

Change in quality of life, anxiety and depressive symptoms with asthma severity in children

Pediyatrik astım şiddeti ile yaşam kalitesi, anksiyete ve depresif semptomlarda değişme

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ABSTRACT

Objective: The aim of this study was to evaluate the change in anxiety-depression symptoms with the change in asthma related symptom score and quality of life in children.

Materials and Methods: Thirty five children with asthma aged 6 to 16 years were enrolled in this cohort. Symptom scores were recorded and all children filled in Pediatric Asthma Quality of Life Questionnaire (PAQLQ), Hospital Anxiety Depression Scale (HADS) and Center for Epidemiologic Studies Depression Scale (CES-D). They were called in again four months later to evaluate for change in all parameters.

Results: When initial presentation and follow-up values were compared, significant decrease in symptom score, number of exacerbations and number of emergency visits was detected ($p < 0.001$, $p =$

ÖZ

Giriş: Bu çalışmanın amacı çocuklarda astım ilişkili semptom skoru ve yaşam kalitesindeki değişikliklerle ilişkili anksiyete-depresyon semptomlarındaki değişimi incelemektir.

Gereç ve Yöntem: Bu kohorta 6 ile 16 yaş arasında 35 astımlı çocuk alındı. Semptom skorları kaydedildi ve tüm çocuklar Pediyatrik Astım Yaşam Kalitesi Anketi (PAQLQ), Hastane Anksiyete Depresyon Skalası (HADS) ve Epidemiyolojik Çalışmalar Depresyon Skalası (CES-D)'ni doldurdu. Dört hafta sonra tekrar çağrılarak tüm parametrelerdeki değişim değerlendirildi.

Bulgular: İlk başvuru ve izlemdeki değerler karşılaştırıldığında semptom skoru, alevlenme ve acil servis başvuru sayısında anlamlı azalma saptandı (sırasıyla $p < 0.001$, $p = 0.001$ ve $p = 0.004$). Benzer şekilde, HADS anksiyete ve depresyon puanlarıyla

0.001 and $p=0.004$ respectively). Similarly, HADS anxiety and depression scores as well as CES-D score improved significantly at follow-up when compared to the initial presentation ($p<0.001$, $p=0.001$ and $p<0.001$ respectively). Change in symptom score was significantly correlated with changes in CES-D score as well as PAQLQ symptom, emotion and total scores ($r=0.39$ $p=0.04$, $r=-0.57$ $p<0.001$, $r=-0.66$ $p<0.001$, $r=-0.66$ $p<0.001$ respectively). Change in PAQLQ total score demonstrated significant negative correlation with the change in HADS anxiety score ($r=-0.42$, $p=0.02$).

Conclusion: Improvement in asthma symptoms and QoL is associated with improvement in depression-anxiety symptoms.

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Key words: Asthma, anxiety, depression, quality of life, children

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INTRODUCTION

Asthma can impair children's participation in play and lead to social, emotional, and school performance consequences. Patients with asthma demonstrate higher risk for emotional and behavioral problems including depression and anxiety than healthy children^[1-3]. Psychological disorders may interfere with patients' development of coping strategies and result in worse quality of life (QoL)^[2,4]. Previous studies also have identified an association between asthma severity and psychological disorders such as depression, anxiety, and post-traumatic stress disorder^[5-8].

Quality of life measures are frequently used to assess outcomes in children with asthma, and especially asthma-specific QoL measures are correlated with disease severity^[9]. QoL is a multidimensional issue and includes physical functioning, somatic sensation, and social and emotional wellbeing^[10]. QoL worsens as the severity of asthma increases and is worse in patients with uncontrolled asthma^[9,11]. Uncontrolled asthma influences daily functioning and it is associated with worse QoL outcomes^[2,11]. Many previous cross-sectional studies have indicated

birlikte CES-D puanı da ilk başvuruya göre kontrolde belirgin iyileşti (sırasıyla $p<0.001$, $p=0.001$ ve $p<0.001$). Semptom skorundaki değişiklik, CES-D puanıyla beraber PAQLQ semptom, duyu ve total puanlarındaki değişikliklerle belirgin koreleydi (sırasıyla $r=0.39$ $p=0.04$, $r=-0.57$ $p<0.001$, $r=-0.66$ $p<0.001$, $r=-0.66$ $p<0.001$). PAQLQ total puanındaki değişiklik HADS anksiyete skoruyla anlamlı negatif korelasyon gösterdi ($r=-0.42$, $p=0.02$).

Sonuç: Çocuklarda astım semptomları ve yaşam kalitesindeki iyileşme depresyon-anksiyete semptomlarında düzelmeye ilişkilidir.

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that worse asthma-related QoL is associated with increased levels of depression and anxiety in both pediatric and adult patients^[6-8]. Therefore, it is essential to assess both asthma severity and depression-anxiety longitudinally to help determine how these problems interact.

The aim of this study was to evaluate the correlation between longitudinal change in asthma-related symptoms and change in anxiety-depression symptoms and quality of life in children with asthma.

MATERIALS and METHODS

Study Sample

Thirty five (20 male, 15 female) children aged between 6 and 16 years with newly diagnosed asthma were enrolled in the study consecutively. Diagnosis of asthma was based on history of recurrent cough and wheezing with prolonged expiration time that regressed with short-acting bronchodilator therapy, beta-2 agonist^[12]. Children with any other chronic disease or doctor diagnosed psychiatric disease, as well as the ones who did not agree to participate, were excluded. Seven children were lost to follow-up during the study period.

Study Design and Ethical Approval

This is a cohort study. The study was approved by the Institutional Review Board of the Celal Bayar University Medical Faculty and informed consent was signed by parents of all the children.

Data Collection

All children diagnosed with asthma and started on controller medications in our Pediatric Allergy and Pulmonology Department were enrolled in the study consecutively. Demographic and disease characteristics of the children were recorded, including age, gender, duration of asthma symptoms before diagnosis, number of exacerbations, days of bronchodilator and/or systemic steroid requirement, days of hospitalizations, and number of emergency visits during the previous two month period. All children filled in the following questionnaires under the supervision of a pediatrician in the allergy clinic: Patient Reported Asthma Symptom Score, Pediatric Asthma Quality of Life Questionnaire (PAQLQ), Hospital Anxiety Depression Score (HADS), and Center for Epidemiological Studies Depression Scale (CES-D). Patients were called in again four months later to evaluate for the change in all the parameters. Disease characteristics and patient-reported symptom score were recorded again, and all the questionnaires were repeated.

Patient-Reported Asthma Symptom Score

The asthma symptom score used in this study included five items reflecting chronic asthma symptoms: dyspnea, tightness in chest, daytime wheeze, nocturnal wheeze, and daily performance during the previous three-month period^[13]. Items were scored from 0 to 3 as the severity increased. Total score was expressed as the sum of all the scores of the items and ranged from 0 to 15.

Pediatric Asthma Quality of Life Questionnaire

The PAQLQ is a disease-specific quality of life questionnaire developed by Juniper et al. in

English^[14,15]. This study used the version previously translated to Turkish and validated^[16]. The PAQLQ is a 23 item questionnaire grouped into "symptoms," "emotional function," and "activity limitations" domains^[17]. Each of the items is rated using a Likert-type scale ranging from 1 to 7, where higher scores indicate less impairment. Individual items within the PAQLQ are equally weighted. Domain scores are expressed as the mean score per item in each domain. Symptoms domain include 10 items, emotional function domain and activity limitations domains include 8 and 5 items respectively.

Hospital Anxiety-Depression Scale (HADS)

The HADS questionnaire, generated by Zigmond et al., was used to evaluate anxiety and depression status. Turkish validity of this scale was done by Aydemir et al.^[18,19]. The HADS includes 14 questions, eight of which are scored from 3 to 0 and six from 0 to 3. The anxiety sub-score is measured by adding seven items, and the depression sub-score is calculated by adding the remaining seven items. Higher scores indicate higher depression and anxiety.

Center for Epidemiologic Studies Depression Scale (CES-D)

The CES-D is a 20-item questionnaire. Each item addresses depressive symptoms during the previous week, and scores range from 0 to 3. Total score is calculated by summing the scores for individual items and ranges from 0 to 60. Higher scores indicate higher depressive symptomology^[20]. The questionnaire has been translated into Turkish.

Statistical Analysis

Statistical analyses were performed using the SPSS 13.0 statistical software package (Chicago IL). Paired samples t-test was used to compare questionnaire scores and disease parameters between initial presentation and follow-up.

Pearson's correlation analysis was performed for the change in symptom score and questionnaire scores.

RESULTS

Characteristics of the Study Population

Mean age of the children included in the study was 9.0 years, with a standard deviation of 2.7 years. Mean age at the onset of asthma symptoms was 3.8 ± 3.1 years. During the previous two-month period, mean days of inhaled bronchodilator and systemic steroid requirement were 2.6 ± 3.3 and 0.9 ± 1.4 days, respectively. Mean number of asthma exacerbations was 1.4 ± 1.2 , and mean number of hospitalization days was 0.4 ± 1.0 . Mean number of times presenting to the emergency department was 0.9 ± 1.4 . Mean patient-reported asthma symptom score was 5.4 ± 3.3 at initial presentation (Table 1).

Comparison of Patient Reported Asthma Symptom Score, PAQLQ Scores, HADS Scores, and CES-D Scores at Initial Presentation and at Four Months' Follow-Up

Comparison of initial presentation and follow-up values revealed a significant decrease in symptom score (5.4 ± 3.3 vs. 1.3 ± 1.6 , respectively, $p < 0.001$). Moreover, number of exacerbations and number of emergency visits had dec-

reased at follow-up visit when compared to the initial presentation (1.4 ± 1.3 vs. 0.3 ± 0.9 , $p = 0.001$, and 0.9 ± 1.4 vs. 0.1 ± 0.2 , $p = 0.004$, respectively). Similarly, HADS anxiety and depression scores and CES-D score decreased significantly at follow-up when compared to the initial presentation ($p < 0.001$, $p = 0.001$ and $p < 0.001$ respectively). PAQLQ activity, symptoms, emotions, and total scores displayed a significant increase at follow-up when compared to the initial presentation ($p < 0.001$ for all) (Table 2).

Correlation of the Change in Disease Severity Parameters, PAQLQ, HADS, and CES-D Scores

Change in symptom score had modest correlation with changes in CES-D score ($r = -0.39$, $p = 0.04$) and stronger correlation with PAQLQ symptom, emotion, and total scores ($r = -0.57$, $r = -0.66$, $r = -0.66$ respectively, $p < 0.001$ for all) but not with the activity score ($r = -0.37$, $p = 0.05$) (Figure 1). Change in number of exacerbations was significantly correlated with the changes in HADS anxiety and CES-D scores ($r = 0.47$, $p = 0.01$, and $r = 0.39$, $p = 0.04$, respectively) (Figures 2,3). Change in the number of exacerbations showed significant negative correlation with all sub-scores of PAQLQ ($r = -0.44$, $p = 0.02$ for activity; $r = -0.53$, $p = 0.004$ for symptom; $r = -0.70$, $p < 0.001$ for emotion; $r = -0.63$, $p < 0.001$ for total score). Change in PAQLQ total score demonstrated significant negative correlation with the change in HADS anxiety score ($r = -0.42$, $p = 0.02$).

DISCUSSION

The results of our study indicate that asthma-related quality of life in children improves as symptom score and number of exacerbations decrease. Moreover, change in asthma symptom score and number of exacerbations is correlated with the change in PAQLQ total score.

It has been reported that asthma-related QoL is associated with anxiety and depression in adult patients with asthma^[6-8]. Compared to these published cross-sectional studies, our lon-

Table 1. Demographic and disease characteristics of the study population at enrollment (n= 35)

	Mean \pm Standard deviation
Age (years)	9 \pm 2.7
Disease duration (days)	3.8 \pm 3.1
Symptom score	5.4 \pm 3.3
Number of exacerbations*	1.4 \pm 1.2
Days of bronchodilator requirement*	2.6 \pm 3.3
Days of systemic steroid requirement*	0.9 \pm 1.4
Days of hospitalization*	0.4 \pm 1.0
Number of emergency visits*	0.9 \pm 1.4

*During previous two month period.

Table 2. Change in symptom score, PAQLQ scores, anxiety and depression parameters between initial presentation and follow up (n= 28)

	Presentation*	Follow up*	p**
Symptom score	5.4 ± 3.3	1.3 ± 1.6	< 0.001
Number of exacerbations	1.4 ± 1.3	0.3 ± 0.9	0.001
Number of emergency visits	0.9 ± 1.4	0.1 ± 0.2	0.004
HADS depression score	3.2 ± 2.7	1.7 ± 2.1	0.001
HADS anxiety score	5.7 ± 3.1	2.4 ± 2.8	< 0.001
CES-D score	23.1 ± 7.9	14.8 ± 4.6	< 0.001
PAQLQ activity score	4.2 ± 1.0	6.6 ± 0.4	< 0.001
PAQLQ symptoms score	4.4 ± 1.2	6.4 ± 0.7	< 0.001
PAQLQ emotions score	4.7 ± 0.9	6.4 ± 0.7	< 0.001
PAQLQ total score	4.5 ± 0.9	6.5 ± 0.6	< 0.001

* Mean ± standard deviation.

** Student's t test

PAQLQ: Pediatric Asthma Quality of Life Questionnaire, HADS: Hospital Anxiety Depression Scale, CES-D: Center for Epidemiologic Studies Depression Scale.

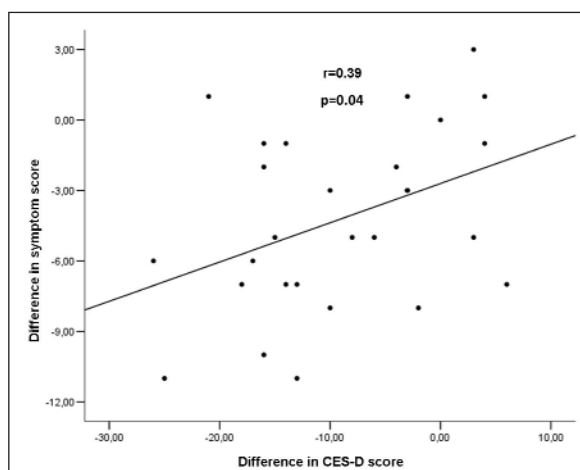


Figure 1. Correlation of the changes in symptom score and CES-D score.

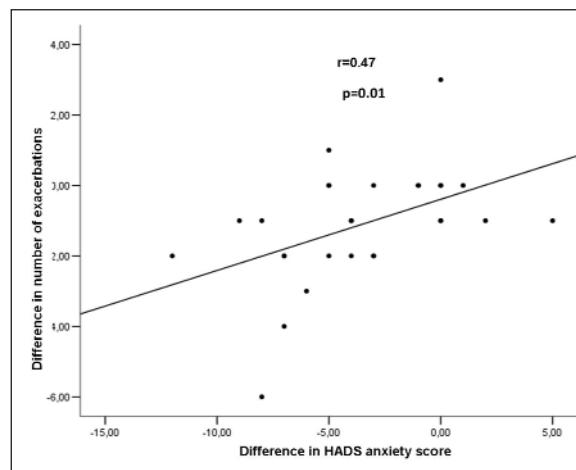


Figure 2. Correlation of the changes in number of exacerbations and HADS anxiety score.

itudinal study design demonstrates a good correlation between improvement in symptoms and improvement in QoL and thus strengthens the evidence for this important association in children. Some authors have argued that deteriorated quality of life leads to behavioral and emotional disorders in adults; some have argued that depression and anxiety lead to worse QoL^[6-8,13]. Clarification of the factors that influence this association and the direction of causality is important to develop

appropriate therapeutic strategies both in adults and children. Thus, our results may provide clues to this in children.

Asthma is associated with increased rates of depression, and lower asthma-related QoL is associated with higher levels of depression severity^[6-8]. The presence of depression or anxiety is associated with increased asthma symptom burden in children with asthma^[21]. Previous cross-sectional studies have suggested that such association might reflect common factors asso-

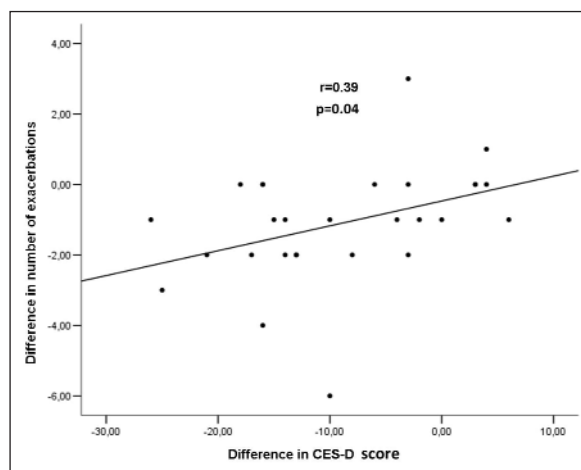


Figure 3. Correlation of the changes in number of exacerbations and CES-D score.

ciated with asthma and depression rather than a causal relationship between the diseases^[7]. Therefore, further cohort studies were required to clarify this issue. The results of this study indicate that change in CES-D score is associated with a change in symptom score and number of exacerbations in children with asthma during follow-up. Depression decreased as symptom score and number of exacerbations decreased at the follow-up visit when compared to the initial presentation. This finding strengthens the evidence for the important association between asthma control and symptoms of anxiety and depression.

There is a high comorbidity of asthma and anxiety disorders^[22]. Anxiety is associated with worse asthma presentation and outcomes, including perception of symptoms and asthma self-management, leading to a vicious cycle between asthma-related quality of life and anxiety^[8]. Therefore, both elements of this cycle need to be considered when treating patients with asthma to achieve better treatment outcomes. The results of our study indicate that change in anxiety score as measured by the HADS questionnaire is significantly correlated with the changes in the number of exacerbations and PAQLQ total score during follow-up. Moreover, the results of this cohort study demonstrate that anxiety score decreased signifi-

cantly after four months of follow-up as asthma-related QoL parameters and number of exacerbations improved.

Children with asthma and co-morbid depressive and anxiety symptoms have higher health care utilization and costs^[23]. Moreover, they display a more severe functional disability^[4]. Consideration of these facts makes the results of our study, which demonstrate improvement in depression-anxiety symptomology with improving asthma severity, significant not only for the psychological consequences of this disease but also for other aspects of asthma, such as cost and functional disability.

The major limitation of this study is that QoL might be influenced by many social and emotional factors besides asthma. This limitation was partially overcome with the use of a disease-specific measure for measurement of QoL and with exclusion of children with any other chronic diseases. The direction of cause and effect between asthma control and symptoms of anxiety and depression and QoL cannot be inferred from these data, but this study provides further justification for a cohort study design comparing exacerbation rates between patients with and without high levels of anxiety and depression at baseline.

In conclusion, the results of our study indicate a correlation of asthma severity, as predicted by symptom score and number of exacerbations, with quality of life and anxiety-depression symptoms. The longitudinal design of the study enabled us to analyze the correlation between change in asthma severity that leads to improvement in asthma-related QoL and change in depression-anxiety symptoms. These results support evaluation of children with asthma for the presence and course of depression and anxiety symptoms at initial presentation and follow-up.

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