

Assessment of quality of life in asthmatic Turkish children

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Our aim was to assess impairment in quality of life (QOL) in asthmatic children and to determine the influencing factors.

The study group consisted of 305 outpatients with asthma, aged 7-17 years, who were undergoing regular checkups in our outpatient clinic. QOL was assessed using the Pediatric Asthma QOL Questionnaire (PAQLQ).

Asthma severity, presence of allergic rhinitis, and steroid usage were strongly and negatively associated with the overall PAQLQ score ($p=0.038$) in multivariate regression models. Sex, IgE levels, positive skin tests and smoking status demonstrated no statistically significant effects on the overall or three individual domain PAQLQ scores ($p=0.307, 0.137, 0.470, 0.353$, respectively). Lung function measures were strongly correlated with each other (Spearman correlation of 0.77), but were not associated with QOL ($p=0.441$). Fifty-one percent of the patients reported that asthma affected their lives significantly.

This study captured the baseline QOL information about the pediatric asthmatic population and factors influencing QOL and will facilitate longitudinal monitoring.

Key words: pediatric asthma, quality of life, questionnaire.

Quality of life (QOL) has increased in popularity over the last 20 years as an outcome measure in health research. Many clinicians now recognize the importance of incorporating an assessment of health-related quality of life (HRQL) into their clinical studies. This fact becomes even more relevant in patients with chronic diseases. QOL is a concept including the child's and parents' subjective experience with the disease, providing information about how the condition affects everyday functioning and well being¹. Traditional clinical indices provide valuable information about the status of the affected organ system, but they only moderately correlate with how patients feel and are able to function in their everyday lives. To obtain a complete picture of a patient's health status, both the conventional clinical indices and the patient's HRQL must be measured.

Asthma is the most common chronic pediatric disease that can result in variable restriction in the physical, emotional and social aspects of

the patient's life. Asthma and allergic rhinitis very often coexist in the same patient and both diseases are associated with impairment in QOL². Children with asthma and rhinitis are distressed by the symptoms (difficulty in breathing, wheezing, and cough), and they are limited in their day-to-day activities, such as sports, schoolwork, and participation in other activities with friends. Children are often fretful, irritable and anxious because they have asthma. Patients with allergic rhinitis experience both nasal symptoms such as rhinorrhea, nasal congestion and sneezing and non-nasal symptoms like headache, thirst, and disturbed sleep. In addition, both children and their families experience emotional strain as a result of both conditions³.

The purpose of this study was to determine whether asthma severity, allergic rhinitis, steroid usage, lung function measures, IgE levels, skin test positivity, smoking status, age and sex were important determinants of QOL scores.

Material and Methods

The study group consisted of 305 outpatients with asthma (183 boys, 122 girls), aged 7-17 years (mean age: 9 ± 3.2 years) who were undergoing regular checkups at our asthma outpatient clinic. The study was done between January 2004 and August 2004. Subjects were excluded if they had an illness other than asthma that might have an impact on HRQL or if they had no asthma attack in the previous 12 months.

Patients were included if they gave a history of current asthma. Subjects were defined as current asthmatics if they had had at least one asthma attack in the previous 12 months. Symptoms of perennial rhinitis were defined as an affirmative answer to the question: "When you are near animals, such as cats, dogs or horses, near feathers, including pillows and quilts, or in a dusty part of the house, do you ever get a runny or stuffy nose or start to sneeze?". Symptoms of seasonal rhinitis were defined as an affirmative answer to the question: "When you are near trees, grass or flowers, or when there is a lot of pollen, do you ever get a runny or stuffy nose or start to sneeze?" Subjects were considered as having allergic rhinitis if they answered positively to one or both questions on symptoms of rhinitis.

Data on the children's serum IgE levels, asthma diagnosis and frequency of asthma symptoms in the last 12 months, use of asthma medication, emergency room visits and hospitalizations were provided from medical records. In the intake interview, the caregiver (defined as the individual who knows most about asthma care for the child) was asked about child and family asthma history, exposure to smoking, and medication usage. Asthma severity was classified according to the classification scheme proposed by the Global Initiative for Asthma⁴ (presence of daytime coughing/wheezing, the use of short-acting β_2 agonists, home monitoring of peak expiratory flow rate [PEFR] by the physician). The QOL was assessed using the Standardized Pediatric Asthma Quality of Life Questionnaire (PAQLQ [S]) interviewer-administered Turkish version. This 23-item questionnaire measures HRQL in patients aged 7 to 17 years with asthma and has proved reliable, valid and responsive throughout this entire age range⁵. The PAQLQ (S) includes three primary domains: how asthma interferes with activities (5 items, including

physical, social, school and sleeping), asthma symptoms (10 items, including shortness of breath, wheeze, cough, tightness of chest and tiredness), and emotional function (8 items, including frustration, fear, anxiety, anger, and feeling different and left out). Children are asked to recall impairments they have experienced during the previous week. The subjects were asked to indicate how much they have been "bothered" or how "often" an asthma symptom has occurred in the past week with the use of a 7-point categorical scale from "extremely bothered" to "not bothered" or "all of the time" to "none of the time" (1 indicates maximum impairment and 7 indicates no impairment).

Scores were calculated as described in the original publication⁶. A child's scores on questions belonging to each domain are summed and divided by the number of questions of the domain. Scores on all questions are summed and divided by 23, giving the overall score. Results are expressed as a mean score per item for each domain and for all 23 questions ranging from 1 to 7.

An allergy testing for common indoor and outdoor allergens was conducted with skin testing using the prick puncture method. Valid tests had a negative control wheal at least 1 mm smaller than the positive histamine wheal, and tests were considered positive if the wheal for a given allergen exceeded the negative control wheal by at least 2 mm. Allergens evaluated included *Dermatophagoides farinae*, *Dermatophagoides pteronyssinus*, *Aspergillus fumigatus*, *cladosporium*, *penicillium*, cockroach, cat, dog, 12-grass mix, 4-tree mix, and 4-cereals mix.

Pulmonary function was assessed using the Spiromed-microplus portable spirometer M503 (MAN5105). We focused on the assessment conducted concurrently with the intake interview. To compare lung function across children, we determined the percent (%) of predicted value for forced expiratory volume in one second (FEV1) and PEFR⁷. The best of at least three technically acceptable values for FEV1 was selected. PEFR and FEV1% were used as the lung function measure of severity.

The Hospital's Ethics Committee approved the study. Informed consent was obtained from at least one of the parents.

The Statistical Package for the Social Sciences (SPSS 12.0 for Windows) was used for data management and analyses. For the regression models, we evaluated the relationship between our primary outcome measure (pediatric asthma-related QOL) and a subset of demographic variables and possible risk factors. Overall PAQLQ and its three domain scores were analyzed as the dependent factor in a logistic regression, using the median values as the cut-off for low scores. PAQLQ overall and domain scores below the calculated median cut-off values were considered as impaired QOL. Stepwise logistic regression analysis was used to examine potential predictors of asthma-related QOL.

Spearman correlation coefficients were calculated to measure the relationships between the overall PAQLQ with its three dimensions and PEFr and FEV1% of predicted and age.

Results

Data from 305 eligible children were analyzed. The mean age of children participating in the study was 9 ± 3.2 years, and the male to female ratio was 1.5:1. According to the classification scheme proposed by the Global Initiative for Asthma, 82% of children had intermittent, 11% mild persistent and 7% moderately persistent asthma. Sixty-four percent of asthmatics also had allergic rhinitis. The children's median duration of asthma diagnosis was 5 ± 2.8 years (range: 1 to 14 years). Seventy-eight percent of the patients' skin tests were positive at least to one allergen. In 55% of patients' families, at least one member was a smoker. The characteristics of the patients are described in Table I.

Table I. Patient Characteristics

Number of patients	305
Age (year)	9 ± 3.2
Sex (M/F)	183/122
Asthma severity	
Intermittent	249 (81.6%)
Mild persistent	34 (11.2%)
Moderately persistent	22 (7.2%)
Current asthma medication	
No medications	42 (13.8%)
Bronchodilators alone	32 (10.5%)
Bronchodilators plus inhaled steroids	231 (75.7%)
Leukotriene antagonists	23 (7.5%)
Allergic rhinitis	
Yes	195 (63.9%)
No	110 (36.1%)

For children, using the PAQLQ, the median score on the seven-point symptoms subscale was 6.6, with medians of 5.8 for activity limitation and 5.25 for emotional function, with a median overall QOL score of 5.91 (where a score of 1 indicates maximal impairment and a score of 7 indicates no impairment). The range across children was substantial, with overall QOL scores ranging from 1.52 to 7.

Fifty-one percent of the patients reported that asthma affected their lives, 55% reported impairment in physical activities, 55% reported impaired QOL due to asthma symptoms like shortness of breath, cough or wheeze, and 52% felt irritable, frustrated or left out and that they could not keep up with others because of their asthma.

Grading of asthma severity from medical records in the categories intermittent, mild and moderate yielded a statistically significant effect on the overall PAQLQ scores ($p < 0.001$) in univariate regressions. Asthma severity, presence of allergic rhinitis and steroid usage were strongly and negatively associated with the overall PAQLQ score ($p = 0.038$) in multivariate regression models. Although age was predictive of asthma-related QOL in univariate regressions ($p = 0.028$), it was not statistically significant in multivariate models ($p = 0.105$). Sex, IgE levels, positive skin tests and smoking status did not demonstrate statistically significant effects on the overall or three individual domain PAQLQ scores (p values = 0.307, 0.137, 0.470, 0.353, respectively). Asthma severity and allergic rhinitis were strongly and negatively associated with the symptom score ($p = 0.024$), while age was strongly and positively associated ($p = 0.013$), with younger children reporting more symptoms. Although many factors were predictive of emotional score, no terms other than steroid usage ($p < 0.01$) were statistically significant in multivariate models. Asthma severity and allergic rhinitis were strongly and negatively associated with the activity score ($p = 0.002$).

The mean FEV1% was 96.1% of predicted (standard deviation of 7.2%). The mean PEFr% was 97.9% (standard deviation of 6.3%) of predicted. As would be anticipated, these two measures were strongly correlated with each other (Spearman correlation $r = 0.77$, $p = 0.001$), but the lung function measures were not associated with QOL ($p = 0.441$).

Discussion

In the current era of health care, providers are increasingly taking into account HRQL outcomes as part of the decision-making process for the delivery of good quality care. As asthma is becoming increasingly prevalent, it is essential to study not only the causes and treatments of asthma, but also the associated QOL. The purpose of this study was to profile the factors influencing QOL in asthmatics, and offer recommendations for further research.

In this study, asthma severity and presence of allergic rhinitis were found to be significant factors associated with impaired QOL except emotional function. There is a statistically significant decrease in QOL with increasing asthma severity, in agreement with past studies^{8,9}. The finding that the total burden of QOL impairment was greater in patients with more severe asthma is intuitively sensible. Patients with severe asthma might experience different limitations and types of impairment from those experienced by patients with milder asthma. On the other hand, Perin et al.¹⁰, Montalto et al.¹¹ and Annett et al.³ found no difference in QOL based on the severity of asthma.

Allergic rhinitis was found to further impair the QOL in subjects with asthma. Leynaert et al.² also found that patients with both asthma and allergic rhinitis experienced more physical limitations than patients with allergic rhinitis alone, but no difference was found between these two groups for concepts related to social/mental health. In agreement with this study, allergic rhinitis and asthma severity were not found as significant contributing factors in QOL in emotional function. On the other hand, data from a trial by Akcakaya et al.¹² suggest that mean depression scores were significantly higher in children with moderate and severe asthma than in those with mild asthma.

Fifty-one percent of the patients reported that asthma affected their lives, 55% reported impairment in physical activities, 55% reported impaired QOL due to asthma symptoms like shortness of breath, cough or wheeze, and 52% felt irritable, frustrated or left out and that they could not keep up with others because of their asthma. In a previous study by Sekerel et al.¹³ 50% of the patients reported that asthma affected their lives significantly.

In children, QOL used to be based on the conventional assessment of asthma severity, on pulmonary function testing, on the presence and intensity of the symptoms or the need for medication. Past studies have demonstrated varied relationships among these parameters. Percent of predicted FEV1 has been correlated with asthma attacks and symptom score but not with symptom days¹⁴. FEV1% was correlated with asthma-related QOL in a low-income adult population¹⁵ but not in a general population sample¹⁶. FEV1% was correlated with asthma-related QOL in mild asthmatics, but not in severe asthmatics¹⁷. In a pediatric population, asthma symptoms have been correlated with asthma-related QOL but not FEV1%¹⁸. In our study, considering the Spearman correlation among the key covariates, the lung function measures were strongly correlated with each other but were not significantly associated with QOL in regression models. Since this measurement was taken at a single point in time, it may not have given an accurate reflection of the clinical status. The lack of a relationship may also be related to a relatively small number of participants with low FEV1%, explaining the poor association between pulmonary function measures and QOL. Another explanation is that clinical parameters have a weak association with what a child is feeling and the status of his/her daily functioning.

Unlike severity of the disease and presence of concomitant allergic rhinitis, sex was not found as a significant predictor of QOL in any of the domains, while symptom score was associated with age, with older children reporting less impairment than younger ones. In previous studies, girls and women have been noted to report more symptoms than boys or men with similar exposure^{8,19}.

Another important finding is that although 82% of the children had intermittent asthma, 56% of the patients were reported to be receiving preventive medication. Asthmatic children who were using steroids scored less in overall ($p=0.038$) and emotional function ($p<0.001$) scores than children not using steroids, meaning impaired QOL. Steroid usage is found to be the only parameter that has a significant effect on emotional function. Prescribing preventive medication to intermittent asthma and even to a patient who has wheezed just once in his life

is becoming an important issue in our population. Parents whose children have been prescribed preventive medication may take this to mean that their children have very significant asthma, and these parents may subsequently develop heightened perceptions about their children's medical vulnerability. Parents who perceived that their children were more vulnerable were significantly more likely to keep their children home from school, sporting activities and from playing with friends²⁰. Excessive parental concerns of vulnerability can disrupt the child-parent relationship, leading to behavioral and emotional problems in the child^{20,21}.

Chronic illness outcomes research mandates longitudinal testing to capture the dynamics of an illness with multiple sequelae spanning a range of time. Cross-sectional studies do not offer causative or comparative data for an individual patient, but establish general trends in the population. These results of our study captured the baseline QOL information about our pediatric asthmatic population and will facilitate longitudinal monitoring.

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