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Features of bronchial asthma in children according to age and disease duration

Keywords: children, asthma, flow.

Bronchial asthma (BA) of childhood is a serious medical and social problem. The prevalence, severity of complexity of diagnosis, treatment and rehabilitation, and social and economic problems of asthma occupies a leading position among the "diseases of century" [1, 2]. This is determined by several factors, among which are the early onset of the disease and the difficulty of diagnosis, including differential diagnosis. Pediatric Asthma can occur at any time, but the debut of the disease often occurs at an early age of 50–80 % of cases – children under 5 years.

The level of diagnostic errors of general practitioners in the diagnosis of asthma is higher than 40 %, and the correct diagnosis delayed for 5–6 years. According to Sokolova L. V. only 15.9 % of children diagnosed has been installed in the first 6 months of disease, 18.8 % – in 2 years, 65.3 % – 5-10 years or more [1].

Early onset of the disease and the difficulty of diagnosis, late diagnosis of asthma in childhood lead to a steady increase in morbidity and mortality in childhood. The first signs of the disease, according to the authors, 54.1 % appear at an early age, while 14.3 % of them – on the first year of life. However, early, timely diagnosis of asthma in children occurred only in 9.5 % of cases [4].

Often the diagnosis of asthma is established with a delay of 4–5 years, determining treatment strategy wrong patient, the lack of prevention of exacerbations of the disease and, in general, significantly worsen the prognosis. Ignorance of practicing doctors clinical features of asthma in children contributes to the dramatization of the disease (disability with the formation of severe complications) [1, 6, 7, 9].

The disease has clinical features and course in different ages and phenotypic variants that significantly affect the

diagnostic and therapeutic process [1, 3, 8]. Experience leading allergists children suggests that asthma is not diagnosed in a timely manner, often runs under the guise of recurrent obstructive syndrome of different genesis, followed by its transformation in some children with typical asthma [2, 3, 4]. Most asthma exacerbations due to incorrect therapy due to underestimation of historical information and improper interpretation of clinical symptoms and dynamics of disease in general [4, 8]. Therefore, only the timely diagnosis ranging from infancy to lead to appropriate therapy and, consequently, controlled Supervision of patients that will prevent the development of serious complications and disability, improve quality of life for patients with this disease.

Objective: to study the course of asthma in children depending on the child's age and disease severity.

Materials and methods: The study involved 107 patients: one group consisted of 62 patients who, after examination at the clinic was first diagnosed with asthma. By the 2-nd group were included patients who came to clinic diagnosed with asthma for at least 6 months (45 patients).

The degree severity of children's asthma, respectively, were as follows: patients with newly diagnosed disease were 51.6 % of patients with mild, 38.7 % – from moderate and only 9.7 % – asthma was found with severe asthma. Among patients with a long disease course dominated by patients with moderate and severe asthma.

Results and discussion: Work carried out by public funds. Analysis of the distribution of surveyed children by gender revealed predominance of boys ($67,7 \pm 8,2$ %) in group 1, mersed which the vast majority of patients had preschool and prepubertal age (Table 1).

Distribution of patients by sex				
sex	Groups of patients			
	1		2	
	abs	(M ± m) %	abs	(M ± m) %
male	42	67,7 ± 8,2*	20	44,4 ± 6,6
female	20	32,3 ± 5,6	25	55,6 ± 7,4
Total	62	57,9 ± 7,6	45	42,1 ± 6,4

Note: * -Significant difference between gender (P < 0.05).

Most children with asthma disease makes its debut in early childhood and it is this group of children is at risk and needs careful examination to exclude the diagnosis of asthma. In the evaluation of asthma by age established significant differences between the degree of severity (Table 2). For example, among children aged 3-5 years, asthma was first established in descending order: mild course of (27,4 ± 5,1)% of patients, moderate – at (12,9 ± 3,4) % of patients and severe – (1,6 ± 0,2)%. Among patients 6-12 years observed a similar pattern among patients older than 13 years, asthma of ten ran as a moderate (in (9,7 ± 2,9) % of patients).

Disease onset asthma have an average age of (4,64 ± 0,8) years, that most children the disease makes its debut in early childhood. Children aged 4-5 years are most prone to the implementation of asthma that is caused by negative factors against the back drop of age immaturity of the immune system. Analysis of clinical observations indicates a late diagnosis of asthma in 43.6 % of children, particularly mild when notypical attacks of breathlessness.

The initial manifestations of asthma in children are: the unwarranted attacks of dry cough attacks (51.6 %), wheezing (25,8 %), the prevalence of nocturnal episodes of obstruction (30.6 %), episodic obstructive syndrome after physical activity (25.8 %), asthma attacks school-age patients (29.0 %). In the study of the clinical features of asthma in children were found (Table 3), all patients in the observation complained of cough (100 %).

Thus recurrent dry cough was intrusive in most patients of the second group (71.1 %) and half of the patients of the 1st group with significant difference between the indexes. Paroxysmal nature of cough was in 2 times less likely in patients with long- established diagnosis of asthma (11.1 % vs. 29.5 and 24.2 %, P < 0.05). Wheezing was observed in a quarter of the patients of 1st and 2nd groups, irrespective of the diagnosis – in 25.8 % and 22.2 %, respectively. An even more pronounced difference in the incidence of manifestations had complaints of asthma (5 times or more). Thus in patients with asthma attack frequency was more than 1 time per week (especially among the 2 groups of patients, as they prevailed among patients who had acted in a compartment in acute asthma).

Complaints of shortness of breath had a total (32,3 ± 5,6) % of group 1st and (35,6 ± 5,8) % 2nd groups. In the distribution by age of the frequency of symptoms was also different. Among preschool children dyspnea was 60.0 % in patients with long- diagnosed asthma. The greater was the age of the child , the more dyspnea occurred during exercise and was a manifestation of bronchial asthma. Patients with asthma often complained of attacks of wheezing / hryplychoho night breathing and coughing fits at night, especially children aged 3 to 5 years. The respondents of the same age group often have dyspnea at rest as well as during exercise, due, in addition to the presence of inflammation, even with the anatomical and physiological characteristics of the organism in the present age period .

The most significant medical history factors that contribute to the development of asthma in childhood: multiple organopathy (atopic dermatitis and/or allergic rhinitis, food allergies, etc.) (42 %), burdened with atopic heredity (78.2 %), frequent acute respiratory diseases (47.3 %), with a frequency of 4 or more times per year (43.6 %) and obstructive bronchitis (27.3 %) in the first year of life, and subsequently three more cases of bronchial obstruction in a year, recurrent laryngostenosis in children older than 3 years old.

On examination, patients with asthma attracted the attention of pale skin, rapid noisy breathing with forced exhalation, involving pleural chest in 83 patients, that the vast majority of children 1st and group 2nd. Swelling of the chest was observed in 16 patients. Modified percussion sound

Distribution of patients with asthma by the disease						
The patient's age, years	Asthma flow					
	Group 1 (n = 62)			Group 2 (n = 45)		
	Mild (n = 32)	Moderate (n = 24)	Severe (n = 6)	Mild (n = 15)	Moderate (n = 20)	Severe (n = 10)
3 – 5	27,4 ± 5,1	12,9 ± 3,4	1,6 ± 0,2 [#]	11,1 ± 3,0 *	6,7 ± 2,1	4,4 ± 1,5
6 – 12	19,4 ± 4,2	16,1 ± 3,8	6,5 ± 2,2 [#]	17,8 ± 4,0	35,6 ± 5,8 *	15,6 ± 3,7 [#]
> 13	4,8 ± 1,8	9,7 ± 2,9	1,6 ± 0,2 [#]	4,4 ± 1,5	2,2 ± 0,2 *	2,2 ± 0,2 *
All	51,6 ± 7,1	38,7 ± 6,1	9,7 ± 2,9 [#]	33,3 ± 5,6 *	44,4 ± 6,6	22,2 ± 4,5 [#]

Notes: * – significant difference between patients 1st and 2nd groups (P < 0.05);
– significant difference between the number of patients with a particular disease in the middle of group (P < 0.05).

Table 3

Clinical manifestations in patient's examined				
Manifestations	Groups of patients			
	1		2	
	abs.	(M ± m) %	abs.	(M ± m) %
1	4	5	6	7
Cough:	62	100,0	45	100,0
- dry	32	51,6 ± 7,1	32	71,1 ± 8,4
- wet	15	24,2 ± 4,8	8	17,8 ± 4,0
- attacks	15	24,2 ± 4,8	5	11,1 ± 3,0
wheezing	16	25,8 ± 5,0	10	22,2 ± 4,5
Asthma attacks	18	29,0 ± 5,3	13	28,9 ± 5,2
incidence of asthma	18	29,0 ± 5,3	13	28,9 ± 5,2
<1 time/ week	12	66,7 ± 8,1	6	46,2 ± 6,5
>1 time/ week	4	22,2 ± 4,2	6	46,2 ± 6,5*
- at night	2	11,1 ± 2,5	1	7,7 ± 0,8
Shortness of breath when entering				
All of dyspnea	20	32,3 ± 5,6	16	35,6 ± 5,8
Children 3- 5 years	11	55,0 ± 7,3	7	43,8 ± 6,3
Children 6- 12 years	6	30,0 ± 5,1	5	31,3 ± 5,2
Children 13 years and older	3	15,0 ± 3,3	4	25,0 ± 4,5
- dormancy	4		5	
Children 3- 15 years	1	25,0 ± 2,5	3	60,0 ± 7,2*
Children 6- 12 years	2	50,0 ± 6,1	2	40,0 ± 5,3
Children 13 years and older	1	25,0 ± 2,5*	0	0 ± 57,5
- during exercise	16	25,8 ± 5,0	11	24,4 ± 4,8
Children 3- 5 years	5	31,3 ± 5,2	4	36,4 ± 5,5
Children 6- 12 years	8	50,0 ± 6,8	3	27,3 ± 4,5*
Children 13 years and older	3	18,8 ± 3,7	4	36,4 ± 5,5*
Increased body temperature	3	4,8 ± 1,8	3	6,7 ± 2,1
Attacks of wheezing/	12	19,4 ± 4,2	10	22,2 ± 4,5
Children 3- 5 years	7	58,3 ± 7,4	5	50,0 ± 6,7
Children 6- 12 years	4	33,3 ± 5,3	2	20,0 ± 3,5*
Children 13 years and older	1	8,3 ± 0,8	3	30,0 ± 4,8*
Attacks of wheezing cough at night	7	11,3 ± 3,1	8	17,8 ± 4,0
Children 3- 5 years	5	71,4 ± 8,2	2	25,0 ± 4,0*
Children 6- 12 years	1	14,3 ± 1,4	4	50,0 ± 6,6*
Children 13 years and older	1	14,3 ± 1,4	2	25,0 ± 4,0*
First dyspnea:				
- associated only with ARI	11	17,7 ± 4,1	9	20,0 ± 4,3
Children 3- 5 years	9	81,8 ± 9,0	3	33,3 ± 5,1*
Children 6- 12 years	1	9,1 ± 0,9	6	66,7 ± 7,9*
Children 13 years and older	1	9,1 ± 0,9	0	0 ± 42,9
- not associated with ARI	14	22,6 ± 4,6	15	33,3 ± 5,6
Establishment nose, itching, discharge from the nose	25	40,3 ± 6,3	21	46,7 ± 6,7
Children 3- 5 years	16	64,0 ± 7,9	7	33,3 ± 5,5*
Children 6- 12 years	7	28,0 ± 5,0	11	52,4 ± 7,1*
Children 13 years and older	2	8,0 ± 2,1	3	14,3 ± 3,2

Note: * – significant difference between 1st and 2nd groups (p < 0.05).

(with boxshade or shorter) was determined in 36 (58,1 ± 7,6%) patients of 1st, in 27 (60,0 ± 7,7 %) – group 2nd. Auscultation on the background of hard breathing (104 patients with asthma), dry whistling rales (in 72,6 ± 8,5) % and (73,3 ± 8,5) % of patients 1st and 2nd groups.

The most sensitive indicators of respiratory function, which significantly altered in children with asthma, the level PEF, MEF₅₀ and MEF₂₅.

Analysis of the mean values PFT in the children of both groups showed a probable decrease FEV₁, PEF, MEF₅₀ % and MEF₂₅ %. Changes PFT were found in both groups of patients (22,6 ± 4,6) and (37,8 ± 6,0) %. Statistical differences between groups of patients with asthma also significant (p < 0.05).

Mean values of forced expiratory in first second (FEV₁, %) in patients 1st and 2nd groups – (83,3 ± 3,1) % and (84,6 ± 3,5) %, respectively (p_{1:2} < 0.05). Patients with newly diagnosed asthma (group 1st) there is a significant decrease in the average MEF₇₅ and MEF₅₀ compared with patients in group 2nd.

We examined the average values of which were lower than normal in patients with asthma and identified the most sensitive parameters that vary significantly in patients with asthma: the level of PEF (%), MEF₇₅ (%), MEF₅₀ (%) and MEF₂₅ % (Table 4).

Index	Groups of patients			
	group 1, n = 62		group 2, n = 45	
	abs.	(M ± m) %	abs.	(M ± m) %
FEV ₁ , %, cases < 80%	2	3,2 ± 1,3	8	17,8 ± 4,0*
PEF, %, cases < 80%	7	11,3 ± 3,1	12	26,7 ± 5,0*
MEF 75 %, cases < 60 %	4	6,5 ± 2,2	7	15,6 ± 3,7*
MEF 50 %, cases < 60 %	7	11,3 ± 3,1	10	22,2 ± 4,5*
MEF 25 %, cases < 60 %	8	12,9 ± 3,4	4	8,9 ± 2,6

Note: * – significant difference between 1st and 2nd groups (p < 0.05).

It was established that the rate of bronchial obstruction, which are more sensitive and can detect changes in initial airway management in children is PEF (%), the number of cases in which there was to reduce it by more than 20 % of the predict values.

In children with asthma, all ages occur almost similar changes in the immune system, which with age become more distinct. The most significant immunological changes in patients with asthma is increased activity of Th2-lymphocytes with hyperproduction of interleukin IL-4 (in 4,1-4,9 times), which contributes to more severe (in 5,1-9,3 times) over production of IgE, growth in 1,7-2 times of eosinophilic cationic protein. Patients with asthma are determined by changes in the ratio of active Th2-i Th1-lymphocytes towards more active Th2.

Increased activity of Th2-lymphocytes with hyperproduction of interleukin IL-4, IgE hyperproduction, increased eosinophilic cationic protein with a probable significance and can be used as additional markers for early diagnosis of asthma in children. Thus, asthma in childhood different variety of clinical and functional manifestations and pathology is multifactorial because many of factors, including the child's age and manifestation of disease, are important in the progression of the disease.

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ОСОБЕННОСТИ ТЕЧЕНИЯ БРОНХИАЛЬНОЙ АСТМЫ У ДЕТЕЙ В ЗАВИСИМОСТИ ОТ ВОЗРАСТА И ДАВНОСТИ ЗАБОЛЕВАНИЯ

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Резюме

Цель исследования: Изучить течение бронхиальной астмы (БА) у детей в зависимости от возраста ребенка и тяжести заболевания.

Материалы и методы: С целью изучения течения БА у детей в зависимости от возраста ребенка и тяжести заболевания обследовано 107 пациентов: 1-ю группу составили 62 пациента, которым после обследования в клинике был впервые установлен диагноз БА. Ко 2-й группе были отнесены больные, которые поступали в клинику с установленным диагнозом БА и длительностью заболевания более 6 мес (45 пациентов). По степени тяжести среди обследованных больных со впервые выявленным заболеванием у 51,6 % больных БА

была легкого течения, 38,7 % – средне-тяжелого и только в 9,7 % случаев астма имела тяжелое течение. Среди больных с длительным течением заболевания преобладали больные со средне-тяжелым и тяжелым течением.

Результаты и обсуждение: Анализ распределения обследуемых детей по полу выявил преобладание мальчиков дошкольного и подросткового возраста. Начало заболевания БА приходится в среднем на возраст (4,64 ± 0,8) года, т.е. у большинства детей заболевание дебютирует в дошкольном возрасте. Среди детей 3–5 лет БА имела течение (в порядке убывания): легкое течение – у (27,4 ± 5,1) % больных, средне-тяжелое – у (12,9 ± 3,4) %, тяжелое – у (1,6 ± 0,2) %. Среди больных 6–12 лет наблюдалась аналогичная картина, а среди больных старше 13 лет астма чаще протекала как средне-тяжелая – в (9,7 ± 2,9) % случаев.

Исходными проявлениями БА у детей являются: приступы немотивированного сухого приступообразного кашля, «свистящее» дыхание (wheezing), преобладание ночных эпизодов обструкции, эпизодический характер обструктивного синдрома после физической нагрузки, приступы удушья у пациентов школьного возраста. Наиболее значимые анамнестические факторы, способствующие развитию БА в детском возрасте: полиорганная атопия, отягощенная по атопии наследственность, частые острые респираторные заболевания и обструктивный бронхит на первом году жизни, рецидивирующие ларингостенозы у детей старше 3 лет.

Наиболее чувствительными показателями функции внешнего дыхания, существенно изменяются у детей, больных БА, является уровень PEF, MEF50 и MEF25.

При изучении клинических особенностей течения БА у детей было установлено, что четвертая часть обследованных больных 1-й и 2-й групп жаловались на кашель и затрудненное дыхание со свистом (wheezing) независимо от срока постановки диагноза.

Наиболее значимыми иммунологическими изменениями у больных БА является повышение активности Th2-лимфоцитов с гиперпродукцией интерлейкина ИЛ-4 (в 4,1–4,9 раза), что способствует более выраженной (в 5,1–9,3 раза) гиперпродукции IgE, рост в 1,7–2 раза уровня эозинофильного катионного протеина. У больных БА определяются изменения соотношения активности Th2- и Th1-лимфоцитов в сторону большей активности Th2 независимо от степени тяжести заболевания. Повышение активности Th2-лимфоцитов с гиперпродукцией интерлейкина ИЛ-4, гиперпродукция IgE, повышение уровня эозинофильного катионного протеина имеют достоверную значимость и могут использоваться как дополнительные маркеры ранней диагностики БА у детей.

Выводы: Суммируя полученные результаты, мы имели возможность еще раз убедиться в том, что БА в детском возрасте отличается многообразием клинических и функциональных проявлений и является многофакторной патологией, поэтому множество факторов, в частности возраст ребенка и манифестация заболевания, имеют большое значение в прогрессировании и течении болезни.

Ключевые слова: дети, бронхиальная астма, течение.

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FEATURES OF BRONCHIAL ASTHMA IN CHILDREN ACCORDING TO AGE AND DISEASE DURATION

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Abstract

Aim: The aim of study was study course of bronchial asthma (BA) in children depending of age and severity of disease.

Materials and methods: were examined 107 patients: first group consisted of 62 patients with first diagnosed BA. Second group includes patients with diagnosis of asthma duration more than 6 months (45 patients). Among patients with first diagnosed BA were: 51.6 % patients were with mild asthma, 38.7 % – moderate asthma and only 9.7% – severe asthma. Among patients with a longer duration of the disease dominated patients with moderate and severe asthma.

Results: was found, that pre-school boys and teens were more with BA than girls. Beginning of asthma have an average age of (4,64 ± 0,8) years, for most children the disease makes debut in the preschool years. Among children 3–5 years old with asthma: a mild course (27,4 ± 5,1) % of patients, moderate – (12,9 ± 3,4) % and severe – in (1,6 ± 0,2) % of patients. Among patients 6–12 years old was the same, and among patients older than 13 years, asthma often occur as a moderate.

The initial manifestations of asthma in children are unmotivated attacks of paroxysmal dry cough, wheezing, the prevalence of nocturnal episodes of obstruction, episodic obstructive syndrome after exercise, asthma attacks in patients of school age. The most significant medical history factors that contribute to development of asthma in childhood: multiple organ atopy, burdened by family history of atopy, frequent acute respiratory disease and obstructive bronchitis in the first year of life, recurrent laryngostenozы in children older than 3 years. There quarter of patients had a cough and wheezing.

The most sensitive indicators of lung function, significantly altered in children with asthma is the level of PEF, MEF50 and MEF25.

The most significant immunological changes in patients with asthma is increased activity of Th2-lymphocytes with overproduction of interleukin IL-4 (in 4,1–4,9 times), which promotes a more pronounced (in 5,1–9,3 times) overproduction of IgE, an increase in 1.7–2 times the level of eosinophil cationic protein. Patients with asthma are determined change activity ratios Th2- and Th1-lymphocytes towards Th2 greater activity regardless of the severity of the disease. Increased activity of Th2-lymphocytes with overproduction of interleukin IL-4, overproduction of IgE, increased levels of eosinophil cationic protein have reliable value and can be used as additional markers of early diagnosis of asthma in children.

Conclusions: As a result of this work were able to once again see that BA in childhood and characterized by a variety of clinical manifestations and functional disorders is multifactorial, so a lot of factors, including the age of the child and the manifestation of the disease are important and progression of the disease.

Key words: children, bronchial asthma, current.

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