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Study of the Major Risk Factors Associated with Bronchial Asthma in Children in Georgia

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Abstract

Bronchial asthma is an important health problem worldwide. Identification of asthma risk factors is important in asthma management. A better study of risk factors provides an opportunity for primary prevention of asthma. Assessment of the symptoms, severity, and control of bronchial asthma in children living in different regions of Georgia, identification of the risk factors and their relationship to asthma severity, and asthma control.

Observational, cross-sectional study. Data were collected in 2017 - 2020 from M. Iashvili Children's Central Hospital, as well as from Batumi and Zugdidi Referral Hospitals. In the research participated 507 children aged 2 to 18 diagnosed with asthma. The research tool was a set of questionnaires consisting of the following questionnaires: 1) General questionnaire - a basic, general questionnaire that included information about the asthma of the participants; 2) The Pediatric Quality of Life Inventory TM (Peds QL), Asthma Module (Version 3.0, Short Form (SF 22)). Pediatric Quality of Life Inventory (Peds QL), Asthma Module (Version 3.0, Short Form (SF 22)); 3) The Peds QL Multidimensional Fatigue Scale; 4) The Peds QLTM Family Impact Module; 5) Asthma control test (ACT) or the childhood Asthma-Control Test (C-ACT);

Asthma severity and control are significantly associated with a genetic factor. Children whose mothers had bronchial asthma (31.6%) had a severe form of asthma, and children whose fathers had bronchial asthma made up 57.1%.

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Being overweight is associated with both, asthma severity and asthma control. 1/3 of the overweight children had severe (18%) and moderate (12.6%) asthma. As for asthma control, 13.2% of the overweight patients had uncontrolled and 4.4% had partially controlled asthma.

In children with a smoking mother the incidence of a severe form of asthma is 6.25 times higher than in the case of a non-smoking mother. In smoking father, the incidence of severe asthma was 9.9 times higher than in the case of a non-smoking father. 33.7% of children of smoking mothers and 19% of smoking fathers were diagnosed with severe forms of asthma. As for asthma control, 17.3% of the children of smoking mothers had uncontrolled asthma, while the children of smoking fathers made up 16, 15%.

41.3 % had severe asthma with concomitant allergic diseases (4.9% of children with concomitant allergic rhinitis, 14.7% with food allergies, and 21.7% with mixed allergies). Uncontrolled forms were most often detected in children with concomitant mixed allergies (30.4%).

Home humidity, type of flooring, and type of fuel used were also associated with asthma severity and its control; the presence of dampness was strongly correlated with both severe forms of asthma as well as poor control. The presence of carpet was associated with more severity than control, and the presence of linoleum was associated with both severity and control. Severe asthma was correlated with firewood use.

Severe and uncontrolled forms of asthma were correlated with family income as well as parental education. Child asthma is a family burden; 100% of the parents of the participants said that they had difficulties in the family due to the child's asthma, such as anxiety and depressive mood (63%), financial (12%), and other difficulties (25%).

Finally; Identification of risk factors plays an important role in controlling asthma. Correctly managed bronchial asthma ensures a reduction in the impact of asthma on the quality of life of both the child and the entire family.

Keywords: Bronchial asthma; risk factors; triggers; asthma in children; asthma control.

1. Introduction

Bronchial asthma is considered a global problem. Asthma is a chronic noncommunicable (NCD) disease that affects the quality of life of both children and adults. Asthma appears to be a public health priority in the world because of its social values (epidemiology, impact on quality of life, long-term outcomes, direct and indirect healthcare costs). Asthma is included in the World Health Organization's Global Action Plan for the Prevention and Control of Noncommunicable Diseases (NCDs), also known as chronic diseases, and the UN 2030 Agenda for Sustainable Development.

Bronchial asthma is the most common chronic disease in children [1]. In 2019, asthma affected approximately 262 million people and caused 455,000 deaths [2].

Asthma is a chronic inflammatory disease of the airways characterized by obstruction of airflow. Asthma in children and adolescents 5-17 years of age causes an annual loss of 10 million school days and caregivers lose $ 726.1 million workdays annually due to work absences [3]. Bronchial asthma is a respiratory disease caused by the complex interaction of many environmental and genetic factors. The heterogeneous nature of the disease makes it difficult to accurately assess the prevalence. The prevalence of asthma varies worldwide, which appears to be 8-10 times higher in developed countries (e.g. United States, UK, Australia, New Zealand) than in developing countries. In some countries, the reasons why asthma incidence reaches a plateau or has potential decline remain unclear.

The prevalence of asthma is high in Georgia as well. According to official epidemiological data in Georgia, the number of new cases of bronchial asthma has been steadily high for the last 10 years: 3189 cases in 2008, 3285 in 2010, and 3261 cases in 2015. There are no significant changes in the incidence rate of new cases in children similarly: 588 cases in 2008 and 559 cases in 2015. Meanwhile, the number of registered cases has decreased: 16,443 registered bronchial asthma cases in 2008 and only 12,664 in 2015. The total prevalence of asthma and asthmatic status registered in 2019 in Georgia is 286.7 and the incidence rate is 59 [4]. However, the officially registered rate of bronchial asthma is likely lower than the actual situation in the country.

According to the most common definition, (Global Initiative for Asthma - GINA) Asthma is defined as a heterogeneous disease characterized by chronic inflammation of the airways. It is characterized by a history of variable respiratory symptoms such as wheezing, shortness of breath, chest tightness, and cough, the intensity of which changes over time with the variable expiratory airflow limitation [5].

Diagnosing asthma is also difficult because there is no gold standard test. A combination of characteristic clinical signs and various tests (spirometry, airway inflammation, bronchial hyperreactivity test bronchial hyper-responsiveness (BHR), allergy test) is used to make a diagnosis.

Asthma treatment, control, and management are impossible without identifying and evaluating risk factors. Many risk factors for asthma have been identified with the help of associative learning. In the 1990s a series of epidemiological studies were conducted worldwide to identify and assess the global prevalence, frequency, and risk factors of asthma; The studies were based on the data of questionnaires. The three most commonly used questionnaires to investigate asthma epidemiology and risk factors are those used in the International Study of Asthma and Allergies in Childhood (ISAAC), the European Community Respiratory Health Survey (ECRHS), and the World Health Survey (WHS) questionnaires [6, 7, 8].

The etiology of asthma is complex and multifactorial. Risk factors studied for asthma in different environments and different individuals may not be alike and do not necessarily increase the likelihood of developing asthma. According to the existing studies and the accumulated evidence, the following can be stated:

1.1 Genetics and Family History

It is apparent that there exist components of the asthma phenotype that appear to be highly hereditary. However, these inherited components do not follow the simple Mendelian pattern and the specific genes that are

responsible for these inherited components, and how they interact with each other and the environment.

1.2 Maternal prenatal tobacco exposure

is a well-established risk factor for the development of pediatric asthma, associated with impaired lung function in the newborn and a greater likelihood of occurrence of pediatric asthma [10–16]. In addition, smoking during the gestation period may be associated with other adverse effects of pregnancy, including premature birth, which is another risk factor for asthma.

1.3 Gender

Childhood asthma is usually a predominantly male disease, with the maximum prevalence in the stage of puberty [17.18.19]. The incidence of asthma in girls begins to increase in the stage of puberty and the prevalence in adulthood is approximately equal. The causes of gender differences are unclear and remain largely unexplored. It may be related to the greater prevalence of atopy in boys, or the relatively smaller size of boys' airways compared to girls [20]. The small size of the airways may also increase the risk of wheezing after viral respiratory infections in boys compared to girls.

1.4 Respiratory Hyperactivity

Abnormal and excessive airway response to harmful stimuli appears to be the main feature in the pathophysiology of asthma and all patients with asthma have airway hyperresponsiveness (AHR). AHR is a risk factor for developing asthma, but not all people with AHR develop asthma [21.22].

1.5 Respiratory infections

Viral and bacterial respiratory infections are known to be major causes of exacerbation of asthma in children and adults [23,24]. Whether respiratory infections are the cause of asthma, a predictor of asthma susceptibility, or a protective factor is unclear [25.26]. Perhaps, the effect of infection is depended on the specific type and amount of infection, genetic susceptibility, and other factors such as age, atopic status, and microbiome of an individual. Respiratory viral infections in infants, particularly respiratory syncytial virus (RSV) and human rhinovirus (HRV), predict the development of asthma in late childhood to adolescence, although no causal effect has been identified.

1.6 Atopy

Asthma is more common in individuals with underlying atopic diseases such as atopic dermatitis and allergic rhinitis; however, only about a third of children with atopic dermatitis develop asthma. Studies have shown that asthma was more closely linked to IgE levels, while allergic rhinitis was more closely related to skin test reactivity. High serum immunoglobulin E (IgE) levels are associated with AHR (airway hyperresponsiveness) [27-30].

1.7 Food allergens rarely

cause isolated asthma without other symptoms. However, patients with food allergies may have asthma symptoms as part of food-induced anaphylaxis, and inhaled food allergens may occasionally trigger asthma symptoms.

1.8 Obesity

Patients with a high body mass index (BMI) have a higher risk of developing asthma than patients with a normal BMI, although the magnitude of the effect is unclear [31].

Sensitization to **internal allergens** is strongly associated with asthma, although exposure to an allergen does not necessarily increase the risk of developing asthma.

1.9 Cigarette smoke

Cigarette smoke is a common irritant to the airways. Children exposed to the effects of tobacco smoke have a higher risk of developing asthma, more severe asthma symptoms, and more frequent exacerbations [32–34]. Stopping the effects of smoking/tobacco smoke has been linked to the improvement of lung function [35]. In addition, the effects of tobacco smoke enhance the inflammatory reactions of the airways to allergens [36].

Identification and prevention of the triggers of asthma are essential to prevent asthma exacerbations and minimize the effects of asthma.

2. Research Results in Georgia

The study to assess the quality of life (QOL) of children with bronchial asthma in Georgia was carried out from 2017 to 2020. The study aimed to assess the quality of life (QOL) of children with bronchial asthma using a variety of questionnaires, and also the importance of QoL assessment in clinical practice, and its role in asthma management.

The first stage of the study was the identification and evaluation of asthma symptoms and their severity, and asthma-related risk factors in children with bronchial asthma with the help of different questionnaires in various regions of Georgia.

2.1 The objective of the first stage

Identification of risk factors and their relationship to asthma severity and asthma control.

2.2 Methods

Observational, cross-sectional study. Data were collected in 2017 - 2020 from M. Iashvili Children's Central Hospital, as well as from Batumi and Zugdidi Referral Hospitals. In the research participated 507 children aged

2 to 18 diagnosed with asthma and wheezing, were registered both as outpatients and inpatients; their parents had agreed to participate in the study.

2.3 Exclusion criteria:

Other underlying chronic diseases (depression, diabetes, cancer, congenital heart disease, etc.).

The research tool was a set of questionnaires consisting of the following questionnaires: 1) General questionnaire - a basic, general questionnaire that included information about the asthma of the participants; 2) The Pediatric Quality of Life InventoryTM (PedsQL), Asthma Module (Version 3.0, Short Form (SF 22)). Pediatric Quality of Life Inventory (PedsQL), Asthma Module (Version 3.0, Short Form (SF 22)); 3) The PedsQL Multidimensional Fatigue Scale; 4) The PedsQLTM Family Impact Module; 5) Asthma control test (ACT) or the childhood Asthma-Control Test (C-ACT);

Asthma control was assessed using the Asthma Control Test (ACT) or The childhood Asthma-Control Test (C-ACT). The ACT questionnaire was filled in by children under 12 years of age independently. The C-ACT was completed by Children between the ages of 4 and 11 together with their parents. The C-ACT scores were from 0 to 27 and the ACT scores were from 5 to 25. A score of ≥20 in the ACT and C-ACT questionnaires indicated controlled asthma, scores of 19–16 points indicated partially controlled asthma, and ≤15 points indicated uncontrolled asthma.

The form and severity of asthma were determined by a pediatrician and an allergist using the BTS Asthma Treatment Step-by-Step Approach of the British Thoracic Society, where 4^{th} and 5^{th} stage asthma was considered severe asthma forms.

In addition, in children over 6 years of age, external respiration was assessed with computer-assisted spirometry, determining the following parameters: FEV_1, FVC, FEV_1/FVC, FEF_{25-75}.

The questionnaires used in the study were provided by the Lithuanian Paediatric Respiratory Society in English. Which were translated into Georgian by a doctoral student, checked by the research supervisor, and reviewed by two independent translators, after which a valid version of the questionnaire was developed and sent and received by MAPS.

The study adheres to the ethical standards set out in the Helsinki Declaration. The study was approved by the Biomedical Research Ethics Committee of Tbilisi State Medical University on 27.07.2016 # 57/3.

Data from the first questionnaire were used to assess asthma symptoms and risk factors.

1. General Questionnaire. The questionnaire consists of 4 parts:

A - general information about a child - 7 questions. (Gender; Age; Height; Weight; Does any family member have asthma? and who has? Does any family member have allergies? and who has?).

B - child's family structure; education and occupation of the parent - 6 questions.

C - information about the environment in which the child grows - 11 questions (maternal smoking during pregnancy, smoking environment, type of heater and floor, pets, the presence of moisture, etc.)

D - information on child asthma symptoms, underlying allergic conditions, child activities, parent and family attitude about child's asthma and health - 16 questions.

1.5 Statistical analysis

Data analysis was performed with SPSS 22.0 and Microsoft Excel 2013.

Descriptive and conclusion (analytical) statistical methods were used for statistical analysis:

- The Kruskal – Wallis test; This nonparametric test checks to see if there is a difference between two or more groups;
- Spearman's rank correlation coefficient was used to estimate associations between nominal and ranking variables. We calculated OR (odds ratio).
- The Chi-Square and Fisher's exact probability tests were used to compare categorical data.
- The Wilcoxon signed-rank test (this is the Sign Test; with this test, we compared how different the answers of parents and children to the same questions were).

Binary logistic regression (LR) was performed to identify the most important risk factors associated with poor QoL, increased fatigue, and the impact of disease on family life.

The results were considered statistically significant when $p \leq 0.05$, higher statistically significant - when $p \leq 0.01$, and maximum statistically significant - when $p \leq 0.001$;

We changed a Likert scale data from a 0-4 scale to a 0-100 scale, where 100 was the highest and 0 was the lowest rating. QoL is the mean of the points.

Note! Children under 4 years of age were excluded from the statistical analysis when assessing asthma control, as there was no valid questionnaire to assess asthma control for this age group.

2.4 Results

In the research participated 507 children aged 2 to 18 and their parents, of whom 319 were from M. Iashvili Central Children's Hospital in Tbilisi, 130 were from Batumi Referral Hospital and 58 were from Zugdidi Referral Hospital; the patients had been diagnosed with asthma and wheezing (Asthmatic bronchitis), and were registered both as outpatients and inpatients from all regions of Georgia;

We have identified 11 regions according to the place of residence. Distribution by region is given in **Table 1**:

Table 1: Distribution of patients by regions

	Region	Hospital			Total
		Iashvili	**Batumi**	**Zugdidi**	
1	Tbilisi	152			152
2	Mtskheta-Mtianeti	6			6
3	Kartli	67			67
4	Samtskhe-Javakheti	15			15
5	Kakheti	17			17
6	Imereti	20		2	22
7	Guria	4		1	5
8	Adjara	13	130		143
9	Samegrelo	21		52	73
10	Racha-Lechkhumi Svaneti	2		2	4
11	Abkhazia	2		1	3
	Total	319	130	58	507

6 age groups were identified: 1) 2-3-year-olds; 2) 4-year-olds; 3) 5-7-year-olds; 4) 8-11-year olds; 5) 12-year-olds; 6) 13-18-year-olds; distribution by age is presented in **Table 2**.

Table 2: Distribution of patients by age

Age groups	Age	Number
I	2-3	6
II	4	28
III	5-7	142
IV	8-11	162
V	12	27
VI	13-18	142

50.1% of the respondents had mild asthma, 38.1% had moderate asthma, and only 11.8% had severe asthma (50% of severe asthma came from the Adjara region).

Asthma of pure allergic origin was diagnosed in 15.4% of children, acute bronchitis with bronchospasms in 19.3%, mixed asthma in 59.4%, and non-allergic asthma in only 5.9%.

Severe asthma was manifested mainly in mixed types. According to Pearson's chi-squared test, asthma severity is associated with asthma control and this association is statistically highly reliable ($P < 0.001$).

2.4.1 The relationship of genetics, gender, and overweight with asthma severity and its control

2.4.1.1 Asthma and Genetics

25.83% (131) of the respondents had a family history of asthma (an equal percentage of maternal (57) and paternal (56) history of asthma). Neither of the participants had an asthma history from both parents. Children whose mothers had bronchial asthma (31.6%) had a severe form of asthma, and children whose fathers had bronchial asthma made up 57.1%. As for asthma control, 22.8% of children of asthmatic mothers had

uncontrolled asthma, and 10.5% had partially controlled asthma. And in children of asthmatic fathers, 35.7% had uncontrolled asthma and 10.7% had partially controlled asthma.

According to Pearson's chi-squared test:

- Asthma severity is associated with maternal asthma and this association is statistically significant (P <0.001);
- Asthma control is associated with maternal asthma and this association is statistically significant (P <0.01);
- Asthma severity is associated with paternal asthma and this association is statistically significant (P <0.001);
- Asthma control is associated with paternal asthma and this association is statistically significant (P <0.001);
- Asthma severity is associated with a family history of asthma and this association is statistically significant (P <0.001);
- Asthma control is associated with a family history of asthma and this association is statistically significant (P <0.001).

Family history of allergies was reported by the majority of respondents 95.85% (486). The largest percentage of this, 33.53% (170), was associated with paternal allergy. There were almost no participants whose both parents had allergy history. Asthma severity was not associated with paternal allergies (P> 0.05).

- The severity of asthma is associated with other allergies in families and this association is statistically significant (P <0.05);
- Asthma control is associated with other allergies in families and this association is statistically significant (P <0.05)
- Severe asthma is associated with other maternal allergies and this association is statistically significant (P <0.01)
- Asthma control is associated with other maternal allergies and this association is statistically significant (P <0.001)
- Asthma severity is not associated with other paternal allergies P> 0.05
- Asthma control is associated with other paternal allergies and this association is statistically significant (P <0.001)
- Asthma severity is not associated with a family history of other allergies (P> 0.05)
- Asthma control is associated with a family history of other allergies and this association is statistically significant (P <0.01)

2.4.1.1.2 Asthma and Gender

Although 2/3 (66.46%) of the study participants were boys, asthma severity and control appeared not to be associated with gender. Only 11.9% of boys had severe asthma and almost the same percentage (11.1%) had uncontrolled asthma, 7.8% had partially controlled asthma.

According to Pearson's chi-squared test, asthma severity and asthma control were not associated with gender (P> 0.05).

2.4.1.1.3 Asthma and overweight

36% (183) of the participants were overweight (1 child under 4 years of age). 1/3 of the overweight children had severe (18%) and moderate (12.6%) asthma, as for asthma control, 13.2% of the overweight patients had uncontrolled and 4.4% had partially controlled asthma.According to Pearson's chi-squared test, the association between overweight and severity is statistically significant (P <0.001).Asthma control is associated with overweight and this association is statistically significant (P <0.01)

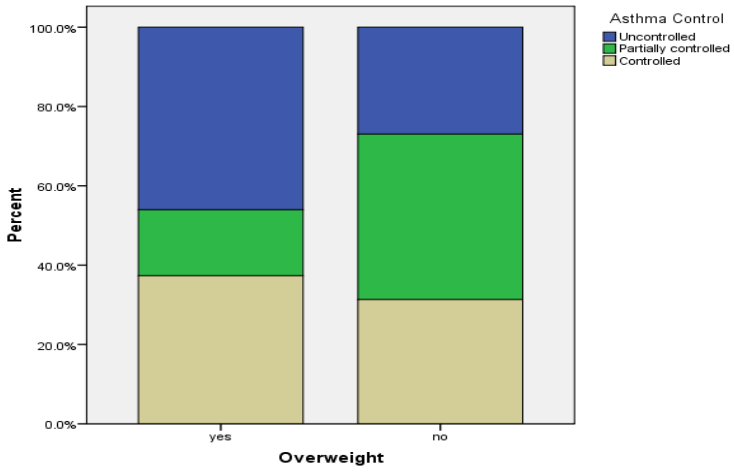

Figure 1: Asthma and overweight

2.4.2 Asthma and smoking

The study found that 60.9% of children grew up in environmental tobacco smoke, 16.37% had a smoking mother (however 19.1% of mothers were smoking during pregnancy), and 57.19% had a smoking father. 33.7% of children of smoking mothers and 19% of smoking fathers were diagnosed with severe forms of asthma. As for asthma control, 17.3% of the children of smoking mothers had uncontrolled asthma, while the children of smoking fathers made up 16, 15%.Although asthma severity is not associated with other smokers in the family (P> 0.05), asthma control is associated with other smokers in the family and this association is statistically significant (P <0.001).In all patients aged 15–18 years, both girls and boys with non-allergic asthma, asthma manifestations were associated with tobacco use.

According to Pearson's chi-squared test:

- The severity of asthma is associated with maternal smoking and this association is statistically significant (P <0.001);
- Asthma control is associated with maternal smoking and this association is statistically significant (P <0.01);

- Asthma control is associated with other smokers in the family and this association is statistically significant (P <0.001);
- The severity of asthma is associated with a smoking father and this association is statistically significant (P <0.001);
- Asthma control is associated with a smoking father and this association is statistically significant (P <0.001);
- The severity of asthma is associated with a smoking mother during pregnancy and this association is statistically significant (P <0.001);
- Asthma control is associated with a smoking mother during pregnancy and this association is statistically significant (P <0.001).

In the case of children with a smoking mother the incidence of a severe form of asthma appeared to be 6.25 times higher than in the case of a non-smoking mother. In the case of a smoking father, the incidence of severe asthma was 9.9 times higher than in the case of a non-smoking father.The association of the risk factors (genetics, gender, obesity, smoking) with asthma severity and control are presented in **Table 3.**

Table 3: the association of the risk factors with asthma severity and control. (genetics, gender, obesity, smoking)

Risk factors	**Total**	**Asthma severity**			**Asthma control**		
		severe	moderate	mild	uncontrolled	partially controlled	controlled
Family history of asthma	131 (25,83%)	54 41,2%	51 38,9%	26 19,8%	37 28,2%	12 9,2%	82 62,6%
Mother with bronchial asthma	57 11,24	18 31,6%	27 47,4%	12 21,1%	13 22,8 %	6 10,5%	38 66,7%
Father with bronchial asthma	56 11,04	32 57,1%	10 17,9%	14 25,0%	20 35,7%	6 10,7%	30 53,6%
Family history of allergies	486 (95,85%)	54 11,1%	189 38,9%	243 50,0%	46 9,6%	46 9,6%	388 80,8%
Mother with other allergies	118 23,27%	4 3,4%	49 41,5%	65 55,1%	8 6,8%	0 0	110 93,2%
Father with other allergies	170 33,53%	20 11,8%	62 36,5%	88 51,8%	0 0	32 19,5%	132 80,5%
Other relatives with allergies	23 4,5%	6 26,1%	7 30,4%	10 43,5%	7 30,4%	0 0	16 69,6%
Gender (boy)	337 66,46%	40 11,9%	125 37,1%	172 51,0%	37 11,1%	26 7,8%	270 81,1%
Obesity	183 36%	33 18,0%	23 12,6%	127 69,4%	24 13,2%	8 4,4%	150 82,4%
Prenatal smoking	97 19,1%	18 18,6%	0 0	79 81,4%	4 4,2%	0 0	91 95,8%
Smoking mother	83 16,37%	28 33,7%	0 0	55 66,3%	14 17,3%	0 0	67 82,7%
Smoking father	290 57,19%	55 19,0%	115 39,7%	120 41,4%	47 16,5%	4 1,4%	233 82,0%
Smoking environment	309 60,9%	42 13,6%	119 38,5%	148 47,9%	34 11,2%	4 1,3%	263 87,5%

Note: Children under 4 years of age were excluded from the statistical analysis when assessing asthma control, as there was no valid questionnaire to assess the asthma control for this age group.

2.4.3 Asthma and accompanying allergies

The majority of children 94% (477) had concomitant allergies, mainly allergic rhinitis 40% (203). Food allergies/skin forms were revealed in 26.82% (136) of the respondents and 27.2% (138) of the children had mixed forms of allergy.

41.3 % had severe asthma with concomitant allergies (4.9% of children with concomitant allergic rhinitis, 14.7% with food allergies, and 21.7% with mixed allergies).

Uncontrolled forms were most often detected in children with concomitant mixed allergies (30.4%).

According to Pearson's chi-squared test, the association between the form and severity of allergies is statistically significant (P <0.001).

The association of concomitant allergies in children with bronchial asthma on the asthma severity and its control is given in Table 4.

Table 4: Relationship of comorbid allergies to asthma severity and control

Comorbid allergies	**Total** 477(471)	**Asthma Severity**			**Asthma Control**		
		severe	moderate	mild	uncontrolled	partially controlled	controlled
Allergic rhinitis	203 40,03%	10 49%	84 41,4%	109 53,7%	0 0	8 3,9%	195 96,1%
Food allergies	136 26,82%	20 14,7%	47 34,6%	69 60,7%	10 7,7%	8 6,2%	112 86,2%
Mixed allergies	138 27,21%	30 21,7%	50 36,2%	58 42,0%	42 30,4%	26 18,8%	70 50,7%

Note! Children under 4 years of age were excluded from the statistical analysis when assessing

asthma control, as there was no valid questionnaire to assess the asthma control for this age group.

2.4.4 Asthma and other factors

In most of the participants' homes mainly gas had been used for heating - 68.44% and severe asthma cases were correlated with firewood use.

33.92% of the participants reported having dampness at home. Home dampness was strongly correlated with both severe forms of asthma (31.4%) and poor control. (Especially the presence of dampness in the living room and basement).

The presence of carpets at home was associated more with severity than with control, while the presence of linoleum was associated with both severity and control.

The number of severe and uncontrolled asthma cases was higher in children living in private homes (this may be related to the countryside factor, children living in private homes were mostly from the countryside).

13.8% of children with asthma lived only with their parents, the rest of the children were members of large families. Only 9.9% of children with asthma had their room. Asthma severity and control are associated with having or not having one's room. Asthma can be controlled better if you have a private room.

2.4.5 Asthma and pets

59% of the participants had a pet, the severe forms were two times higher in these children (14.7%) than in those who did not have a pet (7.7%). Asthma control, however, has little to do with having a pet. (It is more uncontrollable in the case of a dog than in the case of a cat)

2.4.6 Asthma and socioeconomic status of the family

The socioeconomic status of the families was assessed on a 5-point scale. The majority of respondents 85.4% (433) stated that they had middle socioeconomic status. A small percentage reported that they had high socioeconomic status 11.04% (56) and a smaller percentage 3.85% (18) had low socioeconomic status. and 15.18% were receiving social assistance (77).

Severe and uncontrolled forms of asthma were correlated with family income as well as parental education.

According to Pearson's chi-squared test:

- Asthma severity is associated with maternal education and this association is statistically significant (P <0.001);
- Asthma control is associated with maternal education and this association is statistically significant (P <0.001);
- Asthma severity is associated with paternal education and this association is statistically significant (P <0.001);
- According to Pearson's chi-squared test, asthma control is associated with paternal education and this association is statistically significant (P <0.001).

57.6% reported that the participants had to miss school or kindergarten for 1 week, 40.4% - for 1-4 weeks, and 2% - for more than 4 weeks. During the last 6 months, hospitalization had become necessary in 35.56% of the participants.

100% of the parents of the participants said that they had difficulties in the family due to the child's asthma, such as anxiety and depressive mood (63%), financial (12%), and other difficulties (25%).

Parents of children with asthma assessed the child's health as medium, satisfactory or poor, none of them assessed the child's condition to be good.

3. Conclusion

Thus, based on the analysis of the data of the general questionnaire of the first stage of the research, we can state that:

- Asthma severity and control are significantly associated with a genetic factor, i.e. asthma of both parents, especially paternal asthma.
- Although asthma is more prevalent in boys than in girls, asthma severity and control are not associated with gender.
- Being overweight is associated with both, asthma severity and asthma control.
- Asthma severity and control are significantly associated with smoking, particularly maternal tobacco use during pregnancy.
- Accompanying allergies are closely linked to asthma severity and its control.
- The presence of dampness was strongly correlated with both severe forms of asthma as well as poor control. (Especially the presence of dampness in the living room and basement);
- The presence of carpet was associated with more severity than control, and the presence of linoleum was associated with both severity and control.
- Severe asthma was correlated with firewood use.
- Asthma control is not related to having pets.
- Severe and uncontrolled forms of asthma were correlated with family income as well as parental education.
- Child asthma is a family burden

Identification of risk factors plays an important role in controlling asthma. Identification and prevention of the "precipitants" of asthma is an important component of successful asthma management. By modifying the risk factors, we can control asthma, reduce the need for medication, and prevent asthma complications.

4. Strengths and limitations

This was the first research in Georgia to look at the symptoms, severity, and control of bronchial asthma based on different questionnaires, which are trustworthy and widely used instruments for identifying the status of asthma patients.

However, there are several limitations to this research. We recruited children with asthma who had been admitted to the referral hospitals with relatively more severe asthma, thereby excluding patients with less severe asthma in outpatient facilities. Which means that our findings may not be generalized to the asthmatic population in Georgia at large.

Another downside is that our study was questionnaire-based and relied on self-reports, which makes it more

subjective and does not exclude over- or under-estimation of quality of life or asthma control by the study participants.Despite the worldwide use of QOL questionnaires as a complementary form of assessing diseases, few studies have focused on children and in this age group QOL impairment is not solely associated with asthma.And one more: the sample size is relatively small and the findings may not be generalizable to the entire Georgian population. Study with a larger population seems necessary to further support the findings of this study.

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