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# The dynamics of spreading of allergic diseases among children and teenagers in Vinnytsia Region (results of the first stage of epidemiological study).

**Key words:** *epidemiology, prevalence, allergic diseases.*

It is necessary to have statistics of any diseases (including allergic ones) for the management of corresponding pathology, adequate providing with appropriate operating personnel, means of diagnosis and treatment, scientific add-ons etc. [13]. Real statistics of allergic diseases (AD) can't substitute the registration of cases seeking medical care, because it does not reflect the true state of the prevalence of AD [14]. On the one hand, it is clear that patients with severe manifestations of AD consult physicians more than others. Moreover, the majority of patients consults general practitioners, otolaryngologists or dermatologists (as allergists are available only in big cities), and it also leads to the significant underestimation of the frequency of AD because of the specific features of national statistics [1]. In the works of A.V. Bogova [6], I. I. Illina [12], B. M. Puhlik [18] and others, it is shown that the prevalence of AD which is established with a targeted research is 10 or more times higher, than the one which is registered officially [2].

It happened so that Vinnytsia is the only one region in Ukraine, where clinical-epidemiological studies were held (separate small-scaled studies were conducted in other regions

of Ukraine), and these studies held the attention of more than 100 000 people during the period of 1981–1992 years [10, 16]. Exactly there the real prevalence of AD in Ukraine was for the first time obtained close to the true data (Vinnytsia Region is located in the centre of the country and unites industrial and agricultural production).

According to many researchers, allergic disease is one of the most common diseases [8]. So, in the USA 20 % of the population suffers severe AZ, and 40–50 % has unstable allergy symptoms [26]. In Mexico, Canada, Brazil, Portugal, Cuba AD are observed at about the same rate as in the USA [29]. In Germany, AD are recorded in 15–20 %, in Yugoslavia – in 23 % of the population, in France from AD suffered 5–6 million people, 3/4 of which have respiratory manifestations of AD (mainly – allergic rhinitis) [22]. The lowest prevalence of allergies is typical for Colombia, Italy, Turkey and the Philippines, and the highest – for Ukraine, Japan, Bulgaria, Sweden and the UK [21, 23, 24, 27].

According to WHO, the prevalence of seasonal allergic rhinitis (SAR) around the world is ranging from 1 to 40 %,

permanent allergic rhinitis (PAR) – from 1 to 18 % [30]. AR symptoms are common for 40 % of Ukrainians [17].

Official statistical data during 2006–2007 years show that in Ukraine the prevalence of respiratory diseases and allergic rhinitis (AR) in 2007 increased by 6,5 % and rated 113, 0 per 100 thousand adults in comparison with 2006. Thus, it is known that AR is a risk factor of bronchial asthma (BA) formation and in 43–64 % of cases AR precedes the development of BA [11]. BA is one of the most common allergic diseases among children and adults, which leads to the significant impairment of life quality, disability and considerable economical expenditures [15]. Epidemiological studies conducted in different countries of the world show that the prevalence of asthma among adults in the world reaches 5–8 %, and among children – up to 15 % [25, 27]. The highest prevalence of asthma is observed in the countries with developed economics which lead the «western» way of life, and the lowest – in Russia, China and the countries that are developing. More than 80 % of deaths from asthma occur in the countries with low and middle-income [31].

Many people still believe that the AD problem in the southern hemisphere is less relevant. However, it is a mistake: allergy occurs everywhere, even among the inhabitants of the jungle and outlying islands. This is proved by the publications of the authors from Europe, South and East Asia, India and Latin America [28, 31]. They completely share the view that the allergy is the scourge for the inhabitants of these countries.

Atopic dermatitis (AtD) takes one of the leading places in the structure of AD, and in recent years its weight has increased [3]. According to various authors, the prevalence of atopic dermatitis among children in the developed countries is 15–30 %, among the adult population – 2–10 % [7]. A pathomorphism of atopic dermatitis among children has been changed – its earlier manifestation is marked and the incidence of serious, combined forms of AtD is increased [20]. The true prevalence of AD is comparatively higher than it is given in the Ukrainian official health statistics, furthermore during the all years of independence, in the whole country there were no significant changes neither in the overall incidence of AR, asthma, allergic dermatitis (if you focus on official statistics), nor in its individual regions, whereas almost all foreign researchers reported about a steady increase of the AD frequency [6, 9].

Due to everything stated above and using the fact that Vinnitsa National Medical University has a certain experience in clinical and epidemiological studies, we set a goal: to examine the current situation with AD in our region and to compare it with the data obtained in the last decades.

## Materials and methods

Considering existing possibilities, we decided to focus on the most important categories of the population – children and teenagers. We made such a choice, because these categories could be explored in organized groups – kindergartens, schools and universities.

The investigations were carried out according to the technology of prescriptive screening in 2 stages: stage 1 – a questionnaire and stage 2 – a physical examination. In the first

stage, we used a questionnaire for screening AD, which is approved by the MH and AMS Order of Ukraine №127/18 dating 02.02.2002 (Fig. 1).

In the second stage, we used a specially designed questionnaire (pic.2)

In this article we present data from the first phase of the study, which took place in 2013–2014. With the help of questionnaires for screening, 7784 people aged from 3 to 27 years (including 4532 children and 3252 teenagers) were interviewed. Conducted researches allowed us to find out the prevalence of allergic diseases among the population which is under study according to individual nosologies. Table 1 shows the frequency of the identified allergic symptoms (phase 1 of the survey).

The study proved that 5.18 % of the respondents had some form of AD (2.84 % of the respondents – two diseases, 2.30 % – three diseases). The results confirm the thesis that the allergy should be regarded as a systematic process which may have some clinical implications.

As can be seen from the Table 1, the most widespread symptoms among children are AR and among adults – BA ( $p < 0,005$ ).

Tables 2–4 show the results of the separately identified manifestations of AD: allergic rhinitis, bronchial asthma and atopic dermatitis.

The symptomatology of AR was prevailed in the age groups of 3–6 years, symptoms of BA – in the age groups of 3–6 years and 7–17 years, symptoms of atopic dermatitis – in the age groups of 3–6 years ( $p < 0,005$ ).

Sexual dimorphism was detected, namely, symptomatology of AR, BA and atopic dermatitis was more often met among the surveyed women, and this fact coincides with other studies.

If we compare our data about children with the data of 1991–1992, we will see that in the past children were more frequently found with the symptoms of atopic dermatitis, and in 2013–2014 years – with the symptoms of respiratory allergies ( $p < 0,005$ ).

### QUESTIONNAIRE №

Full name \_\_\_\_\_

Sex (male, female) \_\_\_\_\_

Date of birth \_\_\_\_\_

### PATIENT COMPLAINTS

The attacks of breathlessness (yes, no), dyspnea or severe breathing (yes, no), suffocating cough (yes, no), recurrent wheezing which can be heard in the distance (yes, no).

Frequent or constant stuffiness in nose (yes, no), discharges from the nose without a cold (yes, no), itchy eyes, eyelids, nose (yes, no) all the year round (yes, no) or in a spring and summer period (yes, no), skin rashes (yes, no), swelling of the skin (yes, no).

The stated above complaints occur after the use of drugs (yes, no), food (yes, no), household chemical goods (yes, no), the contact with various substances in manufacturing (yes, no).

You have previously been diagnosed with: asthma (yes, no), allergic rhinitis (yes, no), allergic dermatitis (yes, no), other allergic diseases (yes, no), dangerous reactions to insect stings (yes, no).

Figure 1. Screening questionnaire.

## QUESTIONNAIRE №

Name			Date
Sex	Female	Male	Date of birth

## Did you have a complaint (in the last 12 months) of?

- 1) Skin rash  
☐ yes ☐ no
- 2) Itching  
☐ yes ☐ no
- 3) Dermal edema  
☐ yes ☐ no
- 4) Generalized dryness  
☐ yes ☐ no
- 5) Paroxysmal coughing (especially at night, in the morning, in the evening)  
☐ yes ☐ no
- 6) Asthma attacks  
☐ yes ☐ no
- 7) Recurrent wheezing (which is heard in the distance)  
☐ yes ☐ no
- 8) Stuffiness in nose (permanent or spring-summer)  
☐ yes ☐ no
- 9) Prolonged (transparent) excretion from nose (without cold)  
☐ yes ☐ no
- 10) Sneezing  
☐ yes ☐ no
- 11) Itching nose, eyes, eyelids  
☐ yes ☐ no

## The stated above complaints occur because of:

- 12) drugs  
☐ yes ☐ no
- 13) food  
☐ yes ☐ no
- 14) cosmetics  
☐ yes ☐ no
- 15) the contact with animals  
☐ yes ☐ no
- 16) unknown factors  
☐ yes ☐ no

## Have you previously been diagnosed with?

- 17) Bronchial asthma  
☐ yes at the age \_\_\_\_\_ ☐ no
- 18) Allergic rhinitis  
☐ yes at the age \_\_\_\_\_ ☐ no
- 19) Allergic dermatitis  
☐ yes at the age \_\_\_\_\_ ☐ no
- 20) Urticaria  
☐ yes at the age \_\_\_\_\_ ☐ no
- 21) Other allergies  
☐ yes at the age \_\_\_\_\_ ☐ no
- 22) Hazardous reactions to insect stings  
☐ yes at the age \_\_\_\_\_ ☐ no

## The diagnosis was established by:

- 23) Family Doctor ☐ yes ☐ no
- 24) Doctor-Allergist ☐ yes ☐ no
- 25) Other specialists ☐ yes ☐ no

## Respiratory organs:

Stuffiness in nose	significant	insignificant	constant	no
Itching nose / eyes	significant	insignificant	constant	no
Discharge from the nose	1 time per week	1 time per month	everyday	no
The attacks of breathlessness (in daytime)	1 time per week	1 time per month	everyday	no
The attacks of breathlessness (at night)	1 time per week	1 time per month	everyday	no
The need for inhalation	1 time per week	1 time per month	everyday	no

## How often do you have an exacerbation?

Allergic rhinitis \_\_\_\_\_ 1 time per month \_\_\_\_\_ times during year;  
 Bronchial asthma \_\_\_\_\_ 1 time per month \_\_\_\_\_ times during year.

## ATOPIC DERMATITIS:

Have you ever diathesis/dermatitis in childhood? ☐ yes ☐ no  
 Until what age? \_\_\_\_\_

## Feeding:

- ☐ breast;
- ☐ artificial;
- ☐ mixed?

## Localization of lesions:

- ☐ face;
- ☐ elbow/knee bends;
- ☐ trunk;
- ☐ hands?

## The nature of the lesions:

- ☐ soaking;
- ☐ dry;
- ☐ cracking;
- ☐ itching?

## Exacerbation of disease:

- ☐ in summer;
- ☐ in winter;
- ☐ all the year round?

## URTICARIA

## Can you specify these points?

Itch	no	moderate	medium	intensive
Edema	no	moderate	medium	intensive
Localisation?	trunk	upper / lower limbs	face	stomach

How many times does rash appears per month/per year \_\_\_\_\_?

## What is the combination of exacerbations?

- ☐ Atopic dermatitis + allergic rhinitis + bronchial asthma;
- ☐ allergic rhinitis + atopic dermatitis;
- ☐ bronchial asthma + atopic dermatitis;
- ☐ allergic rhinitis + bronchial asthma.

## What diseases besides allergic ones, do you suffer?

## Do your parents and relatives suffer from allergies?

- ☐ By mothers ancestry;
- ☐ by fathers ancestry;
- ☐ by both parents ancestries;
- ☐ no.

## Have you ever been treated by allergens?

- ☐ Yes;
- ☐ no.

## Have you noticed the positive effect after the allergens' treatment?

- ☐ Yes;
- ☐ no

## What treatment do you use now?

- ☐ Local (ointments, creams);
- ☐ antihistamines;
- ☐ corticosteroids;
- ☐ other.

## SKIN TESTS

Household allergens \_\_\_\_\_  
 Pollen allergens \_\_\_\_\_  
 Epidermal allergens \_\_\_\_\_  
 Mold allergens \_\_\_\_\_  
 Food allergens \_\_\_\_\_

Spirography \_\_\_\_\_

Other studies \_\_\_\_\_

Figure 2. The questionnaire for the survey of persons with suspected allergic diseases.

Table 1

## The prevalence of symptoms of allergic diseases (phase 1)

Allergic symptoms	Children (n = 4532)		Adults (n = 3252)		All (n = 7784)	
	abs.	%	abs.	%	abs.	%
Rhinitis/conjunctivitis	875	19,31	233	7,17	1108	14,23
Asthma	802	17,70	412	12,67	1214	15,60
Allergic dermatitis	559	12,33	185	5,69	744	9,56

Note: here and in the following tables we can't summarize the prevalence of different symptoms, because one person may have several symptoms of AD.

Table 2

## The frequency of symptoms of AR in children and adults according to results of the survey (phase 1)

Age group	All (n = 7784)		Including men (n = 3711)		Including women (n = 4073)		p
	abs.	% of the surveyed in the age group	abs.	% of the surveyed in the age group	abs.	% of the surveyed in the age group	
3–6 years (n = 1459)	351	24,06	198	13,57	153	10,49	< 0,005
7–17 years (n = 3073)	524	17,05	206	6,70	318	10,35	< 0,005
18–27 years (n = 3252)	233	7,17	103	3,17	130	4,0	< 0,005
All	1108	14,23	507	6,51	601	7,72	< 0,005

Table 3

## The frequency of symptoms BA in children and adults on the results of the survey (phase 1)

Age group	All (n = 7784)		Including men (n = 3711)		Including women (n = 4073)		p
	abs.	% of the surveyed in the age group	abs.	% of the surveyed in the age group	abs.	% of the surveyed in the age group	
3–6 years (n = 1459)	265	18,16	163	11,17	102	6,99	< 0,005
7–17 years (n = 3073)	537	17,47	232	7,55	305	9,92	< 0,005
18–27 years (n = 3252)	412	12,67	174	5,35	238	7,32	< 0,005
All	1214	15,60	569	7,31	645	8,29	< 0,005

Table 4

## The frequency of symptoms of atopic dermatitis among children and adults, according to the survey (stage 1)

Age group	All (n = 7784)		Including men (n = 3711)		Including women (n = 4073)		p
	abs.	% of the surveyed in the age group	abs.	% of the surveyed in the age group	abs.	% of the surveyed in the age group	
3–6 years (n = 1459)	244	16,72	138	9,46	106	7,26	< 0,005
7–17 years (n = 3073)	315	10,25	117	3,81	198	6,44	< 0,005
18–27 years (n = 3252)	185	5,69	81	2,49	104	3,20	< 0,005
All	744	9,56	336	4,32	408	5,20	< 0,005

Prevalence of allergic symptoms among children (in %)

Table 5

Allergic symptoms	1991–1992 years	2013–2014 years	Statistical measure
Rhinitis	2,51	19,31	$p < 0,001$
Bronchial asthma	3,06	17,72	$p < 0,001$
Dermatitis	8,69	12,34	$p < 0,001$

Prevalence of allergic symptoms among adults (%)

Table 6

Allergic symptoms	1981–1982 years	1991–1992 years	2013–2014 years	p1 – describes the reliability of differences between 1 and 2 surveys	p2 – describes the reliability of differences between 1 and 3 surveys	p2 – describes the reliability of differences between 2 and 3 surveys
Rhinitis	2,16	4,00	7,16	$p < 0,01$	$p < 0,001$	$p < 0,05$
Bronchial asthma	0,67	1,62	12,66	$p < 0,001$	$p < 0,001$	$p < 0,001$
Dermatitis	6,65	5,77	5,69	$p > 0,05$	$p > 0,05$	$p > 0,05$

In general, it should be stated that today all manifestations of allergic symptoms among children occur significantly more often than in the past ( $p < 0,001$ ).

As for adults, the frequency of symptoms of AR and asthma over the years increased significantly and the frequency of symptoms of allergic dermatitis did not change significantly ( $p > 0,05$ ).

## Conclusions

Thus, the analysis of the results of phase 1 of clinical-epidemiological study conducted in 2013–2014 years showed considerable increase of AD among children and teenagers.

Among children in the structure of signs of AD, which will be more objectively verified, the maximum rates of frequency were typical for allergic rhinitis, among young people – for bronchial asthma. AD symptomatology was more common among the female half of the respondents. The verification of identified signs during phase 2 of our study will give us the opportunity to confirm or deny the reality of the data obtained after the first phase of the investigation.

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## ДИНАМІКА ПОШИРЕНOSTІ АЛЕРГІЧНИХ ЗАХВОРЮВАНЬ СЕРЕД ДІТЕЙ ТА МОЛОДІ ВІННИЦЬКОЇ ОБЛАСТІ (1-й ЕТАП КЛІНІКО-ЕПІДЕМІОЛОГІЧНОГО ОБСТЕЖЕННЯ)

Д. О. Гацька, І. В. Корицька

### Резюме

Метою дослідження було вивчити сучасну ситуацію з алергічними захворюваннями (АЗ) серед дітей та молоді Вінницької області і провести порівняння отриманих результатів з результатами досліджень, отриманих у 1981–1982 та 1991–1992 роках.

Дослідження проводили відповідно до технології прескриптивно-го скринінгу у два етапи: опитування та об'єктивне обстеження; було опитано 7784 респонденти.

Виявлено, що поширеність АЗ як серед молоді, так і серед дітей за минулі десятиріччя має достовірну тенденцію до зростання. Найвищі показники поширеності АЗ виявлено у віковій групі 3–6 років ( $p < 0,005$ ). У структурі алергопатології серед дітей переважала симптоматика алергічного риніту, серед молоді — симптоматика бронхіальної астми. Симптоматику алергічних захворювань частіше реєстрували серед жіночої половини опитаних.

Вивчення поширеності АЗ є необхідним заходом, який надає можливість ефективно контролювати дану патологію, розуміти її закономірності та тенденції. Серед дітей за минулий період най-

більш відчутно збільшилася симптоматика алергічного риніту, серед молоді — бронхіальної астми.

**Ключові слова:** епідеміологія, поширеність, алергічні захворювання.

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## ALLERGIC DISEASE AMONG CHILDREN AND TEENAGERS IN VINNITSA REGION: TIME TRENDS OF THE INCIDENCE (1<sup>ST</sup> STAGE OF CLINICAL AND EPIDEMIOLOGIC STUDY)

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### Summary

*Purpose of study:* to define the current status within structure of allergic diseases among children and teenagers in Vinnitsa Region and to compare the obtained results versus previously conducted research studies within 1981–1982, 1991–1992.

*We present the results of the 1<sup>st</sup> stage of prospective screening study conducted within 2013–2014 which included questionnaire and instrumental examination data. 7784 of respondents were included.*

*The obtained results of prospective study were compared versus those previously obtained within 1981–1982, 1991–1992 in Vinnitsa Region. The incidence of allergic diseases among children and teenagers increased by 3 times within last 20 years ( $p < 0,001$ ). The structure of allergic diseases also changed significantly within last 20–30 years: nowadays the signs of allergic rhinitis prevail among children and signs of bronchial asthma — among teenagers, whereas the signs of allergic dermatitis prevailed among representatives of both age groups in the past.*

*The study of incidence appears to be an effective measure which helps to understand the pattern and tendencies within the structure of allergic diseases, thus raise the efficacy of control of the pathology. The incidence of allergic diseases appears to be higher than the official statistical data shows. The incidence of allergic signs (1 stage) among children and teenagers shows reliable trend growth within last 30 years in Vinnitsa Region: increase of allergic rhinitis signs among children, bronchial asthma — among teenagers.*

**Key words:** epidemiology, incidence, allergic diseases.

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