

# **Dynamic Assessment of Quality of Life Indices in Children with Bronchial Asthma During Administration of Different Therapeutic Schemes**

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## **Abstract**

The article presents an analysis of own data on dynamics of quality of life indices in school-age children with bronchial asthma during application of different treatment schemes. Analysis of quality of life questionnaires of 120 school-age patients (from 6 to 17 years) with bronchial asthma was conducted. Assessment of quality of life in children with bronchial asthma was performed on the first and the final visits to hospital (in a year of treatment) in three groups (1<sup>st</sup> group – 30 patients, who received sublingual allergen-specific immunotherapy (AIT); 2<sup>nd</sup> group – 30 patients, who received subcutaneous AIT; and 3<sup>rd</sup> group – 60 patients (control group)). The results of conducted investigation demonstrate that inclusion of allergen-specific immunotherapy in a complex of basic treatment of bronchial asthma allows improving patients' quality of life considerably. The most reliable increase in quality of life indices based on assessment of bronchial asthma symptoms occurred in the patients, who received sublingual AIT. Whereas, substantially improved emotional function was observed in the group of patients, who received subcutaneous AIT in combination with basic treatment. In patients of all groups, a positive correlation was recorded between the results of spirometry (FEV1 and PEF) and quality of life indices.

**Keywords:** children, quality of life, bronchial asthma, allergen-specific immunotherapy

## Introduction

Bronchial asthma (BA) is one of the most common chronic diseases in pediatric age group. The disease affects not only physical aspect of children's life, but also emotional, social and educational ones. Therefore, in the recent years, dynamics of patients' quality of life has been studied for evaluation of BA treatment efficacy. Quality of life is defined as "functional influence of disease and its therapy on a patient based on his/her own feelings" [7,1,9]. It includes somatic feelings (associated with the symptoms of the disease), physical and professional functions, emotional and psychological influences as well as social adaptation.

Assessment of quality of life as a criterion of treatment efficacy is dictated by the fact that, firstly, some effects of treatment can be determined only by a patient; secondly, standardized assessment is more reliable than informal communication [5,3].

The notion of quality of life is not new in medicine. According to the WHO definition of 1948, "health" is not only absence of a disease, but also presence of physical, psychological and social wellbeing [2], and since 1995 year, WHO has defined quality of life improvement in patients with chronic diseases as one of the most important aspects in medicine [11,6,8].

To assess quality of life, the following components are distinguished: psychological wellbeing; social wellbeing; physical wellbeing; spiritual wellbeing.

Leading international centers on quality of life investigation work in France, the USA, Canada, Germany and the Netherlands [10]. Nowadays, study of quality of life by means of special questionnaires is common, and these are divided into general and special (specific for a certain disease).

Each questionnaire should meet the following requirements: comprehensiveness; simplicity and conciseness; acceptance and possibility of application in different language and social cultures. Psychometric characteristics are also important, such as reliability (exactness of measurement), validity (reliability) and sensitivity (detection of changes in indices).

Nowadays, various options of special questionnaires are offered for patients with BA [6], in particular: Asthma Quality of Life Questionnaire (AQLQ); Standardised Asthma Quality of Life Questionnaire (AQLQ(S)); Mini Asthma Quality of Life Questionnaire (Mini AQLQ); Asthma Quality of Life Questionnaire for 12 years and older (AQLQ + 12); Acute Asthma Quality of Life Questionnaire (Acute AQLQ); Paediatric Asthma Quality of Life Questionnaire (PAQLQ) — original; Standardised Paediatric Asthma Quality of Life Questionnaire (PAQLQ(S)); Mini Paediatric Asthma Quality of Life Questionnaire (Mini PAQLQ); Paediatric Asthma Caregiver's Quality of Life Questionnaire (PACQLQ). In opinions of leading specialists, who study quality of life indices, it is the most expedient using such questionnaires: "Standardized for children with bronchial asthma – pediatric questionnaire of quality of life (PAQLQ(S))", "Mini questionnaire of quality of life, standardized for children with bronchial asthma (MiniPAQLQ)" for children.

It is significant to follow instructions of the questionnaire used. Parents often assess their children's condition differently than children do it themselves. Thus, it

is important to understand how children with bronchial asthma assess their condition themselves.

It has been proven that pharmacotherapy of bronchial asthma can effectively control its symptoms and influence the inflammatory process. However, it cannot affect a specific immune response, and in case of cessation of drug intake, the symptoms of the disease may return. The only treatment method, which can alter natural course of allergy, is allergen-specific immunotherapy, which enables to reduce sensitivity of a child's body to a "responsible" allergen and decrease activity of chronic inflammation.

**The aim of the research:** to improve monitoring of treatment efficacy of bronchial asthma in children, sensitized to house dust mites, based on dynamic assessment of quality of life indices.

**Aim:** To assess dynamics of quality of life indices in school-age children with bronchial asthma, sensitized to house dust mites, based on comparison of quality of life in three groups of patients: the first group – sublingual allergen-specific immunotherapy (AIT); the second – patients, who received subcutaneous AIT; control group (patients, who received only basic pharmacotherapy).

**Materials and methods:** analysis of quality of life questionnaires for 120 patients of school age (from 6 to 17 years) with bronchial asthma has been conducted. These patients were under observation in Lviv allergological center of Communal Municipal Children's Clinical Hospital.

To assess quality of life, a special questionnaire was used (mini questionnaire of quality of life, standardized for children with bronchial asthma (MiniPAQLQ). This questionnaire estimates a patient's life quality (a child or a teenager) suffering from bronchial asthma. The questionnaire is adapted for Ukraine, in the Ukrainian language and is approved for application (prof. Elizabeth Juniper, England). It contains 13 questions. A patient himself/herself fills in the questionnaire (self-administered, self-report). Assessment of quality of life was performed on the first and the final visit to hospital (in a year of treatment) for children with bronchial asthma in three groups (the first group – 30 patients, who received sublingual AIT, the second group – 30 patients, who received subcutaneous AIT; the third – 60 patients (control group)). Evaluation of quality of life included: assessment of symptoms (cough, wheezing, and feeling of tightness in the chest), assessment of emotional function (fatigue, difficulty sleeping at night, sadness, fear, shortness of breath etc.) and assessment of patients' activity. Answers were divided into seven levels: from "disturbed extremely" or "all the time" (1) to "did not disturb" or "never" (7). Children under eight years were asked by the doctor, who conducted the questioning, sticking to the exact statement of questions. Older children read the questions themselves and chose the proper answers. It was explained in advance to children's parents that feelings and complaints of a child have to be assessed and it is important how a child estimates his/her condition.

All three scales of the questionnaire had normal distribution (data of Shapiro-Wilk test equaled 0.963, 0.967 and 0.965, respectively,  $p > 0.05$ ).

The questioned groups statistically did not change by severity of the disease course (Kruskal-Wallis test  $H = 3.49$ ,  $p = 0.17$ ), symptom indices (Fisher's exact

test  $F = 0.22$ ,  $p = 0.81$ ) and limitation of activity ( $F = 1.57$ ,  $p = 0.21$ ). However, individuals from control group had a somewhat higher level of emotional function index (4.24 versus 4.07, Student's t-test  $T = 3.15$ ,  $p = 0.002$ ).

## Results of the investigation

In the process of investigation, quality of life indices were compared on the first and the final visits to hospital (in a year of treatment). Improvements of quality of life indices in each group and their association with BA severity, spirometry indices (FEV1 and PEF) and with ACT (asthma-control test) were assessed.

Below, the data of dynamics of quality of life indices are presented in each group on the first and final visits according to two-sample Student's t-test (table 1).

**Table 1**  
**Dynamics of quality of life indices according to two-sample Student's t-test**

	Assessment of symptoms		Assessment of activity limitation		Assessment of emotional function	
	start	finish	start	finish	start	finish
1 <sup>st</sup> group – sublingual AIT	4.163	4.685	4.583	5.497	4.245	5.125
	(t = 12.12, p<0.0001)		(t = 13.43, p<0.0001)		(t = 43.71, p<0.0001)	
2 <sup>nd</sup> group – subcutaneous AIT	4.126	5.313	4.610	5.680	4.093	5.123
	(t = 13.75, p<0.0001)		(t = 11.298, p<0.0001)		(t = 32.77, p<0.0001)	
3 <sup>rd</sup> group – control group	4.130	5.180	4.767	5.807	4.063	5.243
	(t = 13.11, p<0.0001)		(t = 15.15, p<0.0001)		(t = 19.63, p<0.0001)	

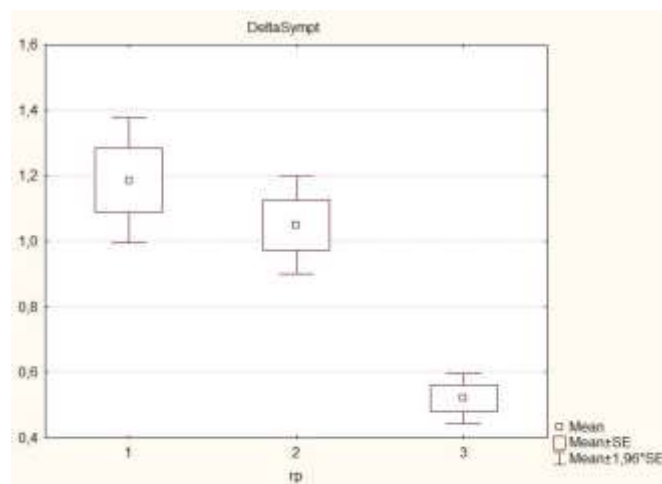
As presented in table 1, all quality of life indices (symptoms, emotional function and activity limitation) statistically reliably improved in a year of treatment in the group of patients, who additionally received sublingual AIT (1<sup>st</sup> group) as well as in the patients, who additionally received subcutaneous AIT (2<sup>nd</sup> group) and in the patients, who received only basic therapy for BA (3<sup>rd</sup> group – control group), ( $p < 0.001$ ).

One factor analysis of variance (ANOVA) was used to compare improvements of quality of life indices (assessment of symptoms, activity limitation and evaluation of emotional function) in each of the three groups of patients. Table 2 contains data of Fisher F test and their p-levels. The result shows statistically reliable difference in symptoms ( $p < 0.001$ ) and emotional function ( $p < 0.001$ ). Changes in improvement of activity limitation index did not differ statistically (table 2).

**Table 2**  
**Comparison of improvements of quality of life indices based on one factor analysis of variance (ANOVA)**

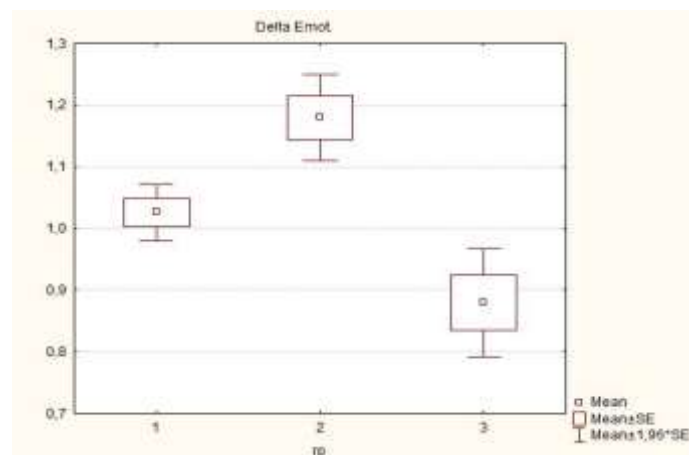
	F	p
Assessment of symptoms	33.7264	0.000001
Assessment of activity limitation	1.3977	0.251253
Assessment of emotional function	12.4006	0.000013

The Scheffe test was used to assess comparison of mean values of improvements of quality of life indices (symptoms, activity limitation and emotional function) in all three groups of patients (fig. 1, 2, 3).



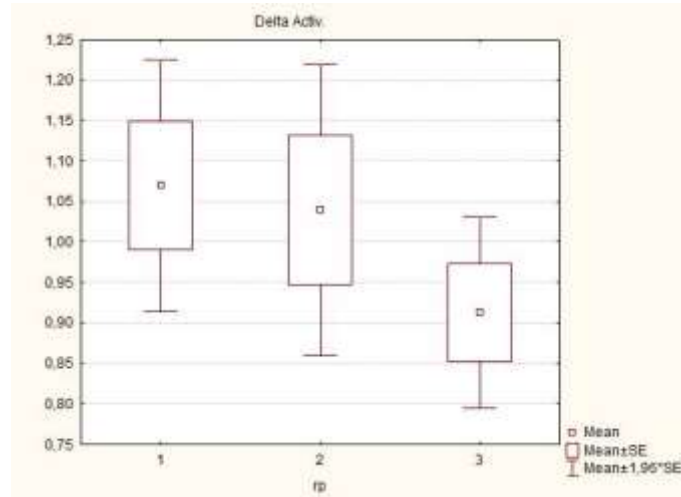
**Fig. 1.** Confidence intervals for mean values of assessment of symptoms

As it is shown in figure 1, improvements in indices of assessment of symptoms in the first and the second groups did not differ statistically between these groups ( $p = 0.42$ ), but were significantly higher in control group ( $p < 0.001$ ).



**Fig. 2.** Confidence intervals for mean values of emotional function assessment

Figure 2 demonstrates that improvements of emotional function index differ in all groups ( $p_{12}=0.09$ ,  $p_{13}=0.05$ ,  $p_{23}<0.001$ ) and are the highest in the second group (the group of patients, who received subcutaneous AIT along with basic treatment).



**Fig. 3.** Confidence intervals for mean values of assessment of activity limitation

Improvement of activity limitation index was somewhat higher in the patients, who received AIT, but statistically did not differ reliably (figure 3).

**Table 3: Correlation matrix of improvements of indices**

	FEV	PEFR	ACT	Assess- ment of symptoms	Assessment of activity limitation	Assessment of emotional function
FEV	1.0000	<i>0.1799</i> p=0.049	<i>0.3002</i> p=0.001	0.0310 p=0.737	0.0421 p=0.648	0.1691 p=0.065
PEF	<i>0.1799</i> p=0.049	1.0000	<i>0.4271</i> P<0.001	<i>0.3628</i> P<0.001	-0.0380 p=0.680	0.0542 p=0.557
ACT	<i>0.3002</i> p=0.001	<i>0.4271</i> p<0.001	1.0000	<i>0.4877</i> p<0.001	-0.0267 p=0.772	<i>0.3045</i> p=0.001
Assessment of symptoms	0.0310 p=0.737	<i>0.3628</i> p<0.001	<i>0.4877</i> p<0.001	1.0000	0.0132 p=0.886	<i>0.3031</i> p=0.001
Assessment of activity limitation	0.0421 p=0.648	-0.0380 p=0.680	-0.0267 p=0.772	0.0132 p=0.886	1.0000	<i>0.2567</i> p=0.005
Assessment of emotional function	0.1691 p=0.065	0.0542 p=0.557	<i>0.3045</i> p=0.001	<i>0.3031</i> p=0.001	<i>0.2567</i> p=0.005	1.0000

Note: Coefficients of correlation statistically different from zero are in italics

It should be emphasized that improvements of quality of life indices directly correlated with improvement of spirometry indices (FEV1 and PEF) and better asthma control (asthma-control test). Below, the table contains pair correlations of these indices (Table 3).

Analysis of Spearman rank-order correlations between the severity of the disease and patients' quality of life indices enable to state that disease severity negatively correlated with emotional function indices ( $p < 0.05$ ).

## Conclusions

1. Inclusion of allergen-specific immunotherapy in the complex of basic treatment of bronchial asthma allows improving patients' quality of life considerably. The most reliable increase in quality of life indices based on assessment of BA symptoms occurred in the patients, who received sublingual AIT. Whereas, substantially improved emotional function was recorded in the group of patients, who received subcutaneous AIT along with basic treatment.

2. In patients of all groups, a positive correlation was observed between the results of spirometry (FEV1 and PEF) and quality of life indices.

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