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Assessment of the quality of life in children and adolescents with asthma

Ocena kakovosti življenja otrok in mladostnikov z astmo

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Key words: quality of life; children; adolescents; asthma; symptom control

Ključne besede: kakovost življenja; otroci; mladostniki; astma; nadzor simptomov

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ABSTRACT

Introduction: Asthma is a global health problem that negatively affects various aspects of the quality of a person's life. The aim of the study was to examine the quality of life in children and adolescents with asthma and the correlation between the degree of asthma control and the quality of life.

Methods: The cross-sectional study included 100 children and adolescents with asthma over a six-month period in 2015. The study used: Standardized Pediatric Asthma Quality of Life Questionnaire (PAQLQ(S)) for the assessment quality of life and the questionnaires for the assessment of asthma control for two age groups: Asthma Control Test (ACT) for adolescents and Childhood Asthma Control Test (C-ACT).

Results: 62 boys and 38 girls aged 7–17, whose average age was 11.2 (s = 2.7) years were included in the study. The overall PAQLQ(S) score ranged between 3.30 and 7.00 with an average mean value of 5.95. The findings have showed that most children with asthma estimated their overall PAQLQ(S) on the positive end of the scale. The children reported more impairment in the domain of 'Emotion' ($\bar{x}$ = 5.84) than in 'Activities' and 'Symptoms'. The percentage of adolescents in the category of poor control (12.5 %) was significantly lower than in the group of children (25.0 %). In both groups of children, the sub-scale 'Symptoms' was in highest correlation with the degree of asthma control (r = 0.915, p < 0.01).

Discussion and conclusion: In this study the children and adolescents with asthma showed an overall good quality of life. Control of asthma symptoms in children and adolescents positively influenced their quality of life.

IZVLEČEK

Uvod: Astma je globalni zdravstveni problem, ki negativno vpliva na različne vidike kakovosti življenja. Cilj raziskave je bil preučiti kakovost življenja pri otrocih in mladostnikih z astmo ter povezavo med stopnjo nadzora astme in kakovostjo življenja.

Metode: Presečna študija je vključevala 100 otrok in mladostnikov z astmo v šestmesečnem obdobju leta 2015. V raziskavi so bili uporabljeni: standardiziran vprašalnik o kakovosti življenja otrok z astmo (PAQLQ(S)) za oceno kakovosti življenja in vprašalnika za oceno krmiljenja astme za dve starostni skupini: test za kontrolo astme za mladostnike (ACT) in test za kontrolo astme pri otrocih (C-ACT).

Rezultati: Vključenih je bilo 62 fantov in 38 deklic, starih od 7 do 17 let, katerih povprečna starost je bila 11,2 (s = 2,7) leta. Skupni rezultati v oceni PAQLQ(S) so se gibali med 3,30 in 7,00 s povprečno vrednostjo 5,95. Ugotovitve kažejo, da je večina otrok z astmo umestila svojo splošno PAQLQ(S) proti pozitivnemu koncu lestvice. Otroci so poročali o večji oslabelosti na področju »Čustva« ($\bar{x}$ = 5,84) kot na področjih »Dejavnosti« in »Simptomi«. Odstotek mladostnikov, ki spadajo v kategorijo slabega nadzora (12,5 %), je bil znatno nižji kot v skupini otrok (25,0 %). V obeh skupinah otrok je bila lestvica »Simptomi« v največji povezavi s stopnjo nadzora astme (r = 0,915, p < 0,01).

Diskusija in zaključek: V raziskavi so otroci in mladostniki z astmo pokazali splošno dobro kakovost življenja. Nadzor simptomov astme pri otrocih in mladostnikih je pozitivno vplival na njihovo kakovost življenja.

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Introduction

Asthma is the most common chronic illness of children around the world. Most frequently, it occurs at an early age, with a variable flow, which may be in progression or remission over time. Moreover, asthma is a public health problem that negatively affects different aspects of the quality of life. The effect of asthma on the quality of life of patients, as well as its cost, is very high (Papadopoulos, et al., 2012; Al-Gewely, et al., 2013). The quality of life in children with asthma depends on several factors, among which the most significant are asthma severity and the level of asthma control. Therefore, the quality of life of asthmatic patients cannot be determined only on the basis of the severity of the disease, but requires a measurement of personal perception such as the impact on everyday-life due to illness, emotional functioning and the quality of life related to health.

Today, it is widely accepted that health care should be focused on the quality of life of the patient. This is more important in patients suffering from chronic illnesses where treatment is more focused on the control of symptoms (Petsios, et al., 2013). The quality of life related to health has also been gaining increasing attention in the pediatric population. The significance of these aspects has led to the development of instruments for assessing a child's quality of life (Limperg, et al., 2014). Some authors state that parents' reports on the quality of their children's lives may differ from the children's perception (Nair, et al., 2014). Therefore, it is recommended to use instruments that require children's responses in order to get their own perception of the disease, as well as their active involvement in decision-making concerning the treatment and care. It is important to obtain information from children regarding their vision of the illness (Al-Akour & Khader, 2008). In their analysis of the determinants of the quality of life of children suffering from asthma, Petsios and colleagues (2013) state that the understanding of asthma in younger children will not be as good as in older children. Therefore, the term 'health' and 'quality of life' can mean different things to children of different ages. The understanding of children can vary with the kind of tasks that they have to do to control their illness. Children and adolescents use different confrontational strategies (cognitive and behavioral) to control the impact of asthma on their everyday lives (Petsios, et al., 2013). In order to assess the quality of life, there are two basic type of instruments: general-generic used for assessing the quality of life as a whole, intended for sick and healthy population, and specific questionnaires designed for groups of individuals suffering from a particular acute or chronic illness (Alvarenga & Caldeira, 2009). It is important to use custom-designed questionnaires for assessing the quality of life in relation to health in order to provide different information on the following: treatment, other subjective beliefs and clinical outcome (Reddel, et al., 2009). The Global Initiative for Asthma (GINA) guidelines suggest the use of tests to control asthma symptoms. Instruments used to control asthma in the pediatric population are: Childhood Asthma Control Test (C-ACT) for the age of 4–11 years and the Asthma Control Test (ACT) for asthma adolescents aged 12 and older (GINA Global Strategy for Asthma Management and Prevention, 2015). In addition to these tests, there are several specific questionnaires for assessing the quality of life of children with asthma. One of the most commonly used is the Pediatric Asthma Quality of Life Questionnaire (PAQOL) (Al-Gewely, et al., 2013; Zomer-Kooijker, et al., 2014). Juniper and colleagues (1996) were pioneers in the formulation of various questionnaires for assessing the quality of life in children with asthma. The assessment enables an insight into the outcomes from the patient's perspective, their experience regarding chronic disease, evaluation (calculation, measurement) of procedures, drugs, and other interventions between groups, among individuals or between populations. Lately, measuring the quality of life is used to promote health, including independent equivalent interventions, such as education and counselling (Peterson & Bredow, 2013).

Aims and objectives

The aim of the research was to examine the overall quality of life with Standardized Pediatric Asthma Quality of Life Questionnaire – PAQLQ(S) and subscale symptoms, activity limitations and emotional function in children and adolescents from 7 to 17 suffering from asthma, and to examine the correlation between the degree of asthma control and the quality of life.

Methods

The research was based on a quantitative descriptive methodology. The data were collected with specific questionnaires for asthma.

Description of the research instrument

The questionnaires used in this cross-sectional study inquired about basic demographics (age, sex, place of residence); the quality of life was assessed using the PAQLQ(S); the questionnaires for the assessment of asthma control for two age groups: ACT and C-ACT.

PAQLQ (S) was developed by Juniper and colleagues (1996) and has been translated and validated in many countries including Serbia. The Serbian version of this questionnaire was adapted to the language and culture of our area in 2003 (Cerović, et al., 2009).

Translation into Serbian and linguistic validation of PAQLQ(S) was made by the MAPI Research Institute (1996) in Lyon, France. The PAQLQ(S) is designed for children (aged 7–17 years) to report on their own experiences. The instrument includes symptoms of asthma, as well as the child's emotional reactions to the symptoms and limitations caused by asthma. An overall PAQLQ(S) score is calculated, as are 3 domain subscales: Symptoms (10 items, such as coughing and wheezing), Activity limitations (5 items, such as playing and singing), and Emotional function (8 items, such as feeling worried and left out). The offered responses are presented using the Likert scale in the range of 1 to 7, where a score of 1 indicates maximal impairment and a score of 7 indicates no impairment, with a 1-week recall period. The overall PAQLQ(S) score is the mean of all 23 items, and the individual domain scores are the means of the items in each domain. The PAQLQ(S) overall score is calculated by adding points of individual responses to all questions, with the higher scores indicating less impairment that is, a better quality of life.

The degree of asthma control in children and adolescents was assessed by licensed semi-quantitative tests in the form of questionnaires, developed by the Quality Metric Incorporated Group. The GlaxoSmithKline pharmaceutical company has purchased the right to use this questionnaire. We received the questionnaires from them. There are two versions of Asthma test controls in their native language for ages 4–11 (C-ACT) and 12 years and older (ACT).

The C-ACT (if ages of 4 and 11), consists of 7 questions, addresses the previous 4 weeks and is divided into two parts. One part is filled in by the child and consists of 4 questions on the perception of asthma control, limitation of activities, coughing and awakenings at night. Each question has four response options. The second part is filled in by the parent or caregiver and consists of 3 questions (daytime complaints, daytime wheezing and awakenings at night) with six response options. The sum of all scores yields the C-ACT score, ranging from 0 (poorest asthma control) to 27 (optimal asthma control). A cut-off point ≤19 indicates uncontrolled asthma. Cronbach alpha for C-ACT was 0.839.

The ACT (if ≥12 years) is a questionnaire on asthma control comprising 5 questions that assess activity limitation, shortness of breath, night-time symptoms, use of rescue medication, and patient rating of asthma control. The offered responses are presented using the 5-point Likert scale in the range of 1 to 5 (for symptoms and activities: 1 – all the time to 5 – not at all; for asthma control rating: 1 – not controlled at all to 5 – completely controlled). The scores range from 5 (poor control of asthma) to 25 (complete control of asthma), with higher scores reflecting greater asthma control. If the score is less than 20, it indicates poor asthma control over the previous 4 weeks. Cronbach alpha for ACT was 0.847.

Description of the research sample

The sample consisted of 100 children and adolescents (62 boys, 38 girls), aged 7–17, whose average age was 11.2 (s = 2.7) years. The respondents were divided into two groups according to their age: the group of children aged 7–11 years (n = 54) (boys 69.0 %, girls 31.0 %) and the group of adolescents aged 12–17 years (n = 46) (boys 54.0 %, girls 46.0 %). The percentage of children from rural areas was higher (64.0 %) than the percentage of children from urban areas (36.0 %). All respondents were diagnosed with asthma and were monitored through the Pulmonary and Allergy Department at the Pediatric Clinic, the University Clinical Centre of the Republic of Srpska, Bosnia and Herzegovina. The survey was conducted in the period from 1 March to 30 September 2015. The inclusion criteria in the research were: children (respondents) at the age of 7–17 years, children who were diagnosed with asthma by a pediatric pulmonologist a year or more ago, children who were monitored for more than 1 year at the Pulmonary Department of the Pediatric Clinic, children whose parents signed an informed consent and informed children about the research. The exclusion criteria were: children under 7 years of age, subjects older than 17, children who were diagnosed with asthma by a pediatric pulmonologist less than a year ago, children who were monitored for less than 1 year at the Pulmonary Department of the Pediatric Clinic, children with cystic fibrosis, cardiovascular and immunological diseases, refusal of participation and parents who have not signed an informed consent.

Description of the research procedure and data analysis

Prior to the interview, children and parents received a brief explanation of how to answer the questions. The researcher conducted the survey and the questionnaires were completed anonymously. The time needed to complete the questionnaire by the respondent was approximately 30 minutes. The research was approved by the Ethics Committee of the University Clinical Center of the Republic of Srpska.

The entire data processing was carried out in the statistical SPSS Statistics version 21.0 (SPSS Inc., Chicago, IL, USA) software package. When processing for categorical variables, the percentages of registered cases for each category were calculated, and for numerical variables, the measures of descriptive statistics (measures of mean value, standard deviation and the minimum and maximum values and curvature of the distribution of results). Internal consistency of used C-ACT and ACT was assessed by the Cronbach alpha coefficient. By means of analyzing the relations between the results on

the overall PAQLQ(S) scale and individual sub-scales 'Activities', 'Symptoms' and 'Emotions' based on the Pearson's correlation test (r), it was concluded that there was a statistically significant correlation coefficient ($p < 0.01$). Relations of individual numerical variables with categorical variables were calculated by analyzing the statistical significance of the differences in the average results for individual categories of independent variables (Student's t–test). The results with a reliability of $p < 0.05$ were statistically significant.

Results

There was no statistically significant correlation between the age of the children and the estimated quality of life in all three aspects ($r = 0.14, p > 0.05$). The sex of the children and adolescents did not demonstrate statistically significant effects on the overall or three individual sub-scales PAQLQ(S) scores boys ($\bar{x}$ = 5.93, $s = 0.93$) and girls ($\bar{x}$ = 5.98, $s = 0.81$) ($t(100) = 0.32, p = 0.75$). The patients' place of residence did not significantly affect overall PAQLQ(S) scores ($p = 0.45$). The responses PAQLQ(S) were given on a seven-point scale. Overall, children and adolescents with asthma scored their quality of life during the previous week on the positive end of the scale. The minimum and maximum values on the 23 PAQLQ(S) items varied between three and seven, with an average mean value of 5.95 (where a score of 1 indicates maximal impairment and a score of 7 indicates no impairment). Table 1 shows a distribution of the average mean values for the children and adolescents overall quality of life score and the values for all three sub-scales scores separately: 'Activity', 'Symptoms' and 'Emotion'. As the descriptive data for the quality of life scale suggests (scores value is 1.35), the distribution of results is prone to higher values that indicate a better quality of life. Namely, the majority of respondents achieve scores between 5 and 7, while there is a significantly lower number of those with values below 5. This fact suggests that the vast majority of respondents positively evaluate their quality of life.

By comparing scores on the PAQLQ(S) scale and subscales between the two groups (children and adolescents), the results of the Student's t-test showed that there was no statistically significant difference in the quality of life ($t = 1.31, p > 0.05$). Analyzing the relations between the results on the quality of life scale and individual sub-scales 'Activities', 'Symptoms' and 'Emotions' based on the Pearson's correlation test, it was concluded that there was a statistically significant correlation coefficient. In the highest correlation with the overall quality of life, there was the 'Symptoms' sub-scale ($r = 0.915, p < 0.01$), but the other two – 'Activity' and 'Emotion' sub-scales were in very high correlation as well. The results are showed in Table 2.

Asthma Control

In the overall sample, slightly less than 20 % of the respondents had poor asthma control. We compared the quality of asthma control in children and adolescents, and found that the percentage of adolescents in the category of poor control (12.5 %)

Table 1: *Distribution of the children and adolescents overall and sub-scales scores in the PAQLQ(S)*
Tabela 1: *Porazdelitev celokupnih in posamičnih rezultatov otrok in mladostnikov v PAQLQ(S)*

Quality of life with asthma / Kakovost življenja z astmo	***n***	***Min***	***Max***	$\bar{x}$	***s***	***Skewness / Koeficient asimetrije***	***Kurtosis / Koeficient sploščenosti***
Quality of Life PAQLQ(S)	100	3.30	7.00	5.95	0.88	−1.35	1.45
Activities	100	3.20	7.00	6.05	0.89	−1.29	1.28
Symptoms	100	2.50	7.00	5.99	1.00	−1.62	2.26
Emotions	100	2.38	7.00	5.84	1.06	−1.20	1.44

Legend / Legenda: PAQLQ(S) – Standardised Paediatric Asthma Quality of Life Questionnaire / Standardiziran vprašalnik o kakovosti življenja otrok z astmo; n –number / število; Min – minimum / minimum; Max – maximum / maksimum; $\bar{x}$ – average / povprečje; s – standard deviation / standardni odklon

Table 2: *Correlation of scale quality of life and subscales 'Activities', 'Symptoms' and 'Emotions'*
Tabela 2: *Korelacija lestvice kakovost življenja in lestvic »Dejavnosti«, »Simptomi« in »Čustva«*

Quality of life with asthma / Kakovost življenja z astmo	***Quality of Life / Kakovost življenja***	***Activities / Aktivnosti***	***Symptoms / Simptomi***	***Emotions / Čustva***
Quality of Life *(r)*	1	0.844**	0.915**	0.875**
Activities *(r)*	/	1	0.711**	0.659**
Symptoms *(r)*	/	/	1	0.639**
Emotions *(r)*	/	/	/	1

*Legend / Legenda: r – Pearson correlation coefficient / Pearsonov korelacijski koeficient; ** – statistical significance, p < 0.01 / statistična značilnost, p < 0,01*

was significantly lower than in the group of children (25.0 %). Table 3 shows these two groups of respondents. The obtained average values of asthma control are above the threshold value. In both groups of patients, the average result of asthma control was above the limit value. Skewness is negative on the entire sample, while in the adolescent group it has a higher absolute value and supports better asthma control.

We investigated whether there was a link between the degree of asthma control and the assessment of the quality of life in children suffering from this disease. The Pearson correlation coefficient showed that there was a statistically significant correlation between 'Activities', 'Symptoms' and 'Emotions' and asthma control that is, the correlation between the overall quality of life and asthma control. In both age groups, there was a significant positive correlation between the degree of asthma control and the assessment of the quality of life, taking into account that this correlation was somewhat higher in younger respondents (r = 0.788, $p < 0.01$). The results are showed in Table 4.

Our results have showed that the degree of asthma control is significantly related to the overall quality of life and sub-scales, which means that children and adolescents with good asthma control had a better quality of life ($p < 0.01$). The results are presented in Table 5.

Discussion

The main finding of this study was that children and adolescents with asthma scored their quality of life on the positive end of the scale. The children and adolescents reported more impairment in the domain

Table 3: *Data on asthma control in children and adolescents*
Tabela 3: *Podatki o nadzoru astme pri otrocih in mladostnikih*

Asthma Control / Kontrola astme	***n***	***R***	***Limit Value / Mejne vrednosti***	***Min***	***Max***	$\bar{x}$	***s***	***Skewness / Koeficient asimetrije***	***Kurtosis / Koeficient sploščenosti***
C-ACT (4–11 years)	52	0–27	≤ 19	13	27	21.42	3.79	−0.74	−0.36
ACT (12–17 years)	48	5–25	20	10	25	21.81	3.34	−1.88	4.19

Legend / Legenda: C-ACT- Childhood Asthma Control Test / Test za kontrolo astme pri otrocih; ACT- Asthma Control Test / Test za kontrolo astme; $\bar{x}$ – average / povprečje; R – rang / rank; Min – minimum / minimum; Max – maximum / maksimum; s – standard deviation / standardni odklon

Table 4: *Correlation of asthma control degree and the assessment of quality of life*
Tabela 4: *Korelacija med stopnjo nadzora astme in oceno kakovosti življenja*

Asthma Control / Kontrola astme	***Quality of Life / Kakovost življenja***	***Activities / Aktivnosti***	***Symptoms / Simptomi***	***Emotions / Čustva***
C-ACT (4–11 years) (r)	0.788**	0.679**	0.746**	0.653**
ACT (12–17 years) (r)	0.616**	0.592**	0.778**	0.351*

*Legend / Legenda: C-ACT - Childhood Asthma Control Test / Test za kontrolo astme pri otrocih; ACT - Asthma Control Test / Test za kontrolo astme; r - Pearson correlation coefficient / Pearsonov korelacijski koeficient; ** - statistical significance, $p < 0.01$ / statistična značilnost, $p < 0,01$; * statistical significance, $p < 0.05$ / statistična značilnost, $p < 0,05$*

Table 5: *Differences in quality of life in relation to the degree of asthma control*
Tabela 5: *Razlike v kakovosti življenja v povezavi s stopnjo nadzora astme*

Quality of life with asthma / Kakovost življenja z astmo	***Asthma Control (C-ACT, ACT) / Kontrola astme (C-ACT, ACT)***	***n***	$\bar{x}$	***s***	***t***	***p***
Quality of Life	Poor asthma control	19	4.93	0.95	−5.44	0.00**
	Good asthma control	81	6.19	0.68	/	/
Activities	Poor asthma control	19	5.08	1.06	−4.66	0.00**
	Good asthma control	81	6.27	0.68	/	/
Symptoms	Poor asthma control	19	4.81	1.18	−5.16	0.00**
	Good asthma control	81	6.26	0.72	/	/
Emotions	Poor asthma control	19	5.00	1.23	−4.15	0.00**
	Good asthma control	81	6.04	0.91	/	/

*Legend / Legenda: C-ACT- Childhood Asthma Control Test / Test za kontrolo astme pri otrocih; ACT- Asthma Control Test / Test za kontrolo astme; n - number / število; $\bar{x}$ – average / povprečje; s – standard deviation / standardni odklon; t – Student's t- test / Studentov t-test; ** – statistical significance, $p < 0.01$ / statistična značilnost, $p < 0,01$*

of 'Emotion' than in 'Activities' and 'Symptoms'. The degree of asthma control significantly affects the overall quality of life of children and adolescents. In both groups the sub-scale 'Symptoms' was in the highest correlation with the degree of asthma control.

There are few studies in our area that have been engaged with the concept of the quality of life in children with asthma. We used the PAQLQ(S) questionnaire to determine the subjective experience that is, the child's perception regarding the severity of their illness and identify the psychosocial aspects of life that the child experiences as a disorder caused by the disease. The onset of the illness in early childhood can significantly affect the quality of life and expose children and their social environment to numerous disadvantages in terms of their everyday activities (Al-Akour & Khader, 2008).

The methodology of work with the PAQLQ instrument is widely accepted amongst the pediatric population regarding the assessment of the quality of life in children with asthma and is also used by a large number of authors (Al-Akour & Khader, 2008; Cerović, et al., 2009; Al-Gewely, et al., 2013; Nair, et al., 2014). On account of this, we opted to research this problem as asthma is a disease of high-prevalence, while the quality of life is a concept that advocates a holistic approach which, as such, is deeply incorporated in all areas of health care. The conducted research showed that the children assessed their quality of life in the overall PAQLQ(S) score as quite high, on the positive end of the scale.

When comparing the results of our research with the results of other authors, they are in correspondence. A study conducted by Ricci and colleagues (2009) aimed at examining the correlation of self-assessment of PAQLQ questionnaires and the main clinical and functional parameters assessed during regular visits to health facilities. Their results suggested that the children showed an overall good quality of life with slight disorders in the domain of 'Activities' and 'Emotions', and that the PAQLQ was well connected to other clinical parameters that were assessed during the control examinations. By observing different aspects of the quality of life through three domains (Activities, Symptoms and Emotions), our research showed that the domain 'Emotion' was the most affected. Possible reasons for this result may have been a concern and constant fear that something bad would happen if the symptoms of the disease developed. In their study, Nair and colleagues (2014) similarly reported that the most affected domain was 'Emotion' and suggested that, in addition to medical intervention in providing the treatment, children with asthma should be provided with psychological support and counseling. A previous study by Boran and colleagues (2008), which examined the impact of asthma and corticosteroids on the quality of life in children with asthma, suggests that the use of corticosteroids is an important parameter that has a significant effect on emotional functioning. The same author states that children could not follow their peers in their everyday activities, which made them feel frustrated and irritable, and that excessive parental care for children with asthma could have a negative impact on the emotional status of the child.

By a further analysis of the correlation between individual 'Activities', 'Symptoms' and ' Emotions' with the overall quality of life, our research showed that there was a statistically significant correlation ($p < 0.01$) between all three subscales with the total quality of life scale. The results showed that the 'Symptoms' sub-scale was in the highest correlation, which points to the fact that if the symptoms were more pronounced, the quality of life of the children could be lower. It is very important that children adhere to daily therapies, i.e. to regularly take medications to control the disease by applying the correct inhalation techniques.

An adequate access to the disease by children and parents and the advisory role of doctors and nurses can significantly contribute to improving their overall quality of life. Other studies dealing with this problem reported similar results (Al-Gewely, et al., 2013; Zahrani, et al., 2014). According to the guidelines (GINA Global Strategy for Asthma Management and Prevention, 2015) and statements by other authors, the expression of the symptoms of asthma is directly connected to achieving a complete control of asthma. Complete asthma control is only achieved when a child has no pronounced symptoms of the disease (daily, night and symptoms in the effort, needs for short-acting beta-2 agonists and inadequate pulmonary function) (Turkalj, et al., 2011; Ghaffari, et al., 2014).

In order to assess asthma control, subjects were divided into two age groups: children (7-11 years) and adolescents (12–17 years) according to the tests for asthma control (C-ACT and ACT). The GINA Global Strategy for Asthma Management and Prevention (2015) and National Asthma Educational Prevention Programs (NAEPP) (2007) emphasize the importance of assessing asthma control in order to make treatment as effective as possible. The goal of the asthma treatment is to achieve complete control of the disease, while the simultaneous degree of asthma control is directly related to the children's quality of life (Cano-Garcinuño, et al., 2014; Ghaffari, et al., 2014). Assessment of the symptoms and the quality of life are important aspects of disease control.

The questionnaires which are related to the control of symptoms and the quality of life provide valuable information on the disease from the perspective of a child and their family (Vidal, 2014). By analyzing the degree of asthma control via C-ACT and ACT, our research showed that most children had good asthma control. The analysis of the results obtained in the two age groups by means of disease control questionnaires showed that adolescents in our study had a better asthma control than children. Therefore, the obtained

results could indicate that adolescents cope with their illness better and that they are mature and more skilled in the use of inhalation techniques.

Contrary to our research, several studies examined the correlation between the quality of life and uncontrolled asthma. Koolen and colleagues (2011), showed that asthma was uncontrolled in 51 % of children and was fully controlled in 14 %. The conclusion made by these authors is that C-ACT and ACT correlate well with the GINA criteria in predicting uncontrolled asthma, taking into account the limit value of the overall score of these questionnaires. The examination of the correlation between the quality of life and the degree of asthma control in our study showed that children with good asthma control have a better quality of life compared to children with a poor control of the illness. The results obtained coincide with the literature data (Cerović, et al., 2009; Ricci, et al., 2009; Al-Gewely, et al., 2013). A study by Serbian authors whose goal was to examine the significance of the Serbian version of the PAQLQ questionnaire in clinical practice suggests that this questionnaire showed a good correlation with the clinical and functional indexes that are usually evaluated in monitoring children with asthma. The same research states that the PAQLQ questionnaire is strongly linked to asthma control (C-ACT and ACT) and that children whose asthma was controlled had a better quality of life compared to children with poor asthma control (Cerović, et al., 2009).

The main limitation of the study is the short duration as well as the limited follow-up with the children and adolescents in the study. However, it should be noted that respondents from stationary treatment were not included in our study. This study is the first in our region that has been conducted to show the importance of the measurement of the quality of life and correlation between the degree of asthma control and the quality of life in children and adolescents with asthma. The findings have showed that most children and adolescents with asthma estimated their overall PAQLQ(S) on the positive end of the scale. One of the possible reasons for these results could be that the children came to regular check-ups at the Pulmonary-Allergy Clinic, which had a positive effect on the level of disease control and consequently, on their quality of life.

Conclusion

This study showed that children with asthma have evaluated their quality of life as quite good. The research showed that the respondents with good asthma control have a better quality of life compared to the respondents with poor asthma control. We believe that the use of C-ACT and ACT questionnaires during regular monitoring of children and adolescents can significantly reduce the percentage of patients with poor control. In this way, a team of health professionals together with the patient and his family will strive for the same goal, which is to achieve complete control of the disease.

The questionnaires themselves could be used to compare the degree of disease control between the check-ups of children, which would in some way reduce the need for additional examinations and lead to savings in the health care system. With this approach the ultimate goal, which is to improve the quality of life in children with asthma by means of achieving a complete control of asthma, can be reached.

Conflict of interest / Nasprotje interesov

The authors declare that no conflicts of interest exist. / Avtorice izjavljajo, da ni nasprotja interesov.

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