 3), and those with severe asthma required intense treatment (stage 4 and stage 5).

QoL was assessed using the Pediatric Asthma Quality of Life Questionnaire (PAQLQ), which is destined for patients with asthma aged between 7 and 17 years. The questionnaire is composed of 23 questions grouped into 3 domains:

– Activity limitation: five questions about the discomfort caused by asthma when performing certain activities.
– Symptoms: 10 questions about the discomfort caused by seizures, coughing, dyspnea, wheezing, chest tightness, and nocturnal awakening.
– Emotional function: eight questions about the frequency with which the disease makes the patient feel angry, feel different from others, feel fear due to an eventual asthmatic attack, and feel irritated or upset for not being able to keep up with other people's rhythm.

All items have equal weight. The score and arithmetic mean corresponding to each domain were calculated to obtain the individualized score, as well as the arithmetic mean of the 23 questions to obtain the general QoL score. To establish to what extent asthma severity and control can influence QoL in children and adolescents, the following definitions were considered:

– Scores ≥ 6: minimal or no impairment.
– Scores < 6 and ≥ 3: moderate impairment.
– Scores < 3: severe impairment.

The sample was analyzed using descriptive statistics by measures of central tendency (arithmetic mean and median), variance (standard deviation), and absolute and relative frequencies. Continuous variables were analyzed using the Kruskal-Wallis test (with Dunn's post-test in case of statistical significance) or Mann-Whitney test, according to the number of analyzed groups. Categorical variables were analyzed using the G test. For dichotomous categorical variables, the odds ratio was assessed, considering a 95% CI. All statistical inference was performed on BioEstat 5.4. A p-value ≤ 0.05 was considered significant.

The study was approved by the Research Ethics Committee under decision no. 3.238.653.

Results

From April to December 2019, 190 patients received care at the pediatric outpatient service in question. Of these, 45 were eligible for the survey and were interviewed. Among the 145 patients who were not eligible, 76 were outside the age group and 69 were in one of the following categories: follow-up for another pulmonary disease, presence of comorbidities with systemic repercussions, or cognitive impairment that precluded the understanding of research procedures.

The sample consisted of 26 boys (57.7%) and 19 girls (42.2%). Mean patient age was 9.53 ± 1.89, with a median of 9 (7-13.9) years. Mean body mass index (BMI) was 18.5 ± 3.61, with a median of 17.92. Mean height was 139.46 ± 12.59, with a median of 141.

Regarding patients' personal morbid history, 41 (91%) had allergic rhinitis in addition to asthma and 17 (37.7%) had a history of hospitalization due to asthma. As for family history, 35 patients (77.7%) had a positive history for asthma and 31 (68.8%) for allergic rhinitis.

ACQ results showed that 19 patients (42.2%) had controlled asthma, 11 had partially controlled asthma (24.4%), and 15 (33.3%) had uncontrolled asthma. Regarding asthma severity, 25 (55.5%) had mild asthma, 19 (42.2%) had moderate asthma, and only 1 patient (2.2%) had severe asthma.

Of patients with controlled asthma, 14 (73.6%) had mild asthma, 4 (21%) had moderate asthma, and 1 (5.2%) had severe asthma. In the partially controlled asthma group, 7 patients (63.63%) had moderate asthma and 4 (36.3%) had mild asthma. In the uncontrolled asthma group, 8 patients (53.3%) had moderate asthma and 7 had mild asthma (46.6%). The controlled asthma group was significantly associated

with the mild asthma group ($p < 0.05$), meaning that those with controlled asthma were more likely to be classified as having mild asthma. Other levels of symptom control and asthma severity were not significantly associated in the present study. Age, BMI, and height were not associated with symptom control and asthma severity, meaning the groups are comparable.

Regarding the association between symptom control and QoL assessed by the PAQLQ, the controlled asthma group had significantly improved scores in the overall score and in all domains than the partially controlled and uncontrolled asthma groups ($p < 0.05$). Score distribution of the PAQLQ domains with the mean score, standard deviation, and median of each domain is shown in Table 1.

In the present study, the PAQLQ score was not significantly associated with asthma severity, and the mild, moderate, and severe asthma groups were comparable in this regard, as shown in Table 2.

QoL impairment according to asthma control and severity is reported in Tables 3 and 4, respectively. In the overall score, 25 (55.5%) of patients had minimal or no impairment, 18 (40%) had moderate impairment, and 2 (4.4%) had severe impairment. Symptom control was significantly associated ($p < 0.05\%$) with QoL impairment in the general score in the domains of activity limitation and emotional function. The same association was not observed in the domain of asthma symptoms and control, and asthma severity was not associated with QoL impairment in the present study ($p > 0.05\%$).

Among patients with minimal or no impairment on the PAQLQ, 16 (64%) were in the controlled asthma group, whereas 85% of patients with moderate to severe impairment were in the partially controlled and uncontrolled asthma groups. Regarding asthma severity, 68% of patients with mild asthma had minimal or no impairment in QoL, whereas 63.16% of patients with moderate asthma had moderate to severe impairment.

In the domain of activity limitation, 24 (53.3%) of participants had minimal or no impairment, 17 (37.7%) had moderate impairment, and 4 (8.8%) had severe

Table 1
Score distribution of the Paediatric Asthma Quality of Life Questionnaire domains according to level of asthma control

Variable	Group	Mean	SD	Minimum	Median	Maximum	p-value*
Overall	CA	6.51	0.81	3.69	6.91	7.00	0.0083
	UA	5.13	1.65	2.95	5.21	7.00	
	PCA	4.98	1.50	2.82	4.86	7.00	
Activity limitation	CA	6.34	1.10	3.40	7.00	7.00	0.0160
	UA	4.84	1.91	2.20	4.60	7.00	
	PCA	5.16	1.31	2.80	5.00	7.00	
Symptoms	CA	6.61	0.67	5.00	7.00	7.00	0.0035
	UA	5.21	1.53	2.40	5.40	7.00	
	PCA	5.18	1.60	2.70	5.80	7.00	
Emotional function	CA	6.62	0.74	3.87	7.00	7.00	0.0497
	UA	5.39	1.70	2.50	6.00	7.00	
	PCA	5.12	1.69	2.62	4.75	7.00	

CA = controlled asthma (n = 19), UA = uncontrolled asthma (n = 15), PCA = partially controlled asthma (n = 11).
* Kruskal-Wallis test.

impairment. Of those with minimal impairment, 15 (62.5%) were in the controlled asthma group and 16 (66.6%) were in the mild asthma group. Of those with moderate to severe impairment, 17 (80.95%) were in the partially controlled and uncontrolled asthma groups and 12 (57.14%) were in the moderate asthma group.

In the domain of symptoms, 26 (57.7%) participants had minimal or no impairment, 17 (37.7%) had moderate impairment, and 2 (4.4%) had severe impairment. Sixteen patients (61.53%) with minimal or no impairment had controlled asthma and mild asthma, respectively. Of the 19 patients with moderate to severe impairment, 16 (84.2%) had partially controlled and uncontrolled asthma and 10 (52.63%) had moderate asthma.

Regarding the domain of emotional function, 30 (66.6%) participants had minimal or no impairment, 13 (28.8%) had moderate impairment, and 2 (4.4%) had severe impairment. Eighteen (60%) patients with minimal or no impairment were in the controlled asthma group and had mild asthma. Fourteen (93.3%) patients in the moderate to severe impairment group had partially or uncontrolled asthma and 8 (53, 3%) had moderate asthma.

Treatment adherence was associated with impaired QoL. As shown in Table 5, taking into consideration the overall PAQLQ score, a patient with adequate treatment adherence would be approximately 2.66 times more likely to have minimal or no impairment than a patient with treatment nonadherence. The same association was observed between treatment adherence and the other domains.

Discussion

Obtaining a complete evaluation of the health status of a child includes, in addition to clinical parameters, the assessment of HRQoL,[12] given that better disease control is associated with improved QoL in children.[13] However, the lack of targeted or adapted instruments to other cultures constitutes a major obstacle.[12]

Table 2
Score distribution of the Paediatric Asthma Quality of Life Questionnaire domains according to level of asthma severity

Variable	Group	Mean	SD	Minimum	Median	Maximum	p-value*
Overall	MA	5.92	1.42	2.95	6.69	7.00	0.1966
	ModA	5.28	1.51	2.82	5.43	7.00	
	SA	–	–	–	–	–	
Activity limitation	MA	5.79	1.59	2.60	6.60	7.00	0.1807
	ModA	5.16	1.57	2.20	5.00	7.00	
	SA	–	–	–	–	–	
Symptoms	MA	6.02	1.36	2.40	6.80	7.00	0.1731
	ModA	5.44	1.47	2.70	5.90	7.00	
	SA	–	–	–	–	–	
Emotional function	MA	6.04	1.35	3.00	6.75	7.00	0.3313
	ModA	5.53	1.68	2.50	6.25	7.00	
	SA	–	–	–	–	–	

MA = mild asthma (n = 25), ModA = moderate asthma (n = 19), SA = severe asthma (n = 1).
* Mann-Whitney test.

The PAQLQ was developed with the objective of measuring QoL in children and adolescents. When correctly applied, it can detect subtle changes in QoL,[14] and is currently the only instrument with complete cultural validation and adaptation for measuring QoL in pediatric patients with asthma in Brazil.[12] A 20-year study with patients with asthma and their caregivers showed that children and adolescents with asthma have worse QoL compared with those without asthma.[15]

Patient age has been associated with symptom control, asthma severity, and QoL in pediatric patients from Egypt[16] and Serbia,[17] where increased asthma severity was associated with increased QoL impairment in older children. Such association was not observed in this study nor in previous studies conducted in Brazil,[11] Lebanon,[18] and Nigeria.[19]

BMI was not significantly associated with symptom control, asthma severity, or QoL, which is in accordance with the results obtained by Matsunaga[11] and El-Gilany.[20] A Danish study,[21] however, found an association between BMI, symptom control, and asthma severity, which were proportional to the BMI of the study participant.

The association between symptom control and QoL in children and adolescents with asthma is well documented, with poorer symptom control being associated with a decrease in QoL rates.[5,16,18,22] This association was observed in our study population, in which worse ACT scores were associated with lower overall score as well as lower scores in all PAQLQ domains. In the present study, the overall PAQLQ score and all PAQLQ domain scores were associated with symptom control, as demonstrated in

Table 3
Distribution of asthma cases according to level of asthma control and reported type of impairment in the Paediatric Asthma Quality of Life Questionnaire domains

Variables	CA n (%)	UA n (%)	PCA n (%)	p-value*
Overall				
Minimum or none	16 (84.21)	6 (40.00)	3 (27.27)	
Moderate	3 (15.79)	8 (53.33)	7 (63.64)	0.0301
Severe	–	1 (6.67)	1 (9.09)	
Activity limitation				
Minimum or none	15 (78.95)	6 (40.00)	3 (27.27)	
Moderate	4 (21.05)	6 (40.00)	7 (63.64)	0.0243
Severe	–	3 (20.00)	1 (9.09)	
Symptoms				
Minimum or none	16 (84.21)	6 (40.00)	4 (36.36)	
Moderate	3 (15.79)	8 (53.33)	6 (54.55)	0.0601
Severe	-	1 (6.67)	1 (9.09)	
Emotional function				
Minimum or none	18 (94.75)	8 (53.33)	4 (36.36)	
Moderate	1 (5.26)	6 (40.00)	6 (54.55)	0.0167
Severe	–	1 (6.67)	1 (9.09)	

CA = controlled asthma (n = 19), UA = uncontrolled asthma (n = 15), PCA = partially controlled asthma (n = 11).
* G test.

Table 4
Distribution of asthma cases according to level of asthma severity and reported type of impairment in the Paediatric Asthma Quality of Life

Variables	MA n (%)	ModA n (%)	SA n (%)	p-value*
Overall				
Minimum or none	17 (68.00)	7 (36.84)	1	
Moderate	7 (28.00)	11 (57.90)	–	0.6290
Severe	1 (4.00)	1 (5.26)	–	
Activity limitation				
Minimum or none	16 (64.00)	7 (36.84)	1	
Moderate	7 (28.00)	10 (52.63)	–	0.5959
Severe	2 (8.00)	2 (10.53)	–	
Symptoms				
Minimum or none	16 (64.00)	9 (47.37)	1	
Moderate	8 (32.00)	9 (47.37)	–	0.8966
Severe	1 (4.00)	1 (5.26)	–	
Emotional function				
Minimum or none	18 (72.00)	11 (57.89)	1	
Moderate	7 (28.00)	6 (31.58)	–	0.7191
Severe	–	2 (10.53)	–	

MA = mild asthma (n = 25), ModA = moderate asthma (n = 19), SA = severe asthma (n = 1).
* G test.

other studies.[5,11,20,23] However, two domains are often more affected than the others depending on the study population: activity limitation and symptoms.[24]

Unlike other studies in which the symptoms domain was the most affected,[5,16,19] the activity limitation domain was the most affected in the present study, as well as in a study conducted in Portugal.[25] This may be explained by different perceptions of activity limitation, level of physical activity, different inclusion criteria, and adequate clinical follow-up.[5,16]

In the present study, asthma severity was not significantly associated with QoL, which is consistent with studies from Israel[26] and Turkey.[13] Because the classification of asthma severity is related to the intensity of the therapeutic regimen, severity categorization may differ according to different health care services and adherence to different therapeutic measures.[26] In addition, the lack of correlation between severity and QoL observed in this and other studies may be associated with the small number of participants with severe asthma (only 1 in this study) or the relatively limited study sample. However, other studies have reported an association between QoL and level of asthma severity,[5,11,19,24] although some of these studies used other tools to assess asthma severity, which could explain the different results.

Allergic rhinitis is a highly prevalent comorbidity among patients with asthma,[3,5,27] as demonstrated in this study, in which 91% of participants reported having both conditions. Such association was also reported in previous studies from Brazil and Latin America,[3,27] in which most participants reported having both conditions. Because rhinitis may also affect QoL in children with asthma, the concept of a

single airway should be adopted more frequently for adequate disease management.[5]

In chronic diseases such as asthma, adequate adherence to treatment is crucial for achieving the clinically expected results. In this study, adherence to maintenance and rescue therapies was subjectively measured[28] by asking caregivers about current medications and comparing the data with prescription information obtained from medical records. The adherence rate was 71.1%, differing from a large-scale Brazilian study on adherence to asthma treatment[29] that reported a mean rate of 52%. However, our results were comparable to the variable rate found by a Belgian study, in which adherence levels ranged up to 70%.[28]

In the present study, adequate medication adherence was associated with QoL, and patients with inadequate adherence were more likely to have impaired QoL. Such association was also reported by the ADERE study,[29] which found a positive association between treatment adherence and QoL in those with asthma. However, a study conducted in a specialized outpatient clinic in the state of São Paulo did not find this association.[5]

Some caregivers reported the high cost of maintenance therapy as a contributing factor to lower adherence, especially long-acting beta-2-agonists. In previous studies, financial restrictions and the high cost of medications were also reported as important factors that contributed to lower medication adherence.[28,29]

For persistent and lasting improvement in symptom control and QoL in patients with asthma, continuous follow-up is required,[13,16] given that patients with periodic follow-up have improved rates of asthma control over time.[3] Thus, monitoring QoL rates in patients with asthma is important because worse rates are directly associated with decreased

Table 5
Adherence to asthma treatment according to QoL impairment assessed by the Paediatric Asthma Quality of Life Questionnaire

Associated factors	QoL impairment		Odds ratio	95% confidence interval	p-value
	None/minimum (%)	Moderate/severe (%)			
Overall					
Treatment adherence	20 (80.00)	12 (60.00)	2.6667	0.71-10.05	0.2543
Treatment nonadherence	5 (20.00)	8 (40.00)			
Total	25 (100.00)	20 (100.00)			
Activity limitation					
Treatment adherence	19 (79.17)	13 (61.90)	2.3385	0.72-8.77	0.3447
Treatment nonadherence	5 (20.83)	8 (38.10)			
Total	24 (100.00)	21 (100.00)			
Symptoms					
Treatment adherence	21 (80.77)	11 (57.89)	3.0545	0.80-11.60	0.1805
Treatment nonadherence	5 (19.23)	8 (42.11)			
Total	26 (100.00)	19 (100.00)			
Emotional function					
Treatment adherence	23 (76.67)	9 (60.00)	2.1905	0.58-8.33	0.4157
Treatment nonadherence	7 (23.33)	6 (40.00)			
Total	30 (100.00)	15 (100.00)			

symptom control.[23,30] This strategy may facilitate clinical decisions and guide the establishment of more effective treatment regimens.[30]

Study limitations include the limited number of participants and the cross-sectional nature of the study, which lacked long-term patient follow-up. In addition, we only included 1 patient with severe asthma. Another possible limitation is the subjective assessment of treatment adherence, meaning that adherence rates may have been overestimated by parents' reports, poor inhalation techniques, and inaccurate reports regarding the name of drugs and administered doses. Therefore, although our results may provide an overview of the local study population, they do not necessarily represent patients with asthma in general, meaning that data generalization to other populations is limited.

Conclusions

Inadequate symptom control is associated with worse QoL rates in patients with asthma. The same result was not obtained with asthma severity, possibly due to the limited number of patients with severe asthma (n = 1) or the small sample size. In addition, patients with adequate therapeutic adherence were approximately 3 times more likely to have improved QoL rates than patients with nonadherence. Therefore, the use of a questionnaire that assesses QoL in patients with asthma and adequate clinical follow-up may reveal the real impact of the disease on the lives of these patients and their families. New therapeutic, behavioral, and environmental strategies may be established for patients to achieve adequate control of the disease and, consequently, improved QoL.

References

1. Global strategy for asthma management and prevention [Internet]. Global Initiative for Asthma (GINA) 2019. Available in: https://ginasthma.org/wp-content/uploads/2019/04/wmsGINA-2017-main-report-final_V2.pdf. Accessed on: 02/20/2017.
2. Mascarenhas JMO, Silva RCR, Assis AMO, Pinto EJ, Conceição JS, Barreto ML. Sintomas de asma e fatores associados em adolescentes de Salvador, Bahia. Rev Bras Epidemiol. 2016;19(1):181-93.
3. Lage BA, Souza DD, Oliveira RF, Cardoso WCC, Gaspar LR. Avaliação do controle da asma em crianças e adolescentes do Programa Respirar da cidade de Ipatinga, Minas Gerais, Brasil. Rev Med. 2017;96(3):165-71.
4. Cardoso TA, Roncada C, Silva ER, Pinto LA, Jones MH, Stein RT, et al. Impacto da asma no Brasil: análise longitudinal de dados extraídos de um banco de dados governamental brasileiro. J Bras Pneumol. 2017;43(3):163-8.
5. Fontan FCS, Duwe SW, Santos K, Silva J. Avaliação da qualidade de vida e fatores associados em crianças e adolescentes asmáticos atendidos em ambulatório especializado. Rev Paul Pediatr. 2020;38:e2018172.
6. Brazil - Ministério da Saúde. Banco de dados do Sistema Único de Saúde (DATASUS) 2017. Available in: http://tabnet.datasus.gov.br/cgi/tabcgi.exe?sih/cnv/nruf.def. Accessed on: 08/06/2017.
7. Pizzichini MMM, Carvalho-Pinto RM, Cansaço JED, Rubin AS, Neto AC, Cardoso AP, et al. Recomendações para o manejo da asma da Sociedade Brasileira de Pneumologia e Tisiologia - 2020. J Bras Pneumol. 2020;46(1):e20190307.
8. Sheehan WJ, Phipatanakul W. Difficult to Control Asthma: Epidemiology and its Link with Environmental Factors. Curr Opin Allergy Clin Immunol. 2015;15(5):397-401.
9. Amaral S, Pimenta F, Sant'anna C. Asma infantil e estresse familiar: revisão de literatura sobre intervenções familiares. 12º Congresso Nacional de Psicologia da Saúde; 25, 26 e 27 Janeiro de 2018; Portugal. Lisboa: ISPA – Instituto Universitário.
10. Farnik M, Pierzchala W, Broek G, Zejda J, Skrzypek M. Quality of life protocol in the early asthma diagnosis in children. Pediatr Pulmonol. 2010;45:1095-102.
11. Matsunaga NY, Ribeiro MAGO, Saad IAB, Morcillo AM, Ribeiro JD, Toro AADC. Avaliação da qualidade de vida de acordo com o nível de controle e gravidade da asma em crianças e adolescentes. J Bras Pneumol. 2015;41(6):502-08.
12. Roncada C, Mattiello R, Pitrez PM, Sarria EE. Specific tools to assess quality of life in children and adolescents with asthma. J Pediatr (Rio J). 2013;89:217-25.
13. Karadeniz P, Özdoğan S, Ayyıldız-Emecen D, Öncül U. Asthma control test and pediatric asthma quality of life questionnaire association in children with poor asthma control. Turkish J Pediatr. 2016; 58:464-72.
14. Silva AAM, Maciel ACC, Furtado PR, Tomaz RR, Maced TMF, Mendonça KMP. Aplicabilidade de um questionário genérico de avaliação de qualidade de vida para crianças asmáticas. Rev Paul Pediatr. 2018;36(2):207-13.
15. Silva N, Carona C, Crespo C, Canavarro MC. Quality of life in pediatric asthma patients and their parents: a meta-analysis on 20 years of research. Expert Rev. Pharmacoecon. Outcomes Res. Early online. 2015;15(3):499-519. doi: 10.1586/14737167.2015.1008459.
16. Al-Gewely MS, El-Hosseiny NFAE, El-Ghoneimy DH, Hassan AM. Health-related quality of life in childhood bronchial asthma. Egypt J Pediatr Allergy Immunol. 2013;11(2):83-93.
17. Spiriae VT, Bogiae M, Jankoviae S, Maksimoviae N, Miljanoviae SM, Popadiae AP, et al. Assessment of the Asthma Quality of Life Questionnaire (AQLQ): Serbian Translation. Croat Med J. 2004;45(2):188-94.
18. Hallit S, Raherison C, Waked M, Hallit R, Layoun N, Salameh P. Validation of the mini pediatric asthma quality of life questionnaire and identification of risk factors affecting quality of life among Lebanese children. J Asthma. 2018;56(2):200-10. doi: 10.1080/02770903.2018.1441417.
19. Ayuk AC, Oguonu T, Ikefuna NA, Ibe BC. Health-related quality of life in school-aged children with and without asthma in Enugu, South East Nigeria. Niger J Paed. 2013;40(4):364-9.
20. El-Gilany AH, El-Desoky T, El-Hawary A, Farrag M. Quality of life of children with bronchial asthma and their caregivers: A hospital-based study. Prog Med Sci. 2018;2(1):1-8.
21. Bildstrup L, Backer V, Thomsen SF. Increased body mass index predicts severity of asthma symptoms but not objective asthma traits in a large sample of asthmatics. J Asthma. 2015;52(7):687-92.
22. Ibrahim NK, Alhainiah M, Khayat M, Abulaban O, Almaghrabi S, Felmban O. Quality of Life of asthmatic children and their caregivers. Pak J Med Sci. 2019;35(2):521-6. doi: https://doi.org/10.12669/pjms.35.2.686.

23. Nordlund B, Konradsen JR, Pedroletti C, Kull I, Hedlin G. The clinical benefit of evaluating health-related quality-of-life in children with problematic severe asthma. Acta paediatr. 2011;100:1454-60.
24. Ricci G, Dondi A, Baldi E, Bendandi B, Gianneti A, Masi M. Use of the Italian version of the Pediatric Asthma Quality of Life Questionnaire in the daily practice: results of a prospective study. BMC Pediatr. 2009;9:30.
25. Almeida A, Figueiredo C, Rodrigues C. Avaliação da qualidade de vida em crianças e adolescentes com asma. Value Health. 2017;20:889.
26. Mussaffi H, Omer R, Prais D, Mei-Zahav M, Weiss-Kasirer T, Botzer Z, et al. Computerised paediatric asthma quality of life questionnaires in routine care. Arch Dis Child. 2007;92:678-82. doi: 10.1136/adc.2006.111971.
27. Vieira LMN, Ibiapina CC, LMLB Lasmar, Alvim CG, Andrade CR. Gravidade da asma em adolescentes e sua evolução temporal. Rev Med Minas Gerais. 2019;29(Supl 13):S44-9.
28. Desager K, Vermeulen F, Bodart E. Adherence to asthma treatment in childhood and adolescence – a narrative literature review. Acta Clinica Belgica. 2018 Oct;73(5):348-55. doi: 10.1080/17843286.2017.1409684.
29. Chatkin JM, Cavalet-Blanco D, Scaglia NC, Tonietto RG, Wagner MB, Fritscher CC. Adesão ao tratamento de manutenção em asma (estudo ADERE). J Bras Pneumol. 2006;32(4):277-83.
30. Howell CR, Thompson LA, Gross HE, Reeve BB, Huang SW, DeWalt DA, et al. Consistently suboptimal quality of life parallels consistently poor asthma control in children with asthma. Ann Allergy Asthma Immunol. 2017;119(6):562-4. doi:10.1016/j.anai.2017.09.053.

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Correspondência
Maria Emilia Coelho
E-mail: emiliasc_@hotmail.com