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# Incidence of allergic diseases (bronchial asthma, allergic rhinitis, atopic dermatitis) among children and young people of Vinnytsia region. (results of the 2-nd stage of clinical-epidemiologic investigation)

**Key words:** *epidemiology, incidence, allergic diseases, children, young people.*

Allergic diseases (AD) are the global problem of modern medicine but their incidence according to different authors ranges in wide boundaries which is closely connected with using different methods of investigation. According to the authors of the given paper [15] nowadays there are about 500–600 mln sick persons on (AD) in the world. And the incidence of bronchial asthma (BA) is from 0,2 to 8,1 % [1–3].

As to the given epidemiologic investigations from 10 to 28 % of children suffer from atopic dermatitis (At.D) in different countries of the world. [6]. Also, over the last decade the diseases on allergic rhinitis (AR) is constantly increasing and are registered in average in 10–20 % among the population of Europe [7]. At the same time, according to general ISAAC investigations conducted in 56 countries and 155 centers, the frequency of AD ranges from 1,0 to 30,8 % [14]. Many authors show that after appearance of the first symptoms AD the diagnosis is specified and adequate therapy is appointed during the first year only to 25 % of patients, in 2–4 years to 55 % and in more than 5 years to 20 % of patients [12]. AD is one of the most frequent reasons of disturbance of social activity, early children's disability and young working population which brings a significant economical damage and determines their medical and social importance [15].

In Ukraine over the last decades facts about high level of diseases on AD are compiled [10]. The most significant investigation of AD incidence in Ukraine remains the investigation conducted in 1981–1992 and covered more than 100 thousand inhabitants of Vinnytsia region [11]. And even at that time some organizing and methodical decisions, practical recommendations on improving diagnostics, treatment and prophylaxis of AD were proposed. And at the same time the tendency to increasing of allergic pathology incidence is being preserved especially among children and young people which is closely connected most of all with their non time address for medical aid, imperfection of diagnostics and the lack of heredity in the work of family doctors and narrow specialists (allergists, otolaryngologists, dermatologists etc.). In this connection the objective necessity of monitoring initiative investigations of AD incidence has appeared and by conducting them it's possible to find out the real reason of AD incidence and to optimize the work on improving appropriate out patient and specialized aid to population. All mentioned above determines the actuality of the given investigation and its aim consists in studying real AD incidence (BA, AR, At. D) youth and children of Vinnytsia region and comparison of the data obtained with the results of screening examination of the

proper contingent on the first stage of clinic and epidemiologic investigation.

### Materials and methods of investigation

Clinical and epidemiologic investigation of AD incidence among children and youth of Vinnytsia region was being conducted in 2 stages. The first stage consisted of questionnaire screening where the children of four secondary schools took part, three pre-school educational establishments and students of two higher schools. In order to get true results the selection of the above mentioned establishments was random. The total number of the interrogated persons was from 3 to 27 years old was 7784, among them there were 4532 children and 3252 representatives of youth.

At the second stage we selected children and young people who answered positively the questions of the questionnaire concerning possible symptoms of BA, AR, At.D among them. Later these persons were reexamined by means of standard complex of allergic methods of investigation containing the selection of anamnes, clinical examination, estimation of the external breath function, conducting derma tests with a standard

set of household, epidermal, dusty and food allergens. If the examined persons had BA, AR, or At.D their existence was found on the basis of the confirmed national standards of diagnostics of these diseases. In the result of the investigation the data obtained was processed by means of statistic methods of investigation, the authenticity of symptoms distinctions was determined on the student's t-criterion. This difference was considered to be statistically true under  $p > 0,05$ .

### Results and their discussion

Division of persons having AD according to sex on the basis of the results of the 1-st and the second stages of investigation is given in the table 1.

The results of the second stage of clinic and epidemiological examination of children and young people allowed to prove the existence of AD in 1333 (17,12 %) of persons, i.e. 1,61 times less than persons with possible symptoms of allerge pathology during the first stage (27,63 % under  $p > 0,001$ ). As it is seen from the table 1, the essential distinctions according to sex neither before the first stage nor after the second one of clinic and epidemiological examination wasn't found ( $p > 0,05$ ).

**Table 1**  
Division of the respondents (1 stage) and reexamined persons (2 stage) by sex

Stages of investigation	Total number of persons with AD		men		women		P
	abs.	%	abs.	%	abs.	%	
1-st stage	2151	27,67	1036	48,16	1115	51,84	$> 0,05$
2-nd stage	1333	17,12	629	47,19	704	52,81	$> 0,05$

**Table 2**  
Comparison of symptoms incidence of separate AD forms among examined contingents according to the results of the 1-st and the 2-nd stages of investigation

AD symptoms	Results after interrogation (1-st stage)		Results after AD verification (2-nd stage)		P
	abs.	%	abs.	%	
BA	1214	15,60	343	4,41	$< 0,001$
AR	1108	14,23	524	6,73	$< 0,001$
AtD	670	8,61	466	5,99	$< 0,05$

**Table 3**  
Incidence comparison of combined forms of AD among the examined contingents after the 1-st and the 2-nd stages of investigation

Combined forms of AD	Incidence according the results of questionnaire (1-st stage) (n=7784)		Incidence after verification of diagnosis (2-nd stage) (n=7784)		P
	abs.	%	abs.	%	
AR and BA	383	4,92	84	1,08	$< 0,05$
AR and AtD	149	1,91	106	1,36	$> 0,05$
BA and AtD	73	0,94	41	0,53	$> 0,05$
AR, BA and AtD	181	2,33	78	1,00	$< 0,05$

**Table 4**  
**Incidence of BA among children and young people after verification of the diagnosis (2-nd stage of investigation)**

Age	Number of persons with verified diagnosis	
	abs.	%
3–6 year old (n = 1459)	119	8,16
7–18 year old (n = 3073)	123	4,00
19–27 year old (n = 3253)	101	3,11
p1		< 0,05
p2		< 0,05
p3		> 0,05
Total (n = 7784)	343	4,41

Note: p1 – probability of differences between the 1-st and the 2-nd age groups; p2 – probability of differences between the 1-st and the 3-rd age groups; p3 – probability of differences between the 2-nd and the 3-rd age groups.

**Table 5**  
**AR incidence among children and young people after verification of diagnosis (2-nd stage of investigation)**

Age	Number of persons with verified diagnosis	
	abs.	%
3–6 year old (n = 1459)	136	9,32
7–18 year old (n = 3073)	255	8,30
19–27 year old (n = 3253)	133	4,09
p1		> 0,05
p2		< 0,05
p3		< 0,05
Total (n = 7784)	524	6,73

**Table 6**  
**AtD incidence among children and young people after verification of diagnosis (2-nd stage of investigation)**

Age	Number of persons with verified diagnosis	
	abs.	%
3–6 year-old (n = 1459)	175	11,99
7–18 year-old (n = 3073)	184	5,99
19–27 year-old (n = 3253)	107	3,29
p1		< 0,005
p2		< 0,005
p3		< 0,005
Total (n = 7784)	466	5,99

In our opinion, the comparison of data of the first and the second stages of investigation was important concerning some separate forms of AD (table 2).

As it is seen from the information given in table 2 after verification of all diagnoses of all examined contingents the maximal symptoms of allegro pathology incidence were found for AD. These symptoms turned out to be in 2,1 times less than the data obtained after the first stage of investigation (14,23 % vs 6,73 % of cases, under  $p > 0,001$ ). On the second place among AD there was At.D and its frequency before verification was 8,61 % and after verification it was 5,99 % of cases which is 1,4 times less in comparison with the results of the first stage of investigation ( $p < 0,05$ ).

On the third place there was BA and its frequency after verification of the given diagnosis was 4,41 % of cases which was in 3,5 times less in comparison with the results (15,6 % of observations) obtained after the 1-st stage of investigation ( $p < 0,001$ ). Unlike this after screening interrogation (1-st stage) the first and the second places on incidence were taken by respiratory development of allergy (BA and AR and the dermatologic development of allergy was on the third place. Therefore, the biggest percentage of «mistaken positive» answers on questionnaire was received for BA and the smallest one was for At.D. The results of this phenomenon will be analyzed in detail below.

Taking into account the features of atopic diseases (common mechanisms of development, peculiarities of aging dynamics, hard heredity, existence of some diseases in one person), we have analyzed and compared the frequency of combination of AD symptoms among children and youth after 1-st and 2-nd stages of investigation. The corresponding data is given in table 3. As it is seen from the table 3, when comparing results obtained during the first stage of investigation with the materials received after verification of AD diagnosis (2-nd stage) significant distinctions are being traced in the incidence of combination AR and BA and the combination of three given AD. Thus, according to the results of the second stage, the incidence of AR and BA combination was in 4,5 times lower than the corresponding data obtained during questionnaire screening (1,08 % versus 4,9 cases under  $p < 0,05$ ). And at the same time incidence of three forms of AD after diagnosis verification turned out to be 2,3 times lower than that one obtained during interrogating screening (1,00 % versus 2,33 % of cases under  $p < 0,05$ ). And the incidence of the following combinations of AtD with BA and AtD with AR wasn't very essential ( $p,005$ ), perhaps at the expense of those examined persons whose diagnosis was pinpointed earlier. The results of definition of incidence of the main forms (BA, AR, AtD) on the basis of thorough clinic and allergic examination of children and representatives of young people are given in the tables 3–6 below.

As it is seen from the data of Table 4 BA was being registered considerably more often among the children of the first age group (8,16 % of cases which twofold exceeded indices of incidence of the given disease obtained among the children of the second group (4,00 % of observations and 2,6 times it exceeded the symptoms of BA incidence among young people (3,11 % of cases under  $p < 0,05$  for both observations). Perhaps it was partly connected with the fact that except the influence of inhalation allergens respiratory virus and bacterial

infections children suffer from are also trigger factors which caused development, recrudescence and further progressing of BA. It should be pointed out that we have found the essential differences of symptoms of BA incidence among examined groups depending on sex ( $p < 0,05$ ).

Unlike BA incidence among children of the first and the second age groups we didn't find any essential differences in AR incidence among them (9,32 % and 8,30 % of cases respectively, under  $p < 0,05$ ), which shows that in these age periods AR incidence with excessive clinical symptoms is on a quite high level. But we have found the essential difference in AR incidence among children of both age groups in comparison with young people (4,09 % of observations, under  $p < 0,05$  for both comparisons). So, real AR symptoms being observed from 3 to 18 years had the tendency to decreasing in future and in our opinion may be connected with aged peculiarities of immune system function, influence of sexual hormones on immunological mechanisms of appearance and progress of AR and treatment which was being conducted to the examined. Division of epidemiological symptoms of AR incidence didn't depend on sex (men – 2,77 %, women – 3,96 % of cases under  $p < 0,05$ ) of the examined persons as a whole, although the tempo of progressing of AR incidence among females of the second and third age groups was being increased and exceeded the same symptoms among men (5,24 % vs 3,06 % cases under  $p < 0,05$  and 2,49 % of observations under  $p < 0,05$ ).

It should be pointed out that after profound clinical examination (table 6) AtD diagnosis was confirmed only in 5,99 % of the respondents, in particular, in 11,99 % cases among children of the first age group almost in every fourth child), in 5,99 % observations among children of the second age group (nearly every second child) and in 3,29 % of cases among young people (every third reexamined patient). This probably can be explained by the fact that most respondents considered any changes on the part of skin to be AtD. There was one peculiar age involution of dermatologic process for all children with AtD. In fact AtD was diagnosed more often in the first age group in comparison with the second (twice) and the third ones (in 3,6 times) ( $p < 0,005$  for both comparisons). In general we didn't find any essential difference in AtD frequency depending on sex (male – 3,23 %, female – 2,76 % of cases under  $p < 0,005$ ) of all examined persons. As an exception there was only the first age group in which AtD was found more often among boys in comparison with girls (7,68 % versus 4,32 % of observations under  $p < 0,005$ ). It is confirmed by the data from literature.

Taking into consideration the fact that after appropriate re-examination and verification of diagnosis among children and young people a significant decrease of incidence of AD symptoms was being observed and we tried to analyze its reasons. So the incidence of diagnosed AR as to the results of the second stage of investigation was 6,73 % cases ( $p < 0,001$ ), and according to the results of questionnaire the incidence of AR symptoms was 14,23 % of cases ( $p < 0,01$ ). The above mentioned figures are differentiated more than twice. This rather large difference can be explained by significant overestimation of symptoms on the part of examined children or their parents and also by Rinus which is a compiled notion of the whole complex of all diseases of nasal cavity, its bosoms which are linked

with inflectional, inflammatory, non inflammatory, allergic and other reasons. Thus, such diseases as chronic sinusitis, chronic adenoiditis, rhinitis, distorting of nasal drum which break normal blood circulation and tissue atrophy are treated as AR. The current reexamination of patients during the second stage enabled to confirm AR diagnosis in 523 out of 1108 examined persons that is in 47,29 % persons out of those ones who considered themselves to be ill on AR and in 254 examined persons the diagnosis of allergic nature of Rinus wasn't confirmed. And other reasons causing symptoms similar to AR were found in 330 examined patients.

More often all examined persons on AR thought of symptoms of inflectional rhinitis, chronic sinusitis and neuro vegetative rhinitis (38,19 %, 17,33 %, 18,11 % of cases respectively). Among children of the first and the second age groups very often they considered the symptoms of inflectional rhinitis to be AR (16,53 % and 13,38 % of observations respectively) and adenoiditis (11,42 % and 5,91 % of cases respectively). This data is sequenced with that one of literature since the increased adenoids or their inflammation – adenoiditis are caused by viruses and bacteria which are the ones of main reasons of nasal breath breaking [9, 13].

Among young people more often in about 11,42 % of cases AR was considered to be idiopathic rhinitis. Concerning younger schoolchildren this pathology wasn't observed but among the representatives of the second age group its frequency was 6,69 % of observations. It partly can be explained by the fact that vasomotor infractions namely in puberty period can be caused by reconstruction of vegetative nerve system, by frequent symptoms of vagotonia and their fast development, vasomotor rhinitis are acquired at the age of 20. In early years children don't have any vasomotor rhinitis.

Structural infractions in nasal cavity (contortion of nasal drum, narrow nasal ways, hypertrophy of nasal drums etc. can also cause infractions of nasal breath via direct contact mucous septum with the similar one on the part of lateral nasal wall. In this case nasal mucous membrane swells and it results in breaking of nasal breathing. In our investigation the great part of such errors in AR diagnostics was 11,17 % of cases among patients of all age groups. Clinical symptoms under sinusitis (genyantritis, ethmoiditis) in particular are characterized by such symptoms as hard nasal breath, and excreta from nasal cavity. These symptoms are observed in 73 % of patients with given pathology [13].

During inflammation of nasal cavities local symptoms of paranasal sinusitis are developed only by heavy nasal breath and little excreta from nasal cavity without any local painful syndrome. Therefore, most patients (14,17 % in our investigation among age groups) considered this symptomatic as development of AR and during some period they got irrational therapy. Among children of the second age group with false AR symptoms the percentage of sinusitis was 5,51 %, among the third age group it was 8,66 %, and among younger children it was 0 %. It can be explained by the fact that there is an age aspect of development of the accessory nasal sinuses. For example, frontal sinuses begin to acquire these features only at the age of 7 – 8, and being 9 – 11 years old their size is 50 % of the volume of a grown-up's frontal sinuses [9]. Besides we diagnosed polypus rhinosinusitis among 0,79 %



representatives of youth with false AR symptoms that's why they received antihistamin and vascular narrowing medicines without any clinical effect for some months. There was almost similar situation with verification of BA diagnosis. Thus, the symptoms of acute tracheitis, bronchitis, bronchitis including bronchial obstructions According to our figures, of all the persons with suspicion on BA (21,35 % among children of both age groups and 11,10 % of observations among young people) only 40,45 % of all cases had acute and relapsive bronchitis. Tracheitis and larynx made up 31,84 % of cases in the structure of false asthma diagnoses, and the frequency of errors was almost the same among the examined of all age groups. Patients (13,11 % of cases in our investigation) having chronic pathology on the part of larynx organs (sinusitis, adenoids, chronic ear inflammation, sulfuric plugs) also complained on peculiar for BA symptoms dry cough caused by neuro reflexive mechanisms [8]. Besides this coughing sometimes was caused by such pathological processes as gastroesophageal reflux, neurogenic cough (titanic bronchospasm) early tuberculosis infection period, coughing. Thus, in our investigation coughing was diagnosed among 2,62 % children of the first age group and 2,25 % of children among the second one and in 2,25 % of the examined of the third age group took place gastroesophageal reflux. Psychogenic coughing was found in 1,83 % of younger children, in 3,0 % of the elder children and in 2,62 % of cases among young people. Obviously cough under these states was treated by the respondents as alternative manifestation of BA.

Unlike AR and BA, AtD is being diagnosed correctly more often which was caused by the peculiarities of the disease namely by itching, troubling the patient a lot, by continuous stable duration and cosmetic side of the problem due to which a patient has to go to the doctor in time. But in spite of this the patients often regard any pathological changes on the part of skin as AtD. According to our data the most often AtD was taken as dermatopitita (51,47 % of cases), scab (20,50 % of observations), streptodermis (15,47 % of cases). It can be explained by the fact that such main AtD symptoms as polymorphic rash, itching, dry skin are met in many skin diseases involving scab, contact dermatitis, allergic dermatitis, seborrhea dermatitis, eczema, streptodermis etc. Thus, the manifestations of seborrhea dermatitis were found among 3,6 % of younger children, 4,32 % of elder children and 1,08 % among young people who were falsely foreseen to have AtD. Besides, by conducting re-examination of the persons who regarded affection of their skin as AtD, we found 4 children (1,44 % of cases) of 3–6 years old, 5 children (1,8 % of observations) of 7–8 years old and one representative of youth (0,36 % of cases) with eczema. The prevalent number of data of diagnostic errors among children can be partly explained by the fact that in elder age the corresponding diagnosis of eczema was pinpointed by the doctors before.

Therefore all these peculiarities of clinical course of respiratory, skinned symptoms of allergic pathology and the similar to it diseases demand from doctors especially of the first link wide range of knowledge for timely diagnostics of this or that pathological process and decision making concerning choosing rational methods of diagnostics of diseases and treatment of the corresponding categories of patients.

## Conclusions

1. The results of the 2-nd stage of clinical and epidemiological observation of children and young people allowed to find out the real indecency of allegro pathology and 1,61times (from 27,63 % to 17,12 % of cases) to reduce the signs of incidence of possible symptoms of allergy which were obtained on the 1-st stage of clinical and epidemiological investigation during screening examination of children and young people of Vinnytsia region.

2. More often the presence of allergic rhinitis (6,73 %, atopic dermatitis (5,99 %) and bronchial asthma (4,41 % of cases) was being noticed among children and young people.

3. Bronchial asthma was diagnosed more often among children at the age of 3–6 (8,16 %), which twofold exceeded the indices of the incidence of this disease, obtained among children of 7–18 years old (4,00 %) and 2,6 times exceeded the indices of BA incidence among persons of 19–27 years old (3,11 % of cases).

4. Allergic rhinitis is similar to spreading diseases among 3–6 and 7–18 year old children (9,32 % and 8,30 %) and is met among them more often than among young people at the age of 19–27 (3,11 % of cases).

5. In fact, more often atopic dermatitis is diagnosed among 3–6 year old children (11,99 %) than at the age of 7–18 (9,99 %) and among 19–27 year-old people (3,29 % of cases).

6. The errors in diagnostics of allegro pathology are caused by the similarity of the course of allergic and non allergic diseases of larynx and skin, and also insufficient knowledge level of the peculiarity of their duration and diagnostics both on the part of patients and doctors of the first link of giving medical aid.

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# **РАСПРОСТРАНЕННОСТЬ АЛЛЕРГИЧЕСКИХ ЗАБОЛЕВАНИЙ (БРОНХИАЛЬНОЙ АСТМЫ, АЛЛЕРГИЧЕСКОГО РИНИТА, АТОПИЧЕСКОГО ДЕРМАТИТА) СРЕДИ ДЕТЕЙ И МОЛОДЕЖИ ВИННИЦКОЙ ОБЛАСТИ (РЕЗУЛЬТАТЫ 2-ГО ЭТАПА КЛИНИКО-ЭПИДЕМИОЛОГИЧЕСКОГО ИССЛЕДОВАНИЯ)**

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## **Резюме**

Целью исследования было изучение реальной распространенности аллергических заболеваний (АЗ) (бронхиальной астмы (БА), аллергического ринита (АР), атопического дерматита (АтД)) среди детей и молодежи Винницкой области и сравнение полученных результатов с данными скринингового обследования указанных контингентов на 1-м этапе клинико-эпидемиологического испытания.

Исследование проведено в соответствии с технологией пре-скриптивного скрининга в два этапа: отбор по результатам анкетирования лиц с симптомами, похожими на АЗ (2 151 респондент), клинико-anamnestическое и алергологическое обследование данного контингента (1 333 участника).

Выявлено, что реальная распространенность (17,12 % случаев) АЗ среди детей и молодежи в 1,61 раза ниже, чем полученная (27,63 % случаев) по результатам скринингового анкетирования. Среди детей и молодежи чаще встречается АР (6,73 %) и АтД (5,99 %), реже — БА (4,41 % случаев). БА чаще отмечается у детей 3–6 лет, чем у детей более старшего возраста и взрослых. АР одинаково часто распространен среди детей в возрасте 3–6 и 7–18 лет и встречается у них чаще, чем у представителей молодежи в возрасте 19–27 лет. АтД вдвое чаще отмечается у детей 3–6 лет, чем у детей 7–18-летнего возраста, и почти в четыре раза чаще, чем у взрослых в возрасте 19–27 лет.

Ошибки в диагностике алергопатологии обусловлены схожестью картины аллергических и неаллергических заболеваний органов дыхания и кожи, а также недостаточным уровнем знаний в отношении особенностей их течения и диагностики как со стороны пациентов, так и врачей первичного звена оказания медицинской помощи.

**Ключевые слова:** эпидемиология, распространенность, аллергические болезни, дети и молодежь.

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## **INCIDENCE OF ALLERGIC DISEASES (BRONCHIAL ASTHMA, ALLERGIC RHINITIS, ATOPIC DERMATITIS) AMONG CHILDREN AND YOUTHS IN VINNITSA REGION (RESULTS OF 2ND STAGE OF CLINIC AND EPIDEMIOLOGIC STUDY)**

S. V. Zaikov, D. O. Hatska, I. V. Korytska

## **Summary**

The objective of our study was to evaluate the mean incidence of allergic diseases (bronchial asthma, allergic rhinitis, atopic dermatitis) among children and youths in Vinnitsa Region and to compare the obtained numerical values with the ones obtained during the 1st stage of clinical and epidemiological study — screening examination of abovementioned groups.

This study was conducted according to 2 stage technology of pre-scriptive screening: questionnaire-based data gathering (2 151 respondents with allergy-like symptoms), clinical and allergic examination of 1 333 enrolled patients.

We estimated that mean incidence (17,12 %) of allergic diseases among children and youths appeared to be 1,61 times lower than the incidence obtained during the questionnaire-based screening.

Among children and youths allergic rhinitis (6,73 %) and allergic dermatitis (5,99 %) appeared to be mostly widespread, while bronchial asthma — was diagnosed rarely (4,41 %). Unlike among children older than 6 years of age and youths, bronchial asthma occurred to be the dominant diagnosis among 3–6 aged children. The incidence of allergic rhinitis among 3–6 years and 7–8 years aged children appeared to be equal and appeared to be more common diagnosis than among 17–27 years aged youths. The incidence of atopic dermatitis was 2 times higher in 3–6 years aged than in 7–18 years aged children, and was 4 times higher than in 19–27 years aged youths.

The misdiagnosis of allergic pathology is as strongly dependent on similarity of clinical signs of allergic and nonallergic diseases of respiratory tract and skin, as on lack of proper knowledge of their clinical flow and diagnosis methods among both patients themselves and general practitioners.

**Key words:** epidemiology, incidence, allergic diseases, children and young people

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