Khilchevska V. S., Kolyubakina L. V. The role of clinical-anamnestic indices in diagnostics of severe persisting bronchial asthma in children. Journal of Education, Health and Sport. 2017;7(1):293-299. eISSN 2391-8306. DOI http://dx.doi.org/10.5281/zenodo.260199
http://ojs.ukw.edu.pl/index.php/johs/article/view/4199

The journal has had 7 points in Ministry of Science and Higher Education parametric evaluation. Part B item 754 (09.12.2016).
754 Journal of Education, Health and Sport eISSN 2391-8306 7

The authors declare that there is no conflict of interests regarding the publication of this paper.
Received: 02.01.2017. Revised 16.01.2017. Accepted: 24.01.2017.

THE ROLE OF CLINICAL-ANAMNESTIC INDICES IN DIAGNOSTICS OF SEVERE PERSISTING BRONCHIAL ASTHMA IN CHILDREN

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Abstract

Performed integral estimation of the diagnostic value of the obtained clinical-paraclinical parameters is indicative of a sufficient amount of reliable markers in verification of severe bronchial asthma (BA) in children. Children with severe bronchial asthma are characterized by the following phenotype peculiarities: early debut of the disease (chance ratio (CR) = 1,5 (95% confidence interval (CI) 0,9-2,7), comorbid allergic diseases available (allergic rhinitis and atopic dermatitis) (CR 2,7 (95% CI 1,5-4,8) and drug-induced or comorbid drug-induced and food or domestic allergy (CR=4,8 (95% CI 0,1-36,5)), infectious index more than 2 (CR=3,3 (95% CI 1,6-6,7), seasonal exacerbation of BA mainly from November to March (CR=2,7 (95% CI 1,5-4,9), associated with a trigger role of acute respiratory viral infection (ARVI) (CR=5,5 (95% CI 2,4-12,6) and meteorological factors (CR=3,8 (95% CI 0,4-36,4).

Key words: children, bronchial asthma, clinical-anamnestic indices, sensitivity, specificity.

Introduction. Severe bronchial asthma (BA) today is an extremely topical problem for a pediatrician. Severe BA in children as well as in adults progresses with frequent exacerbations, a considerable decrease of functional signs of the lungs and quality of life of patients [3, 4]. Its spread among children is 1:1000, and predominantly children older than 10

suffer from it [8]. The quality of life decreases most considerably among the patients with severe and especially severe uncontrolled progress of BA. The data presented explain the necessity to find possible predictors of severe BA as well as detect clear clinical criteria of its verification.

One of the possible approaches in detection of factors being predictors of a severe progress of the disease is a comparative characteristic of patients with severe and moderate progress of BA on the basis of a standardized set of signs [10, 13]. Both Ukrainian and international authorities emphasize a leading role of clinical-anamnestic criteria in diagnostics of BA and detection of therapeutic approaches [6, 12, 13].

Analysis of clinical-anamnestic indices in children with the signs of BA will enable a physician to optimize early verification of a severe progress of BA, promote the efficacy of treatment and improve the diagnostics.

Objective: to analyze a diagnostic value of clinical-anamnestic indices of severe BA in comparison with a moderate variant of the disease.

Materials and methods. To achieve the purpose of the study 60 schoolchildren suffering from BA were examined at the Pulmonological Department of the Regional Children Clinical Hospital in Chernivtsi. Depending on the severity of persistence the disease of children was distributed into two clinical groups. The first clinical group (I) included 30 children with the phenotype of severe BA, the second one (II) included 30 children with a moderate variant of BA. According to the main clinical signs the groups of comparison did not differ reliably (Table 1).

Table1

General characteristic of the comparison groups

Indices	Clinical groups		P
	I (n=30)	II (n=30)	
Average age, years (M±m)	12,2±0,54	11,1±0,59	>0,05
Boys (%, P±m)	66,7±8,6%	64,3±8,9%	> 0,05
Rural residents (%, P±m)	66,7±8,6%	60,7±8,9%	> 0,05

The study employed clinical-anamnestic method, BA classification according to the protocol of diagnostics and treatment of BA in children approved by the Ministry of Public Health of Ukraine [6], as well as according to International Global Initiative concerning the diagnostics and treatment of BA (GINA) [11]. Aggravation of family anamnesis by atopic diseases and bronchial asthma was evaluated by genealogic index (GI) [5].

The results of the study obtained were analyzed by means of the computer packages «STATISTICA» StatSoft Inc. and Excel XP for Windows on a personal computer using parametric and non-parametric calculation methods and from the point of view of clinical epidemiology. To estimate diagnostic value of the tests the following indices were determined: test susceptibility, test specificity, prognostic value of a positive result (PVPR) and prognostic value of a negative result (PVNR). The risk of the event realization was estimated considering the probability of chance ratio (CR) and detection of their confidence intervals (95% CI) [14].

Results of the study and their discussion. Taking into account a multi-factor nature of BA anamnestic peculiarities of the examined children were considered to be reasonable to be analyzed. The disease debut estimation in the groups of comparison demonstrated that in the group of children with severe progress of BA the patients with so-called "asthma of an early onset" prevailed, which was diagnosed in 53,3% against 42,9% ($P>0,05$) cases of the compared group, although without statistical confidence.

Only the patients born after then third and following it labour were found among those with severe BA, which was associated with a high risk of frequent episodes of acute respiratory diseases, possessing both initial and protector effect concerning BA progress [9]. Thus, infectious index more than 2,0 was found in 33,3% patients with severe BA against 13,2% patients of the compared group ($P\varphi<0,05$).

Aggravation of individual allergy anamnesis was registered more often in the group of children with severe BA. The signs of allergic rhinitis and atopic dermatitis were found in 21 children (70,0±8,3%) of the I clinical group and in 13 schoolchildren (46,4±9,1%) of the compared group ($P\varphi<0,05$). At the same time, the phenotype of severe asthma was associated with drug-induced or combined (drug-induced and food or domestic) allergy: in every fifth (24,2±6,0%) patient against every case in the compared group ($P<0,05$).

It should be noted that genealogical index (GI) in case of available allergic diseases in the families of patients from the groups of comparison did not differ much. Thus, an average GI in the I group was 0,17 standard units (s.u.) and 0,16 s.u. in the II group. Although GI more than 0,16 s.u. was registered in children with severe asthma in 50,0% of cases against 28,6% of the observations ($P\varphi<0,05$) in the compared group.

Analysis of clinical signs of BA during a year among children from the groups of comparison demonstrated that severe asthma is characterized by seasonal exacerbations contrary to a moderate progress of asthma corresponding to the findings of the studies [1]. Thus, association of exacerbations with seasonal character was found in 87,0% of children suffering from severe BA as compared to 69,2% of patients from the II clinical group

(Pφ>0,05). At the same time, the majority of seasonal exacerbations of BA (60,9% of cases) among the patients from the I clinical group occurred in a cold season of the year (November-March) contrary to the II clinical group, where exacerbations in this season of the year occurred only among the third of patients (36,3% of cases) (Pφ<0,05).

The indicated seasonal character of aggravation of the clinical progress of severe BA usually was associated with prevailing non-specific trigger exacerbation factors (ARVI against the ground of increased atmospheric humidity and low temperature) [2]. Thus, the challenge of BA exacerbations in the I group was associated with a trigger role of ARVI in 33,3% cases and meteorological factors in 23,8% children against 8,3% cases (Pφ<0,01) and none of the cases (Pφ<0,01) in the II group respectively.

As to the clinical peculiarities of the disease progress daily symptoms of the disease with the frequency more than once a week were found in children with severe asthma in 36,0±8,7% of cases against 10,5±5,5% (P<0,05) of observations among the patients with a moderate progress of BA. This cohort of patients was characterized by severe restriction of physical activity in 28,0±8,1% of cases against 5,2±4,0% (P<0,05) of children from the II clinical group. Correspondingly, they were characterized by the frequency of admission to the hospital 4-5 times a year in 24,0±7,7% of cases (P<0,01), frequency of β_2-agonists necessary administration more than four doses a day in 16,0±6,6% (P<0,05) of cases against no one from the II clinical group.

Monthly exacerbations of BA occurred in the representative of the I group in 36,0±8,7% of cases against 15,7±6,6% (Pφ<0,05) in the II clinical group. The frequency of unplanned visits to the allergist more than once a month was found in 20,0±7,3% (Pt<0,05) of severe asthma cases against no one in the compared group.

Considering the data obtained clinical-epidemiological analysis of the results of examination of children with severe asthma phenotype was carried out. Table 2 presents the indices of the diagnostic value of clinical-anamnestic indices in verification of severe BA phenotype as compared to its moderate variant.

Clinical-epidemiological analysis conducted in verification of severe asthma demonstrated a low susceptibility of these indices due to false negative results available within the limits of 29,2-76,2%. Specificity of certain criteria appeared to be rather high except early debut of the disease in anamnesis, the signs of comorbid allergic diseases, seasonal exacerbations, aggravated genealogical anamnesis according to allergic diseases characterized by frequent false positive results (27,6-45,3%).

Table 2

Diagnostic and prognostic value of clinical-paraclinical markers of severe and moderate BA

Clinical-anamnestic data	Susceptibility, %	Specificity, %	Prognostic value of the result, %		Chance ratio
			Positive	Negative	
Early debut of the disease	53,3	67,1	71,7	55,0	1,5
Infectious index 2 and >	33,0	87,2	71,7	56,5	3,3
Comorbid allergic diseases available	70,3	54,7	60,3	64,3	2,7
Drug-induced or combined drug-induced and food or domestic allergy available	27,6	90,3	83,3	42,9	4,8
Genealogical index	50,4	72,4	49,3	59,0	2,6
Seasonal character	61,1	64,2	48,1	62,1	2,7
Trigger role of ARVI	33,3	91,7	80,1	57,9	5,5
Trigger role of meteorological factors	23,8	92,3	83,3	42,9	3,8
Daily symptoms of BA more than 1 a week	36,0	90,2	78,3	58,4	5,0
Restricted physical activity	28,3	95,3	72,4	56,9	7,4
Monthly frequency of exacerbations	36,2	85,1	70,6	57,0	3,2

Therefore, an integral estimation of diagnostic value of the examined clinical-anamnestic parameters is indicative of a sufficient amount of reliable markers in verification of severe BA in children. The risk of its diagnostics was reliably increased by higher infectious index, drug-induced or combined drug-induced and food or domestic allergy available, a trigger role of ARVI and meteorological factors in provoked exacerbations of BA, daily symptoms of BA available more than once a week, restricted physical activity and monthly frequency of exacerbations.

Conclusion. Therefore, the risk of diagnostics of severe bronchial asthma in children is ensured by a number of clinical-anamnestic parameters, which consideration in clinical practical work may be effectively used in detection of tactics of a controlled treatment.

References

1. Bezrukov L.O. Clinical-anamnestic characteristics of bronchial asthma in a school-age / L.O.Bezrukov, U.I. Marusyk// Dyt.likar. – 2014.- №2. – P. 35-37.

2. Ilyina N.I. The influence of climate factors on the spectrum and structure of allergic diseases in terms of Moscow region / N.I. Ilyina, L.V. Luss, O.M. Kurbacheva et al. // Ross. allergol. journal. - 2014. – №2. – P. 25-31.

3. Kamayev A.V. Risk factors of severe bronchial asthma in children / A.V. Kamayev, O.Yu. Parshutkina, D.S. Korostovtsev // Allergology. -2005. - №1. – P. 64-68.

4. Kulikov E.S. Molecular and pharmacological mechanisms of severe bronchial asthma / E.S Kulikov, L.M. Ogorodova, M.B. Freydin et al. // Herald of RAMS. -2013. - №3. – P. 15-23.

5. Machulina L.N. A comprehensive estimation of a child's condition of health / L.N. Machulina, L.M. Beliayeva, L.I. Matush // Official edit. – Minsk, 1999.- 52 p. – A standard document of the Ministry of Public Health of the Republic of Belarus. Method. guidelines.

6. Order of the Ministry of Public Health of Ukraine of Ukraine dated 08.10.2013 № 868 «On Approval and Introduction of Medical-Technological Documents Concerning Standard Medical Aid in Case of Bronchial Asthma».

7. Nenasheva N.M. Possibilities of therapy in case of severe bronchial asthma / N.M. Nenasheva // Med. counc.- 2013. - №4. – P.16-26.

8. Akdis C.A., Agache I. Global Atlas of Asthma. Published by the EAACI. – 2013. – P. 7–13.

9. Caliskan M. Rhinovirus wheezing illness and genetic risk of childhood-onset asthma / M. Caliskan, Y.A. Bochkov, E. Kreiner-Moller [et al.] // N Engl J Med. – 2013. - Vol. 368. - P. 1398–1407.

10. Fitzpatrick A.M. Progressive airflow limitation is a feature of children with severe asthma / A.M. Fitzpatrick, W. G. Teague // Journal of Allergy and Clinical Immunology. – 2011. – Vol. 127 (1). – P. 282-284.

11. Global Initiative for Asthma. Global Strategy for asthma management and prevention, revised 2015. – 149 p.: http://ginasthma.com.

12. Hesselmar B. The Heterogenity of asthma phenotypes in children and young adults / B. Hesselmar, A.-C. Enelund, B. Eriksson [at al.] // The Journal of Allergy and Clinical Immunology. – 2012. – Article ID 163089. – P. 6.

13. Identification of asthma phenotypes using cluster analysis in the Severe Asthma Research Program / W.C. Moore, D.A. Meyers, S.E. Wenzel [et al.] // AmJ Respir Crit Care Med. – 2010. – № 181. – P. 315–323.

14. Medical Epidemiology / [R.S. Greenberg, S.R. Daniels, W.D. Flanders et al.]. – [4th Edition]. – Norwalk, CT: Appleton & Lange, 2004. – 196 p.