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ORIGINAL ARTICLE

Comparison of asthma control scales and quality of life in children

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ABSTRACT

Objective: Asthma control levels can be detected through questionnaires such as Asthma Control Test (ACT), childhood ACT (c-ACT), and Asthma Control Questionnaire (ACQ). The quality of life of the child and parent can be affected by asthma. The current study aims to compare asthma control scales and assess how asthma control affects quality of life.

Material and Methods: This study included the children with asthma. Children and their families completed ACT, c-ACT, ACQ, and the Pediatric Asthma Quality of Life Questionnaire (PAQLQ). While high scores on the ACQ test indicate poor asthma control, high scores on the ACT tests indicate well asthma control. High score on the PAQLQ shows that quality of life is also in high level.

Results: Ninety-four patients were included in the study. Median age of the patients was 9.6 (7.9–12.3) years. A comparison of asthma control scales showed that according to both tests, 25.5% (n=24) of patients were under total control. In totally controlled group of patients according to ACQ test, 48.9% were either partially controlled or uncontrolled according to ACTs. There was a negative correlation between ACT and ACQ ($p<0.001$, $r=-0.70$); c-ACT and ACQ ($p<0.001$, $r=-0.57$) and between ACQ and PAQLQ ($p<0.001$, $r:-0.69$). A positive correlation was found between ACTs and PAQLQ ($p<0.001$, $r=0.71$).

Conclusion: Quality of life was significantly impaired especially in uncontrolled asthmatic children. Control of asthma is crucial to increase the quality of life and improve the respiratory condition. Due to the discordance between currently used scales, determining the exact control seems difficult. New tests are urgently required to determine how well children's asthma is controlled.

Keywords: Asthma, child, quality of life.

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INTRODUCTION

One of the most prevalent chronic disorders in children, asthma is characterized by airway inflammation and sensitivity.[1] Most frequently starting at early childhood age, asthma can cause typical symptoms such as recurrent wheeze, dyspnea, and cough. If left untreated, these symptoms may restrict the patient's physical ability and increase school absenteeism during childhood.[2,3] In addition, asthma is listed as one of the main causes for hospital admissions and visits to emergency departments.[4,5]

In asthma management, target is achieving complete control over symptoms.[6] During long-term follow-up, it is crucial to evaluate disease control and regulate treatment protocol accordingly.[7,8] Main problem is the difficulty in achieving an accurate assessment of asthma control procedures. Some studies documented that in the assessment of control, there may be significant variations which are widespread among health-care professionals as patients. Physicians and patients tend to estimate asthma control level higher than it really is and in return, there may be a potential risk for inadequate treatment.[6] In an attempt to simplify asthma control assessment, a number of basic and easy-to-use asthma management questionnaires have been created.[4] Since the questionnaires enable a standard assessment, control of asthma may be achieved successfully.[5] In clinical practice, asthma control levels can be detected through questionnaires such as Asthma Control Questionnaire (ACQ) and Asthma Control Test (ACT).[9,10] Children's perceptions of their performance in sports, games, and other regular activities, including daily social life, determine the symptoms. A study from Saudi-Arabi assessed 278 asthmatic kids using the ACT. In this study, 62.6% were detected to have uncontrolled asthma and 37.4% were detected to have controlled asthma.[10] Similarly, in a different research, it was identified that through teaching the use of metered dose inhaler-spacer, there was a significant fall in the median ACQ score.[11]

Both the child and the caregiver may face a decline in quality of life as a result of asthma.[1,12] Therefore, in addition to the traditional management protocols, a life quality questionnaire is suggested. Among children, the most common scale is Pediatric Asthma Quality of Life Questionnaire (PAQLQ). According to a study conducted in Turkey, it was determined that the quality of life of children with controlled asthma was higher.[13]

There is a scarce of data evaluating asthma control scales with regard to their accuracy in children. The ACT and ACQ have been shown to have desirable reliability, validity, responsiveness, and screening accuracy in a study.[14] Another study conducted in China compared ACQ and ACT. It is concluded that ACT can supply screening accuracy close to ACQ due to its high reliability in assessing asthma control.[15] The National Asthma Education and Prevention Program (NAEPP) Asthma Control Criteria and the ACQ were shown to have weak agreement in a study from USA. In 54% of the patients, the ACQ's assessment of asthma control differed from the NAEPP's classification.[16]

This study aimed to compare ACT and ACQ administered to asthmatic patients and to evaluate how asthma control affects quality of life.

MATERIAL AND METHODS

Asthmatic patients within the age range of 7–16, followed by Marmara University Division of Paediatric Pulmonology, are included in the study. Demographic data and clinical characteristics were extracted from the medical files. All of the patients and their families were interviewed in person. To measure asthma control level and quality of life of all patients, ACT, ACQ, and PAQLQ were administered.

Instruments

ACT

Children between the ages of 4 and 11 were administered the Childhood ACT (c-ACT). The classical ACT test was used to evaluate patients who were older than 12 years old.

The C-ACT is designed as a seven-item survey in two separate parts for children to evaluate their past 4 weeks. The first part of the questionnaire, which consists of four questions, is filled out by the children themselves. It asks them about their perceptions of asthma control, their activity limitations, their coughing, and their nocturnal awakenings. The other part is fulfilled by the caregiver. Three questions on symptoms that occur during the day, wheezing throughout the day, and nighttime awakenings in the second section are questioned. The score is the total of all points between 0 and 27.[17]

Children aged 12 and older use the ACT, to analyze the past 4 weeks of their illness.[18]

Each of the five questions, which vary in difficulty from 1 to 5, asks the patient to assess their own experiences with breathlessness, nighttime awakenings, activity restriction, use of rescue short-acting beta agonists, and asthma management. ACT score is the total of all points, which can range from 5 to 25.

In both tests, if total asthma score is ≤19, it is classified as uncontrolled, if it is between 20 and 24 it is partially controlled and ≥25 score is classified as controlled.[17] Turkish language validity and reliability of both of the ACTs were also performed.[19,20]

ACQ

This questionnaire is administered to children aged between 6 and 16 years. It consists of five questions on symptoms, use of bronchodilator during the past 1 week and one question on FEV1% change. If children fail to complete respiratory function test, it is viable to skip the last item on spirometry. All questions are scored between 0 and 6 points and total score can be defined as the mean of these points. Higher score means impaired asthma control.[11] 0.0–0.75 score is classified as totally controlled; "grey zone" (partially controlled) in between 0.75 and 1.5; and >1.5 is classified as uncontrolled asthma.[21]

PAQLQ

This questionnaire is specific for children in 7–17 age group. Children are required to consider their most recent week when responding to the PAQLQ questions. This globally popular questionnaire consists of three sub-headings with 23 questions related to symptoms, limitations of activities and emotional functions. Based on children's responses, each question is scored in between 1 and 7 points. In scoring, 1 point shows hyper discomfort, or constant complaint while 7 points indicate lack of any complaint. Total quality of life score is computed as per mean score of all questions. Total score to receive from the questionnaire is in between 23 and 161. In addition to total

Table 1: Demographic data for patients with asthma

Age (year), median (25–75 p)	9.6 (7.9–12.3)
Male gender, n (%)	54 (57.4)
Duration of treatment (months), median (25–75 p)	4 (2–6)
Duration of disease (months), median (25–75 p)	5 (3–8)

Table 2: Asthma control scales

	n	%
ACT and c-ACT		
Totally controlled	24	25.5
Partially controlled	43	45.7
Uncontrolled	27	28.7
ACQ		
Totally controlled	70	74.5
Partially controlled	15	16
Uncontrolled	9	9.6

ACT: Asthma control test; C-ACT: Childhood asthma control test; ACQ: Asthma control questionnaire.

score, points received from symptoms, limitations of activities and emotional function dimensions are also computed. High score shows that quality of life is also in high level.[22,23]

Before conducting this research, approval was received from Marmara University, Clinical Researches Ethics Committee. Parents' informed consent was obtained.

Statistical Analysis

Statistical analyses of the research were conducted in IBM SPSS version 23.0© (SPSS Inc., Chicago, IL, USA). The variables were reported as mean±standard deviation for normally distributed data and as median for not normally distributed data (25–75 percentile). Categorical variables were given as frequency percentages. In the comparison of numeric data, for normally distributed data, Independent Sampling t-test was employed. Interlinks among ACTs, ACQ, and PAQLQ were analyzed through correlation test. It was determined that P 0.05 was statistically significant.

RESULTS

In the study, 94 patients were involved. Fifty-four (57.4%) of them were male and median age was 9.6 (7.9–12.3) years. Table 1 shows the demographical data of the patients.

According to ACT results, 25.5% of patients were under total control, 45.7% were under partially control and 28.7% were uncontrolled. According to ACQ, 74.5% of patients were under total control, 16% were under partially control, and 9.6% were uncontrolled (Table 2).

A comparison of asthma control scales showed that according to both tests, 25.5% (n=24) of patients were under total control. In totally controlled group of patients according to ACQ test, 48.9% were either partially controlled or uncontrolled according to ACTs (Table 3).

Table 3: Comparative Analysis of Asthma control scales (n=94)

ACT / ACQ*	Totally controlled	Partially controlled	Uncontrolled
Totally controlled*	24 (25.5%)	38 (40.4%)	8 (8.5%)
Partially controlled*	0	5 (5.3%)	10 (10.6%)
Uncontrolled*	0	0	9 (9.6%)

*: Resembles the data of ACQ.

Table 4: Scores of pediatric asthma quality of life questionnaire and asthma control scales

C-ACT, mean±SD	21.4±4.2
ACT, mean±SD	20.8±3.9
ACQ, median (25–75 p)	0.4 (0.1–0.8)
Total score in quality of life, mean±SD	6.0±0.8
Symptoms score, mean±SD	5.9±1.0
Activity limitations score, median (25–75 p)	6.5 (5.8–7.0)
Emotional functioning, mean±SD	6.2±0.9

ACT: Asthma control test; C-ACT: Childhood asthma control test; ACQ: Asthma control questionnaire; SD: Standard deviation.

Table 5: Correlations between asthma control scales and quality of life questionnaire

	PAQLQ	Symptoms score	Activity limitations score	Emotional function score
Total ACTs	0.71*	0.74*	0.63*	0.53*
C-ACT	0.71*	0.75*	0.58*	0.52*
ACT	0.73*	0.74*	0.66*	0.54*
ACQ	-0.69*	-0.69*	-0.64*	-0.51*

*: P<0.05; ACTs: Asthma control tests; ACT: Asthma control test; C-ACT: Childhood asthma control test; ACQ: Asthma control questionnaire.

Table 4 shows the scores from PAQLQ and asthma control scales. A negative correlation was observed between C-ACT and ACQ (p<0.001, r=-0.57); between ACT and ACQ (p<0.001, r=-0.70); between ACQ and PAQLQ (p<0.001, r=-0.69). There was a positive correlation between C-ACT and PAQLQ (p<0.001, r=0.71); between ACT and PAQLQ (p<0.001; r=0.73) (Table 5).

DISCUSSION

The present study revealed that the definitions of asthma control in children between ACT and ACQ were seriously inconsistent. Both tests have been demonstrated to be connected to quality of life. This study once again revealed that to define control of asthma was still difficult.

The main goal of asthma management is to reach and keep disease control to unblock limitations such as school absenteeism or limited physical activity.[24] Exacerbations of asthma can increase the likelihood of worsening of lung functioning; thus it is essential to attentively describe uncontrolled asthma.[25] According to a previous study, determining the severity of asthma and controlling it are essential to enhancing children's quality of life.[26] ACT/ACQ are standardized, approved, and largely common tools used to assess asthma control.[27] The first study of ACT presenting as an indicator of asthma control was published in 2004. This publication demonstrated the reliability and validity of the ACT scores, demonstrating the test's potential as a screening tool for those with badly managed asthma.[9] Jia et al.[27] conducted a meta-analysis of 21 clinical studies to assess the diagnostic abilities of the ACQ and ACT. For the evaluation of controlled asthma, it was revealed that ACT offered good diagnostic performance. The researchers also suggested that ACQ's sensitivity and specificity existed in a distinct instability. They detected that neither ACT nor ACQ managed to be of use in the assessment of uncontrolled asthma. According to Cloutier and colleagues, factors like access to spirometry (only ACQ provides for a lung function evaluation) or study design (the measurement window for the ACQ is 1 week and the ACT is 4 weeks) may have an impact on the study.[28] In our research, 25% of the patients were detected to be under totally controlled according to both of the scales. In parallel with the study by Nguyen et al.,[29] it became apparent in our study that although ACQ correlated with ACTs, in totally controlled group of patients according to ACQ test, 48.9% were either partially controlled or uncontrolled according to ACTs. Hence, different scales are required to evaluate asthma management.

Low quality of life was found to be substantially correlated with inadequate asthma management in a prior study.[30] In addition, it was revealed that the PAQLQ's three subgroups were all similarly impacted.[30] Similar results were reported in a different investigation; however, the activity restrictions were the most impacted subgroup.[31] A study by Matsunaga et al.[32] revealed that when compared to the uncontrolled asthmatic group, the controlled and partially controlled asthmatic groups showed higher values for the PAQLQ overall score and all PAQLQ domains. In the present study, significantly higher PAQLQ scores were measured among children with controlled asthma. Activity limitations were the most affected subgroup.

One of our study's limitations is its cross-sectional design. Prospective follow-up of the patients could render more accurate insights on the predictive performance of such tools. Our sample size was another limitation of our study. Studies with larger populations would be more beneficial. Furthermore, we did not verify the clinical status of these patients with pulmonary function test (PFT) during the study period as our primary aim was just compare these tests. It would be more beneficial to evaluate the asthma control by adding their PFT.

In conclusion, our research indicates that greater asthma management may improve the quality of life for asthmatic kids. Although asthma control scales seem to be correlated, a good number of patients apperently under totally controlled according to ACQ fail to be under control according to ACT; thus, it becomes evident that different scales are required to determine how well children's asthma is controlled.

Statement

Ethics Committee Approval: The Marmara University Clinical Research Ethics Committee granted approval for this study (date: 11.02.2022, number: 09.2022.323).

Informed Consent: Written informed consent was obtained from patients who participated in this study.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept – APE, MS, CYY, MY, AG, MK, ŞK, EEE, YG, BK; Design – APE, MS, CYY, MY, AG, MK, ŞK, EEE, YG, BK; Supervision – APE, MS, CYY, MY, AG, MK, ŞK, EEE, YG, BK; Resource – APE, MS, EEE; Materials – APE, MS, EEE; Data Collection and/or Processing – APE, MS, EEE, CYY; Analysis and/or Interpretation – APE, MS, EEE, YG, BK; Literature Search – APE, MS, EEE, YG, BK; Writing – APE, MS, EEE, YG, BK; Critical Reviews – APE, MS, EEE, YG, BK.

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