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RESEARCH ARTICLE

Asthma Severity and Mental Well-being Among Children with Asthma in Kosovo

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Abstract:

Background:

Bronchial asthma is a chronic disease recognized as an important public health issue worldwide, causing a major global health burden. Due to its complex nature and varying characteristics, asthma has been a great challenge for public health.

Objective:

This article aims to determine the relationship between asthma severity and mental well-being among children with asthma in Kosovo.

Methods:

In a cross-sectional study conducted in 13 hospitals and outpatient clinics covering all areas of Kosovo, children with asthma aged 7 to 16 years were enrolled. Children and parents answered a questionnaire about socio-demographic characteristics and the Children Strengths and Difficulties Questionnaire (SDQ). Asthma severity was assessed according to the GINA (Global Initiative for Asthma) guidelines and categorized into two levels (IMPA, intermittent and mild persistent asthma; MSPA, moderate and severe persistent asthma).

Results:

Overall, 161 children with asthma and their caregivers were included. Strengths and difficulties questionnaire showed borderline or abnormal scores in about ¼ of children. A comparison of asthma severity groups for the different scales of the SDQ showed a statistically significant increase in emotional problems ($p=0.009$).

Conclusion:

Diminished mental health and emotional problems are relevant in children with a more severe course of the disease and should be taken into account in counseling parents and patients.

Keywords: Asthma, Children, Strength and difficulties questionnaire, Mental, Well-being, Emotional symptoms.

Article History

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1. INTRODUCTION

Bronchial asthma is a chronic disease recognized as an important public health issue worldwide, causing a major global health burden. Due to its complex nature and varying characteristics, asthma has been a great challenge for public health.

Around 300 million people have asthma worldwide. Acute asthma is one of the leading causes of hospital utilization and emergency healthcare [1]. The global prevalence, morbidity, and mortality of childhood asthma among children have increased significantly over the last 40 years [2] and almost doubled each decade [3]. Asthma prevalence is increasing in many countries, especially among children [4].

Asthma not only has an impact at the individual level, impairing wellbeing and quality of life, but also has various

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effects at the community level with medical, societal, and economic consequences [5].

Asthma also has an impact on psychopathology and mental health. A link between asthma, stress and psychiatric illnesses has been documented [6]. Acceptance of this fact by clinicians is an important element in asthma management. As applied in this study, the Strengths and Difficulties Questionnaire is a cost-effective instrument for detecting deviating behavior and psychosocial problems in children and adolescents, particularly in primary health care, which helps in decisions for referral to secondary health care facilities [7, 8]. It is especially appropriate for detecting behavioral disorders in countries lacking skilled experts in this area [9]. Strengths and Difficulties Questionnaire has been translated into more than 66 languages confirming its applicability and attractiveness for international comparisons [10]. This self-reporting questionnaire is dedicated to youths aged 11 years and above, but it can also be used in children as young as 8 years old [11].

Several studies showed a relationship between asthma and mental health. A study in Pakistan revealed that children with asthma in low-income families had an 18 times higher risk for mental health problems and 14 times higher risk for developmental problems than children without asthma [12]. Also, a study in Brazil among children with asthma between 6 and 12 years old found a statistically significant association with behavioral problems [13]. An association has also been shown between asthma and anxiety disorders [14] and mental health problems in an inner-city clinic [15].

Although the potential impact of asthma on mental health has been recognized, there are a few studies assessing the relationship between asthma severity and mental well-being – as measured by the Strengths and Difficulties Questionnaire. We, therefore, aimed to address this issue in a cross-sectional study among children with asthma in Kosovo.

2. MATERIALS AND METHODS

2.1. Study Design

This is a cross-sectional observational study, including information obtained from children, parents and treating physicians. The study has been approved by the ethics committee of the Faculty of Medicine of the University of Prishtina. Informed consent was obtained from parents/guardians and children over 14 years of age.

Data were collected from:

- The Immunology Clinic and Pediatric Clinic at the University Clinical Centre of Kosovo;
- Five hospitals in Kosovo: Mitrovica, Gjakova, Peja, Prizren and Gjilan;
- Five primary healthcare centers in five towns all over Kosovo (in Prishtina, Mitrovica, Peja, Prizren, and Gjakova);
- And at two private immunology clinics in Prishtina, “Analiza” and “Ylli.”

This multicenter approach was necessary to cover the entire area of Kosovo and include patients from all social groups. In each institution, coordinators were selected, trained, and provided a booklet with instructions for selecting and

registering children with asthma and their caregivers.

For asthma definition, we used: (1) wheezing in the past 12 months; (2) wheezing and waking up with breathlessness or breathlessness at rest in the past 12 months; (3) physician-diagnosed asthma.

Assessment of asthma severity was based on GINA classification [16]. The following categories are differentiated: Intermittent asthma – symptoms not more often than twice a week, nocturnal symptoms not more than twice a month, only brief exacerbations (once a year), no limitations of daily activities, FEV₁>80%, FEV₁/FVC>85%; mild persistent asthma: symptoms more often than twice a week but not daily, 3-4 nocturnal awakenings per month, minor limitations of daily activity, FEV₁>80%, FEV₁/FVC>80% (>85% for >12 y); moderate persistent asthma: daily symptoms, more than one nighttime awakening per week but not nightly, some limitations of daily activities, FEV₁ 60-80%, FEV₁/FVC 75-80% (5% below normal for >12 y); severe persistent asthma: symptoms throughout the day, nightly awakenings, extremely limited daily activities, FEV₁ <60%, FEV₁/FVC <75% (more than 5% below normal for >12 y). For further analysis, these categories were divided into two groups: IMPA (intermittent and mild persistent asthma) and MSPA (moderate and severe persistent asthma).

2.2. Patients

The survey included 161 Kosovar children with asthma, aged 7-16 years, and their caregivers. Participants were enrolled on a consecutive basis. For 16 non-participants, 9 were females, refusing due to time constraints, municipality, and where the dwelling place was registered.

Enrolled children and parents were provided with the questionnaires. Data were collected over five months in the selected centers until the projected sample size was achieved. Parents and children over 14 years of age signed an informed consent document. However, children and adolescents between 10 and 16 years of age completed the questionnaire by themselves. Children younger than 10 years were interviewed by trained medical personnel.

2.3. Inclusion Criteria

Inclusion criteria were age range 7 to 16 years, the presence of physician-diagnosed asthma, and living in Kosovo for the past year. This study also included three subjects outside these criteria, one aged 6 years and two subjects aged 17 years, because they were only a few months out of range.

2.4. Exclusion Criteria

Exclusion criteria were the presence of other chronic diseases in the child or severe acute diseases (except exacerbations of asthma) in the past two weeks.

3. MEASUREMENTS

3.1. Children’s Strengths and Difficulties Questionnaire

The SDQ used was self-rated by children and covered 5 topics or scales comprising 25 items, divided into prosocial behavior, hyperactivity, emotional, peer, and conduct problems scales [17]. Each question can be answered by one of three categories (Not True, Somewhat True, and Certainly True)

coded as 0, 1, and 2. The sum of these codes gives a scale score categorized into normal, borderline and abnormal. The following categorization was used: conduct problems: 0-3 normal, 4 borderline, 5-10 abnormal; emotional symptoms and hyperactivity: 0-5 normal, 6 borderline, 7-10 abnormal; peer problems: 0-3 normal, 4-5 borderline, 6-10 abnormal; prosocial behavior: 6-10 normal, 5 borderline, 0-4 abnormal; total difficulties: 0-15 normal, 16-19 borderline, 20-40 abnormal.

Total Difficulties Score is the sum of all scales except for the prosocial scale. The scores can reach 10 points for each scale, and the Total Difficulties Score can reach a maximum of 40 points.

3.2. Statistical Analysis

The sample size calculation was based on the assumption that for the primary endpoints of interest (SDQ scores), there is a gradient for asthma severity with a standardized regression coefficient of 0.33 (reflecting 10% explained variance). To have a power of 80% to detect such an effect at the 5% level of significance, a sample of 150 children is necessary, including a drop-out rate of 5%. Statistical analysis was done by SPSS 17.0 and Statistica 10.0. Comparisons between groups were made

for illustrative purposes by categorizing the different SDQ scales. However, statistical comparisons were always made using the scores themselves. The General Linear Model compared groups with age, gender, and dwelling place as potential confounders. Categorical variables were analyzed by chi-square tests. All data obtained were processed without imputation for missing data.

4. RESULTS

4.1. Demographic Data

Overall, 161 children with asthma were included in the study; among them, 99 (61.5%) were males, and 62 (38.5%) were females. Children were 11.1± 2.7 years old. The majority of children were from urban areas (101; 62.7%), with an average of seven members in the family household. In 157 cases (97.5%), the family structure was a joint household with married parents. Only 93 (57.8%) interviewed parents were employed.

According to the classification of the living standard, almost half of the respondents reported an average living standard (76; 47.2%), and a good living standard was observed in 53 (32.9%) respondents (Table 1).

Table 1. Overview of demographic data for the total sample of children with asthma.

Variable	Category	N	%
-	Total	161	100.0
Gender	Female	62	38.5
	Male	99	61.5
Age (years)	7-10	73	45.3
	11-14	64	39.8
	15+	24	14.9
	Arithmetic mean ± SD	11.1 ± 2.7	
Ethnicity	Albanian	156	96.9
	Other	5	3.1
Dwelling place	City	101	62.7
	Village	60	37.3
Interviewed relative	Parent	158	98.1
	Grandparent	3	1.9

According to GINA classification, among 161 children with asthma, most had an intermittent form (92; 57.1%), followed by mild persistent asthma (28; 17.4%), and the smallest proportion was of severe persistent asthma (5; 3.1%). Severity, according to GINA, was not related to gender (p=0.113) (Table 2).

Table 2. Asthma severity and control status according to GINA classification by gender.

		Female		Male		Total		p-value ¹
		N	%	N	%	N	%	
	Total	64		97		161		
Asthma Severity	Intermittent	31	48.4	61	62.9	92	57.1	0.113
	Mild Persistent	9	14.1	19	19.6	28	17.4	
	Moderate Persistent	15	23.4	11	11.3	26	16.1	
	Severe Persistent	5	7.8	5	5.2	10	6.2	
	(Missing)	4	6.5	1	1.0	5	3.1	
Asthma Control	Controlled	41	66.1	77	77.8	118	73.3	0.962
	Partially controlled	14	22.6	16	16.2	30	18.6	
	Uncontrolled	3	4.8	5	5.1	8	5.0	
	(Missing)	4	6.5	1	1.0	5	3.1	

¹ chi2 test

Table 3. Strengths and Difficulties Questionnaire (SDQ) categories by asthma severity.

Scale		IMPA n=120 n (%)	MSPA n=36 n (%)	Total n=161 n (%)
Conduct problems	normal	87 (72.5)	28 (77.8)	118 (73.3)
	borderline	18 (15.0)	4 (11.1)	23 (14.3)
	abnormal	15 (12.5)	4 (11.1)	20 (12.4)
Emotional symptoms	normal	103 (85.8)	27 (75.0)	134 (83.2)
	borderline	5 (4.2)	5 (13.9)	11 (6.8)
	abnormal	12 (10.0)	4 (11.1)	16 (9.9)
Hyperactivity	normal	99 (82.5)	30 (83.3)	134 (83.2)
	borderline	14 (11.7)	4 (11.1)	18 (11.2)
	abnormal	7 (5.8)	2 (5.6)	9 (5.6)
Peer problems	normal	82 (68.3)	28 (77.8)	114 (70.8)
	borderline	26 (21.7)	4 (11.1)	31 (19.3)
	abnormal	12 (10.0)	4 (11.1)	16 (9.9)
Prosocial behavior	normal	112 (93.3)	34 (94.4)	151 (93.8)
	borderline	4 (3.3)	1 (2.8)	5 (3.1)
	abnormal	4 (3.3)	1 (2.8)	5 (3.1)
Total difficulties score	normal	91 (75.8)	25 (69.4)	120 (74.5)
	borderline	17 (14.2)	2 (5.6)	20 (12.4)
	abnormal	12 (10.0)	9 (25.0)	21 (13.0)

IMPA...Intermediate/mild persistent asthma; MSPA...moderate/severe persistent asthma.

Table 4. Strengths and Difficulties Questionnaire scores by asthma severity (means and 95% confidence intervals; adjusted for age, sex, and place of dwelling); p-values from General Linear Model.

-	Asthma severity		-
	IMPA n=120	MSPA n=36	
Scale			
Conduct problems	2.7 (2.4-3.0)	2.3 (1.7-2.9)	0.241
Emotional symptoms	3.2 (2.9-3.6)	4.2 (3.6-4.9)	0.009
Hyperactivity	3.4 (3.1-3.8)	3.6 (2.9-4.3)	0.680
Peer problems	2.8 (2.4-3.1)	2.3 (1.7-3.0)	0.278
Prosocial behavior	8.8 (8.5-9.1)	9.2 (8.6-9.7)	0.236
Total difficulties score	11.4 (10.4-12.4)	12.2 (10.3-14.0)	0.441

IMPA...Intermediate/mild persistent asthma; MSPA...moderate/severe persistent asthma

Strengths and difficulties questionnaire showed borderline or abnormal scores in ¼ of children.

Among 161 children with asthma, 21 (13%) had abnormal behavioral characteristics, and 20 (12%) were borderline. The emotional symptom scale resulted in 10% abnormal and 7% borderline cases; the conduct problem scale was 12% abnormal and 14% borderline; the hyperactivity scale in 6% abnormal and 11% borderline; the peer problem scale in 10% abnormal and 19% borderline; and prosocial scale resulted in 3% of both abnormal and borderline behavioral characteristics. (Table 3).

SDQ scores were analyzed in relation to asthma severity. Regarding SDQ total score, abnormal scores in moderate/severe persistent asthma (MSPA) were identified at 25%, while the rate in intermittent/mild persistent asthma (IMPA) was 10%. For SDQ emotional problem scale, abnormal and borderline scores were more frequent in children with MSPA (25% vs. 14% in IMPA).

Comparison of asthma severity groups IMPA and MSPA for the different scales of the SDQ adjusted for age, sex, and place of dwelling showed no statistically significant differences in the total score (p=0.441) but a highly significant difference was found on the scale of the emotional problem (p=0.009) (Table 4).

5. DISCUSSION

A comparison of asthma severity groups for the different scales of the SDQ after adjustment for age, sex and place of dwelling did not show a statistically significant difference in the total score. In a large Danish cross-sectional study, children with asthma showed higher scores on the SDQ emotional symptoms scale. In addition, they reported higher conduct and hyperactivity problems scores in children with asthma [18]. More generally, a history of allergic symptoms in children is associated with an increased risk of conduct problems [19]. While scores for conduct and hyperactivity problems were

elevated in our group of children with asthma, no difference in asthma severity was found. High asthma severity is associated with limitations in daily life, including restrictions on physical activity that can be considered as one source of emotional symptoms but, for the same reason, would not increase the likelihood of conduct or hyperactivity problems. Hyperactivity and conduct problems seem to be increased in children with asthma overall, but no further increase by increasing severity was observed. This is not the case for emotional problems; these problems are increased overall and increase further by increasing the severity of the disease. Not only can limitations in daily life and physical inactivity increase emotional problems, but also sleeping problems in children with severe asthma may play a role [20].

Additionally, children with asthma had elevated odds of having emotional problems [21], and adolescents had a higher level of internalizing problems [22]. It may be speculated that emotional problems are not a consequence of experienced limitations and daily life stressors related to asthma but that the reverse is true: immunological changes due to emotional stress increase the risk of asthma. In this context, an Australian study [23] found atopic diseases preceding behavioral problems but not the opposite, which speaks in favor of asthma as a causative agent.

Asthma affects millions of children worldwide with an increasing trend. High costs for hospitalization and exacerbations present a high burden on society. The extent and quality of asthma management are a reflection of the healthcare system and health policy, especially in childhood asthma [24]. With Kosovo being a developing country, effective management of asthma provides challenges for the healthcare system and families with a child suffering from asthma.

Child mental health problems and SDQ scores were similar across France, US, and UK national surveys. For most SDQ scores, differences between France and the UK were smaller (<5%) than those between France and the US [25]. The distributions of SDQ scores are very similar across the Nordic countries as well [26]. It might, therefore, be inferred that for Kosovar children, the classification into the categories normal, borderline, and abnormal also applies.

Family functioning is an important predictor of health-related quality of life in asthmatic children [27]. Family cohesion has been shown to play an important role as a protective factor for children with asthma [28]. In our study, family structure was mostly cohesive, with 157 (97.5%) married parents, and the number of family members living together in a household was comparatively high (6-9 on average), which could have a positive impact on health-related quality of life as the potential for social support increases, but also a negative one if the child must share parental care with many other family members.

It is important to understand the relationships between asthma severity, family support, and wellbeing as potential determinants of children's behavioral problems. Therefore, there should be good cooperation between the patient, their family, the school, and the clinician to control disease and

maintain mental wellbeing [29].

To achieve better control of asthma and thereby improve mental health, medical interventions must be optimized. Education and awareness-raising campaigns are cost-effective strategies to fight the consequences of asthma on health and wellbeing [30].

The limitations of the study are its cross-sectional nature, which precludes a causal interpretation. Although asthma severity might affect emotional stability, it is conceivable that emotional problems enhance airway constriction due to stress responses. Only longitudinal studies can determine which direction the effect chain takes.

We can state that emotional difficulties are significantly associated with asthma severity in a sample of children from Kosovo, and similar results from other studies may allow the generalization of this finding. On the other hand, Kosovar children deviate in several respects from other children populations, including their living in large households together with married parents, a situation that is rarely found in Western communities.

CONCLUSION

Diminished mental health and emotional problems are relevant in children with a more severe course of the disease. Counseling of the patient and their family should address this issue, and measures to mitigate emotional and other problems that could arise due to the severity of asthma should be taken as early as possible.

LIST OF ABBREVIATIONS

- FEV1** = Forced expiratory volume in the 1st second
- FVC** = Forced vital capacity
- GINA** = Global Initiative for Asthma
- IMPA** = Intermittent and mild persistent asthma
- MSPA** = Moderate and severe persistent asthma
- SDQ** = Children Strengths and Difficulties Questionnaire

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The study was approved by the ethics committee of the Faculty of Medicine at the University of Prishtina.

HUMAN AND ANIMAL RIGHTS

No animals were used for studies that are the basis of this research. All human procedures followed were per the guidelines of the Helsinki Declaration of 1975.

CONSENT FOR PUBLICATION

Informed consent was obtained from all parents/guardians and their children above 14 included in this study.

STANDARDS of REPORTING

STROBE guidelines has been followed.

AVAILABILITY OF DATA AND MATERIALS

The data sets used and/or analysed during this study are available from the corresponding author upon request.

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CONFLICT OF INTEREST

The authors declare no conflict of interest financial or otherwise.

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