

## ALLERGIC RHINITIS SYMPTOMS PREVALENCE IN CHILDREN OF KHARKIV

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### Abstract

The purpose of the study was to identify the prevalence of allergic rhinitis (AR) symptoms in children of Kharkiv and to establish the dynamics of symptoms since 1998. The study conducted in 2015–2017 is phase IV of the international ISAAC program. 5735 children were interviewed, including 3238 children aged 6–7 years and 2197 children aged 13–14 years. The incidence of non-cold-related sneezing was found in 14.7 % and 16.1 %, respectively; during the past 12 months similar problems with nose breathing were noted in 9.1 % and 9.9 %; accompanied by conjunctivitis – in 3.4 % and 4.8 % of children of 6–7 and 13–14 years, respectively. Most patients had seasonal exacerbations and mild/moderate rhinitis. AR diagnosis was verified in 12.2 % and 11.3 % of children, respectively. Decreasing of AR symptoms prevalence was found in children of all ages. The dynamics of AR symptoms prevalence, "eye" symptoms over the past 20 years show a probable decrease in all indicators, which can be explained by the widespread introduction in medical practice of screening methods for the disease diagnosing, activation of primary and secondary prevention.

**Keywords:** *children, allergic rhinitis, prevalence, ISAAC.*

### Introduction

The problem of allergic diseases is becoming more urgent every year due to epidemiological, social, scientific and economic aspects. Bronchial asthma (BA) prevalence in the pediatric population reaches up to 10 %, atopic dermatitis (AD) – up to 20 %. According to foreign epidemiological studies, up to 50% of children have AR [1–3]. Moreover, it is relatively rare up to 2 years old, and is most common pathological condition at the age of 6–17 years [4–6], when a child begins school, grows up and prepares to be a full successful member of the society. AR presence significantly reduces the life quality and children with AR have lower scores of life quality than those of patients with asthma [7–10]. It is a significant economic problem not only for the child, family, but also for society as a whole [11, 12].

It is possible to study the problem in a comprehensive way, which will make it possible to

get as close as possible to scientifically based and personalized treatment measures only due to global international intervention. The International Study of Asthma and Allergies in Childhood (ISAAC) is the one of the most successful such global programs [13, 14].

The ISAAC study was conducted by professor Ognev V.A. (KhNMU) in Ukraine in 1997–2003 for first time. The true allergic diseases prevalence was established during the study: BA – 98.25 %, AR – 56.25 %, AD – 39.64 %. This result is significantly higher than the official statistics [15].

The ISAAC program provides for the repetition of Phase I in 10 years to establish the allergic diseases dynamics and trends in the world (Phase IV), which was performed in most countries except Ukraine. Therefore, the ISAAC program in Ukraine requires the next phase (phase IV), which will provide information on the current state of the allergic diseases problem, including AR.

### 2. Purpose, subjects and methods:

**2.1. The purpose** was to improve medical care for patients with AR in pediatric population by estimating the AR symptoms current prevalence in children of Kharkiv city and revealing the symptoms dynamics from 1998.

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## 2.2. Subjects & Methods

The work was performed as interdepartmental research of pediatric departments of Kharkiv National Medical University according to the topic: "Medical and biological adaptation of children with somatic pathology in modern conditions", "Improvement of diagnosis and prevention of allergic diseases in children according to the international program standards "International Study Asthma and Allergy in Children" (state registration number 0114U003393, 0118U000925). The results of the study in children with bronchial asthma were published previously [16].

The study has designed phase IV of epidemiological method ISAAC [16] which was conducted in 2015–2017. Authorization for the performance of the work was received from the official representative organization Global Asthma Network.

In conformance with the international ISAAC program standardized questionnaires were distributed among schoolchildren aged 6–7 years and 13–14 years. The questionnaires included demographic information, allergy related questions and the option of response in the "Yes/No" format.

The sampling amount for the study was calculated by the formula of sampling population with due account of the amount of pediatric population and allergic diseases prevalence ensuring representativeness of the obtained data (Lisitsin Y.P., 2010) and made 5434 children [17].

The results of phases I and III of the ISAAC study were compared to reveal the tendencies in AR prevalence (Ognev V.A., 1998, 2002) [15].

The obtained data were stored in the SQLite/MySQL database, the calculation was conducted by variation statistics method.

The study was conducted with respect to human rights in accordance with the legislation in force in Ukraine, in compliance with international ethical requirements and did not violate ethical norms in science and standards for conducting biomedical research.

## 3. Results & Discussion

### Results

5735 children were interviewed, among them 3238 children aged 6–7 years and 2197 children aged 13–14 years. During analyzing the data of the AR symptoms part on the prevalence of symptomatic manifestations of the disease, 1424 (12.3%) schoolchildren gave positive answers. 47.6% of children aged 6–7 years and 58.9% of all surveyed adolescents had nose breathing disorders. Boys predominated (n=868; 60.9 %;  $P < 0.05$ ).

The answers to all 6 questions of the ISAAC questionnaire on the AR symptomatic manifestations are presented in *Table*.

As shown in *table*, adolescent children were more likely to experience symptoms of nose breathing disorders, as well as their combination with "eye" symptoms, although a significant difference in the values obtained was not identified in Kharkiv. In addition, these symptoms mostly did not bother the children, only a small number of respondents indicated their impact on daytime activities (0.4%). The seasonality most often pointed out by the respondents is autumn,

### *Results of children questioning according to the ISAAC program regarding symptomatic manifestations of AR in Kharkiv (n; %)*

Questions about nose breathing problems is not associated with cold	6-7 y.o.	13-14 y.o.	Average value	
	n =3238	n =2197	n =5735	
1. Has your child ever had a problem with sneezing, or a runny, or blocked nose when he/she did not have a cold or the flu?	475 (14.7%)	354 (16.1%)	414.5 (15.4%)	
2. In the past 12 months, has your child had a problem with sneezing, or a runny, or blocked nose when he/she did not have a cold or the flu?	296 (9.1%)	218 (9.9%)	257.0 (9.5%)	
3. In the past 12 months, has this nose problem been accompanied by itchy-watery eyes?	111 (3.4%)	105 (4.8%)	108.0 (4.1%)	
4. In which of the past 12 months was this nose problem occurred? (Please tick any which apply)	Winter	54 (1.7%)	36 (1.6%)	45,0 (1,7%)
	Spring	114 (3.5%)	99 (4.5%)	106,5 (4,0%)
	Summer	90 (2.8%)	89 (4.0%)	90,0 (3,4%)
	Autumn	119 (3.7%)	81 (3.7%)	100,0 (3,7%)
5. In the past 12 months, how much did this nose problem interfere with your child's daily activities?	Not at all amount	58 (1.8%)	37 (1.7%)	47,5 (1,8%)
	A little	56 (1.7%)	57 (3.0%)	56,5 (2,3%)
	A moderate amount	55 (1.7%)	46 (2.0%)	50,5 (1,9%)
	A lot	9 (0.3%)	11 (0.5%)	10,0 (0,4%)
6. Has your child ever had hay fever?	396 (12.2%)	249 (11.3%)	322.5 (11.8%)	

spring and summer. About 12% of children surveyed had already been diagnosed with allergic rhinitis.

The dynamics of allergic rhinitis symptoms prevalence for 1998–2017 period in children of the Kharkiv is presented in *pictures 1–3*.

There is a decrease of the complicated nose breathing symptoms prevalence in children of 6–7 years, while in adolescents, on the contrary, the tendency to increase, although the probability of this figure does not reach evidence level ( $P > 0.05$ ).

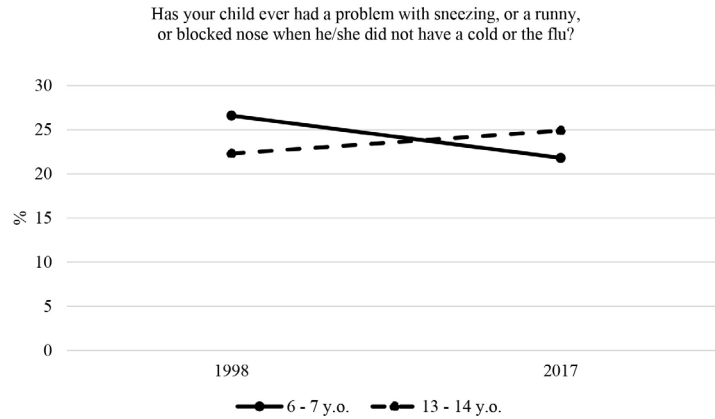


Fig. 1. Dynamics of the prevalence of complicated nose breathing in children of Kharkiv

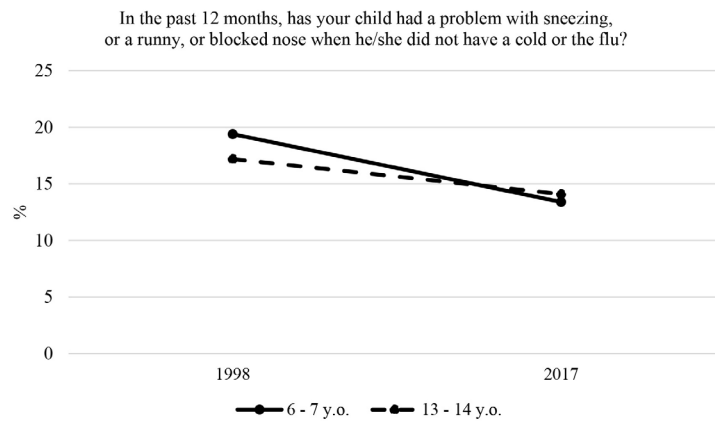


Fig. 2. Dynamics of the prevalence of complicated nose breathing in children of Kharkiv in past 12 months

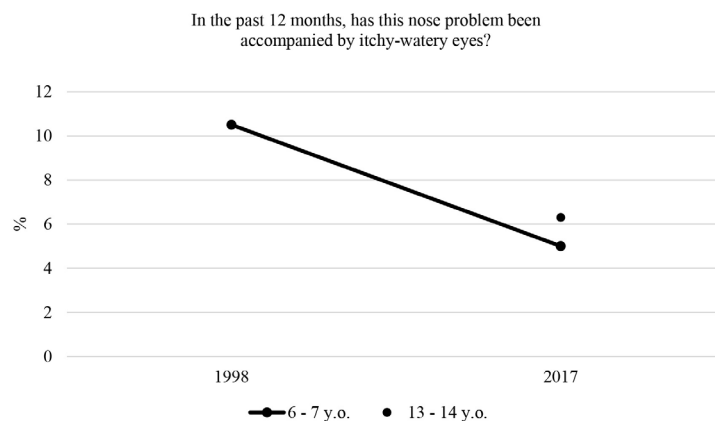


Fig. 3. Dynamics of the prevalence of complicated nose breathing by "eye" symptoms in children of Kharkiv in past 12 months

As can be seen from the picture, there is a probable reduction in the symptoms of nose breathing disorders in all age groups ( $P > 0.05$ ), which indicates disease control and effective preventive measures.

"Eye" symptoms in all age groups of the city's residents have almost halved in the past 10 years ( $P < 0.05$ ).

Thus, there is a decrease of AR symptoms prevalence in children of all ages. The dynamics of the prevalence of AR symptoms, "eye" symptoms, as well as the presence of attacks of difficult nose breathing over the past 12 months show a probable decrease in all indicators. These results can be explained by the widespread introduction into medical practice of screening methods for the disease diagnosing, the primary and secondary prevention methods intensification with the introduction of regulatory documents standards.

We can compare our results with epidemiological data from other countries. The study aimed to determine the prevalence of AR in school-age children was carried out in Budapest, Hungary. 3836 of the questionnaires (1857 M/1979F) were examined. The prevalence of current AR was 29.3%, physician-diagnosed AR was 9.7%, cumulative AR was 36.2% and current allergic rhinoconjunctivitis was 16.2% [18]. Prevalence of AR in Kharkiv is more than 2 times lower.

In Poland (Katowice) the prevalence of physician-diagnosed AR in 6–9-year-old children

was 22.1%, that was lower in two times in comparison with Ukrainian children population (11.8%) [19].

But physician-diagnosed AR in Ukraine was higher significant than that in Eastern Croatia in 10–11-year-old children - 6.3% [20].

These differences in AR prevalence can be explained by differences in genetic factors, environmental factors, lifestyle and confirmed the topicality of national trials.

### Conclusions

1. AR symptoms prevalence in the pediatric population of Kharkiv was 12.3 %.

2. AR symptoms in all age groups of city residents have tendency to decrease in the past 10 years.

3. The screening methods introduction of disease diagnosis into medical practice, the primary and secondary prevention methods have a positive effect and need further improvement.

### Declarations

#### Statement of Ethics

The authors have no ethical conflicts to disclosure.

#### Consent for publication

All authors give their consent to publication.

#### Disclosure Statement

Authors have nothing to disclosure.

#### Funding Sources

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#### Data Transparency

The data can be requested from the authors.

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