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CHILDREN SENSITIZATION TO POLLENS IN LVIV REGION DURING 2012-2013

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Introduction. There are diseases, which does not affect life expectancy or infant mortality rates, however significantly influence and worsen the quality of life of patients. Among such pathology on a special place deserve a disease caused by an allergy to pollen of plants (pollinosis). Hypersensibilization to pollens affect and complicates the course of other allergic diseases such as bronchial asthma, atopic dermatitis, and often is the primary factor that causes serious complications.

Among the child population pollinosis is fairly common disease, and the number of patients is increasing every year. Over the past decades the incidence of children allergic rhinitis increased almost in 2 times, and the prevalence of this disease increased in a 2,8 times [5]. Among the causes that determine the development of pollinosis as a manifestation of seasonal allergies are genetic and environmental factors. Etiological factor that causes pollinosis is the pollen grains of plants, which has a strong allergenic activity. Quantitative and qualitative content of the pollen in the atmosphere is an extremely dynamic. It is particularly dependent on environmental factors. As a result of penetration of allergenic pollen in the human body is the process of sensitization. Clinical symptoms of allergic diseases are manifested from the moment of contact with cause-significant allergen, and last another 3-4 weeks after the end of its actions [6]. However, intensification of allergic process cannot occur at the same time, which is the peak of allergenic plants blooming. Diagnostic criteria of this process are based on the presence of typical symptoms of allergic diseases that occur seasonally and are repeated every year [7].

The study of the correlation between symptoms of seasonal allergies and air pollen concentration is particularly relevant.

In many European countries the correlations between symptoms of seasonal allergies and pollen content in the atmosphere have been shown [3,12]. However, the results of these studies cannot automatically extrapolate to other regions, which are characterized by peculiar physical-geographical, climatic factors and floral composition. In addition, in the same region in different years, duration and intensification of seasonal allergies and terms of plants pollination differ from year to year. Climate change also greatly affects the concentration of pollen grains in the air [1,2, 8-11]. All of these factors contribute to increasing the level of sensitization of population, and it is much higher (in 4-6 times) in the urban population, although direct contact with plants of city residents much smaller than peasants. Given the above discussion, we set a goal to explore the structure of pollen sensitization in children of Lviv region, and compare them with the results of the aerobiological study of the content of pollens in the air.

Materials and methods. Clinical surveys were carried out from 2012 to 2013 inclusive at the Lviv Children's Allergological Center, outpatient department of West Specialized Children's Medical Center and 2nd Lviv municipal urban clinic. This article is the result of the surveys of 572 kids, aged 5 to 18 years old. Among them there were boys (70%) and girls (30%). Research methods included: a retrospective analysis of the medical documentation; General clinical (study of the history, data, objective examination), allergological (scarifмkation skin prick test of pollen allergens produced in Vinnitsa MP «Immunology»), instrumental (computer spirometry) methods.

Aeropalinological study was carried out on the basis of the Department of Botany of Ivan Franko Lviv National University and Danylo Halytsky Lviv National Medical University. Aeropalinological materials were collected in the central part of the Lviv city by gravimetric method [4]. The pollen count was carried out using a light microscope (Ч600 magnification). Statistical processing of the material and diagram plotting was carried out with the Exel program.

Results and discussion. In 2012 the patients with clinical manifestation of exacerbations seasonal allergies began to emerge from the end of February, and significantly increased the proportion of requests for medical assistance in the first decade of March. During this period single pollen grains of alder and hazel were present in the air. The amount of *Corylus* pollen in February did not exceed 4 p.g./m^3. In the second decade of March the maximum number of alder and hazel pollen was registered. In the third decade of March Birch pollen appeared. At the end of March a new wave of appeals of patients to doctors-allergologists about pollinosis was observed.

In the first decade of April 2012 a small concentrations of pollen grains of birch, hornbeam and maximum pollen of elm (35 p.g./m^3) were registered in the air. In the second decade of the month, the number of pol-

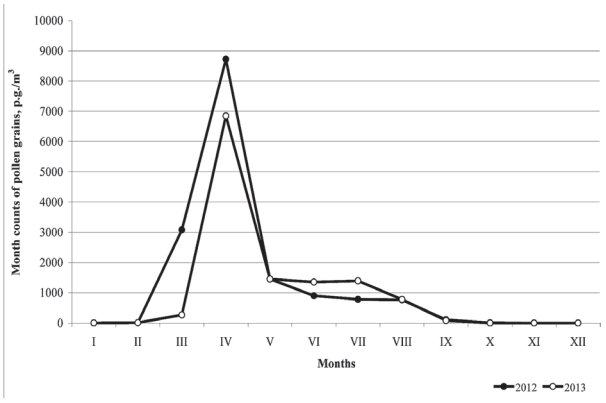

Fig. 1. Monthly sum of allergenic pollen grains during 2012-2013.

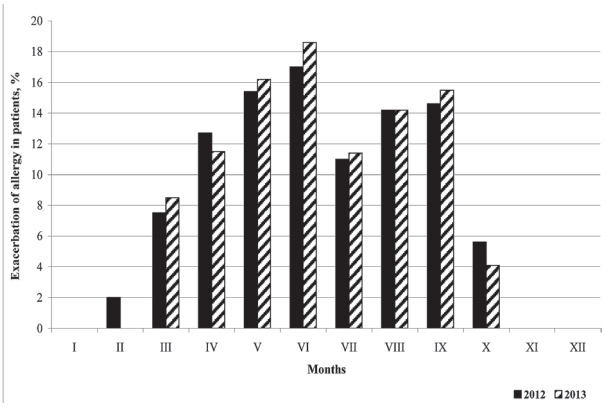

Fig. 2. Exacerbation of allergy in patients.

len of *Betula*, *Carpinus* in the atmosphere began to increase, and single pollen of *Fagus* was found. In third decade the maxima of pollen grains of these taxa (1504 p.g./m^3, 87 p.g./m^3, 217 p.g./m^3, respectively) were registered. During these three decades of April, allergists registered three waves of patients' appeals.

In the first decade of May 2012 exacerbations of allergy were minor. A few pollen grains of *Rumex*, *Plantago* and Poaceae were identificated in the air. The number of patients increased from May 6. In this day a maximum of oak pollen was registered in the atmosphere (173 p.g./m^3). Almost every day throughout the second and third decades of May new patients were registered.

At the beginning of June, the number of patients who seek treatment, significantly increased, however the clinical manifestations of acute pollиnosis in these patients mainly were a continuation of those that started in previous months (from April–May). In the first decade of June there was a maximum of Poaceae pollen (60 p.g./m^3), in the second – *Plantago* (8 p.g./m^3). From the middle of the second decade of June a new wave of aggravation of the pollinosis started: appeals of patients to allergologists increased.

In the first decade of July a maximum of Urticaceae pollen (13 p.g./m^3) was found.

From the first days of August 2012 new patients with symptoms of seasonal pathology began to appeal. At the same time acute hay fever staying at 14% of patients whose disease debut began in previous months.

In August and later there were present in the air single pollen grains of plantain, wild grasses, sorrel. However, in August the maxima of Chenopodioideae (9 p.g./m^3), *Artemisia* (102 p.g./m^3) and *Ambrosia* (7 p.g./m^3) pollen were found.

Palinological analysis of the air in 2013 showed that pollen grains of woody plants (alder and hazel) were in the atmosphere in single quantities already from the end of January. Pollen concentration began to raise in the first decades of the March, but the first clinical manifestation of pollinosis appeared only in the third decade. In the third decade of the month, the pollen grain concentration did not exceed 10 (*Alnus*) and 30 (*Corylus*) p.g./m^3. However, in the majority of patients (45%) the clinical manifestations continued until the end of April.

The aggravation of polynosis in April started in the early days of the first decade of the month. The concentration of the alder and hazel pollen during this period began raise, and in the second decade the monthly maxima of the pollen concentration of these plants in the atmosphere (263 p.g./m^3, 211 p.g./m^3, respectively) has been found. In the third decade of April, a maxima of concentration of birch (581 p.g./m^3) and hornbeam (1213 p.g./m^3) pollen were registered.

At the beginning of May the maxima of concentrations of oak (174 p.g./m^3) and beech (511 p.g./m^3) pollen were in the air. Clinical manifestations of pollinosis aggravation intensified and held at high level throughout May.

The first days of June the incidence of acute manifestations of hay fever has been recorded. At the beginning of the month the concentration of pollen grain in the air do not exceed 40 p.g./m^3. From the middle of the second decade of June a new wave of exacerbations began. At the third decade of June a maximum of cereals pollen (84 p.g./m^3) was registered.

In July 2012 and 2013 exacerbations of hay fever did not activate, however there were many sick children with displays of seasonal allergies, which began in May-June. In July of 2013 high concentrations of Urticaceae pollen (31 p.g./m^3) was registered.

In August 2013, the number of new patients with pollinosis was negligible, while in 27% of patients observed continuation of symptoms from previous months. In the first decade of this month the maximum of *Artemisia* pollen (81 p.g./m^3) was found, in the second – *Chenopodium* (6 p.g./m^3) and *Ambrosia* (9 p.g./m^3). At the beginning of the third decade of September patient appeals with the new sharpening, which continued until the end of October, was recorded.

During March to October of 2012-2013 in Lviv air pollen grains of allergenic plants are present. Prick test showed hypersensibilisation to the allergens of *Artemisia, Bromus, Festuca, Lolium, Phleum, Secale, Dactylis* in 2012 and 2013. The number of children with hypersensibility to these allergens decreased in 2013 compared to the year 2012 **(fig. 1, 2).**

When considering the number of referrals of patients with the symptom of seasonal allergies and pollen grain concentration in the air is a dynamic pattern,

and the general trend is repeated in both 2012 and 2013 revealed. In February allergies were found in some patients, although the concentration of pollen started to rise in March. Such appearance of exacerbations in February can be explained by unstable, raw weather, inherent in this region in recent years. There was a maximum of pollen concentration in the air in April in 2012 and 2013, but peaks of patient appeals for treatment occurred in the May-June. This situation may be explained due to the late recourse to medical assistance. Typically, patients with early disease manifestations engaged in self. Parents of these patients have some experience in treating. In addition, mono-sensibilization to one species of plant pollen observed very seldom. As a result, symptoms may last for the entire period of plants pollination.

Plant's pollen in high concentrations is present in air during spring, summer and autumn. The aggravation of seasonal pathology can manifest lasted, since each plant has its peak concentration of pollen in air, which causes acute manifestations of the disease. Thus, in August and in September, the number of pollen in the air decreases, but there is the emergence of a new wave of patients to medical facilities. These patients have the first manifestation of the disease, or those with repeated stronger manifestation of aggravation. This may occur through failure patients medical prescriptions. Treatment of seasonal pathology must begin before the anticipated lifting of the pollen concentration in the air and finish virtually since his disappearance. The general tendency of increase and decrease of pollen concentration and the occurrence of exacerbations of seasonal pathology is the same as in 2012 as in 2013. However, every month and every year has its own peculiarities, which may depend on many factors.

Conclusions. The obtained data found the plants that caused the highest sensitivity of patients in 2012-2013. They were *Artemisia, Bromus, Festuca, Lolium, Phleum, Secale, Dactylis*. The general tendency of pollen quantity fluctuation and the occurrence of exacerbations of seasonal pathology in 2012 and 2013 is the same. From March to October, the appeals of patients with symptom of seasonal pathology were registered, and the peaks of them were during the May-June and August-September.

Prospects for further research. In further studies plan to create a calendar of allergenic plants pollination and distribute it among doctors allergists and their patients.

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СТАН СЕНСИБІЛІЗАЦІЇ ДІТЕЙ ДО ПИЛКУ РОСЛИН У ЛЬВІВСЬКІЙ ОБЛАСТІ ПРОТЯГОМ 2012-2013 РОКІВ

Воробець Н. М., Волощук К. В., Новікевич С. З., Беш Л. В.

Резюме. У 2012-2013 роках у Львівській області були проведені клінічні дослідження дітей з проявами полінозу. Результати порівнювали з інтенсивністю пилення рослин. Було показано, що з підвищенням концентрації пилку в повітрі одразу зростає кількість звернень пацієнтів.

Ключові слова: концентрація пилку в повітрі, сезонна алергія, клінічні симптоми.

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СОСТОЯНИЕ СЕНСИБИЛИЗАЦИИ ДЕТЕЙ К ПЫЛЬЦЕ РАСТЕНИЙ В ЛЬВОВСКОЙ ОБЛАСТИ В ТЕЧЕНИЕ 2012-2013 ГОДОВ

Воробец Н. Н., Волощук К. В., Новикевич С. З., Беш Л. В.

Резюме. В 2012-2013 годах во Львовской области были проведены клинические исследования детей с проявлениями поллиноза. Результаты сравнивали с интенсивностью пыления растений. Было показано, что с повышением концентрации пыльцы в воздухе сразу растет количество обращений пациентов.

Ключевые слова: концентрация пыльцы в воздухе, сезонная аллергия, клинические симптомы.

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CHILDREN SENSITIZATION TO POLLENS IN LVIV REGION DURING 2012-2013

Vorobets N. M., Voloshchuk K. V., Novykevich S. Z., Besh L. V.

Abstract. Hypersensibilization to pollens affect and complicates the course of other allergic diseases such as bronchial asthma, atopic dermatitis, and often is the primary factor that causes serious complications. Starting the research, we proceeded from the fact that hay fever among children is quite a common disease, and the number of patients is increasing every year. In recent decades, the incidence of children allergic rhinitis increased by almost 2 times, and the prevalence of this disease has increased in 2.8 times. The pollen grains of many plant species, especially those that are pollinated by the wind, have a strong allergenic activity. Their quantitative and qualitative content in the atmosphere is an extremely dynamic, and in particularly dependent on environmental factors. Aeropalinological study was carried out on the basis of the Department of Botany of Ivan Franko Lviv National University and Danylo Halytsky Lviv National Medical University. In 2012 the patients with clinical manifestation of exacerbations seasonal allergies began to emerge from the end of February, and significantly increased the proportion of requests for medical assistance in the first decade of March. During this period single pollen grains of alder and hazel were present in the air. The amount of *Corylus* pollen in February did not exceed 4 p.g./m^3. In the second decade of March the maximum number of alder and hazel pollen was registered. In the third decade of March Birch pollen appeared. At the end of March a new wave of appeals of patients to doctors-allergologists about pollinosis was observed.

Clinical studies of children of Lviv region have been conducted from 2012 to 2013 on hay fever. The results are compared with the intensity of plants pollination. Revealed that in times of greatest concentration of pollen in the air and immediately after these patients's appeals increases. The number of patients increased from May 6 - a day of maximum of oak pollen (173 p.g./m^3). Almost every day throughout the second and third decades of May new patients were registered. From the middle of the second decade of June a new wave of aggravation of the pollinosis started: appeals of patients to allergologists increased. This was connected with pollination of Poaceae and *Plantago*, and in the end of the month – Urticaceae. In August acute hay fever staying at 14% of patients whose disease debut began in previous months. In August 2013, the number of new patients with pollinosis was negligible, while in 27% of patients observed continuation of symptoms from previous months. In the first decade of this month the maximum of *Artemisia* pollen (81 p.g./m^3) was found, in the second – *Chenopodium* (6 p.g./m^3) and *Ambrosia* (9 p.g./m^3). At the beginning of the third decade of September patient appeals with the new sharpening, which continued until the end of October, was recorded. When considering the number of referrals of patients with the symptom of seasonal allergies and pollen grain concentration in the air is a dynamic pattern, and the general trend is repeated in both 2012 and 2013 revealed. In February allergies were found in some patients, although the concentration of pollen started to rise in March. Such appearance of exacerbations in February can be explained by unstable, raw weather, inherent in this region in recent years. There was a maximum of pollen concentration in the air in April in 2012 and 2013, but peaks of patient appeals for treatment occurred in the May-June.

Thereby, during March to October of 2012-2013 in Lviv air pollen grains of allergenic plants are present. Prick test showed hypersensibilisation to the allergens of *Artemisia, Bromus, Festuca, Lolium, Phleum, Secale, Dactylis* in 2012 and 2013. The number of children with hypersensibility to these allergens decreased in 2013 compared to the year 2012.

Keywords: air pollen concentration, seasonal allergy, clinical symptoms.

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