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ALLERGIC REACTIONS TO LATEX IN CONDITIONS OF THE COVID-19 PANDEMIC

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ABSTRACT

Purpose of the Study

The purpose of the study is to examine country-specific important allergens, identify hidden allergens, and interpret MDA results to diagnose Type I allergic reactions.

Materials and Methods

Self-conducted research has been provided which was aimed at identifying allergen-specific IgE to latex in patients with allergic diseases using immunoblot panels of RIDA gLine allergens of the company R-Biopharm (Germany). This test allows you to quantitatively measure the concentration of allergen-specific IgE (IU/ml) in the blood serum by the method of immune analysis, the results are also expressed in RAST-classes.

Results

40 patients with allergic diseases, aged from 14 to 70 years old, were examined in the Republican Scientific and Specialized Allergological Center, and from which 6 patients (15%) had allergen-specific IgE to latex with a concentration of more than 0.35 IU/ml in the blood serum. 83.3% of patients were sensitized to nuts (peanut, hazelnut, almond, Brazil nut, coconut, walnut) and tree pollen (alder, elm, hazel, willow, poplar, birch, beech, maple, oak) and herbs (plantain, wormwood, ragweed).

The twenty-first century is considered to be the century of allergies, as the prevalence of allergic diseases has increased throughout the world in recent decades. One third of the world's population suffers from allergy symptoms that are often severe, disabling and life threatening, such as asthma and anaphylaxis.

Latex allergy is emerged as an epidemic of anaphylaxis, occupational asthma and clinical dilemmas and became a major health concern in the 1980s due to the frequent use of natural latex gloves by healthcare workers (HCWs) as a result of the HIV pandemic. In the last decade, the frequency of latex allergy among healthcare workers in industrialized countries has decreased due to the switch to low-protein, powder-free gloves. However, other populations remain at risk: the prevalence of latex allergy is particularly high among children with spina

bifida and others who often undergo surgery at an early age. In addition, the use of latex gloves is still increasing among non-health occupational groups (e.g. food handlers and greenhouse workers),

The coronavirus (SARS CoV-2) epidemic began in December 2019 in China, and is still a serious problem worldwide. One of the important issues is its rapid spread in all countries of the world. A number of works characterized the epidemiological aspects, clinical and laboratory parameters, radiological characteristics, as well as the treatment of COVID-19. However, there are currently no systematic reviews in the available literature describing the accumulated data on COVID-19. It should also be noted that during the COVID-19 coronavirus pandemic, allergic pathology among the population did not decrease. COVID-19 is a new infectious disease that needs to be studied and presents a major public health challenge. Medical professionals are required to conduct additional studies to determine the factors that may mediate the development of the pathogenesis of a severe and fatal form of the disease [7].

Population-based studies indicate that up to 60% of the world's population is sensitized to immunoglobulin E (IgE) and allergens, most of which are protein antigens [3, 13]. In recent years, the prevalence of latex allergy has been increasing, but in the context of the coronavirus pandemic, the problem of the development of allergic reactions has not been studied, especially when wearing latex-containing gloves and other medical devices. Latex allergy - is an immunologically mediated immediate-type hypersensitivity reaction to immunoglobulin E and delayed-type hypersensitivity to the protein of the rubber tree Hevea of the Euphorbiaceae family.

Latex is found in sports equipment, lycra clothing, contraceptive products, children's toys and other household items. The composition of latex can contain about 250 different high-molecular proteins, of which about 20 are capable of inducing IgE-mediated reactions. Latex proteins can enter the body through the respiratory tract by inhalation of powder, talc or powder from latex gloves, through the skin and mucous membranes through contact with products containing latex proteins (surgical gloves, elastic bandages, tourniquets, plasters, medical bandages, cuffs, drains, urinary catheters, manometer cuffs and tubes, etc.) can enter the blood when using products containing rubber. The ability of the main proteins of latex to induce cross-reactions with food products (bananas, kiwi, avocados, melons, figs, tomatoes, potatoes, eggs, apples, pears, etc.) has been proven, which is called "latex fruit syndrome" [1, 5, eight].In recent years, the study of modern technologies for the molecular diagnosis of allergy (MDA) has become one of the promising areas and has become an integral part of clinical practice. Experts from the World Health Organization (WHO) and members of the International Union of Immunological Societies (IISO) have developed a systematic nomenclature of allergens.

THE AIM OF THE STUDY

Was to study country-specific important allergens, identify hidden allergens and interpret MDA results for the diagnosis of type I allergic reactions. Allergen molecules differ depending on the biological function as well as the structure of the protein families. Some molecules share common epitopes (antigen binding sites), and immunoglobulin E (IgE) antibodies can bind to allergen molecules that have an identical structure. Their origin may be different, the establishment of allergens, with cross-reaction is of great importance and will give clinicians

information about the sensitization of the patient's body to different allergens. MDA improves the quality of treatment of patients with allergies, especially food allergies, which is of tremendous importance in the occurrence of an atopic march. Having information on which allergen molecules the patient is sensitized to, one can predict a tendency to develop a systemic or local reaction and persistence of clinical symptoms.

The systematic nomenclature of allergens originated in the early 1980s by a group of scientists led by Dr. David G. Marsh based on Linnaean taxonomy. In 1986, the International Union of Immunological Societies (WHO/IUIS) WHO Allergen Nomenclature Subcommittee was established to standardize the name of the antigens (allergens) that cause IgE-mediated allergies. The list of allergens includes about 900 proteins from a wide variety of sources. Nowadays, food and other groups of allergens consist of 130 protein families; they differ in functional properties and amino acid sequence identity. It should be noted that more than 130 allergenic molecules from more than 50 allergy sources are commercially available for *in vitro* testing of specific immunoglobulin E (sIgE) [10, 12].

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Sensitization to latex occurs by aerogenic, contact, parenteral routes, the risk group is mainly medical personnel and workers in the production of rubber products. In healthcare workers, contact urticaria occurs on the hands in 60-80% of cases. According to the literature, latex allergy occurs in 2-25% of medical workers, the most severe reaction is Type I - anaphylactic shock, which occurs in 0.3% of cases in patients with latex allergy. Systemic reactions are more often caused by the ingress of a latex allergen into the body by aerogenic means, the main source of latex entering the indoor air is the powder used for processing of medical gloves [4].

The risk group also includes patients who have undergone many surgeries, exposed to prolonged exposure to latex, children with neurological diseases (meningomyelocele, Spina bifida, myelodysplasia), defects in the gastrointestinal tract, urogenital malformations, workers in the food industry and public catering, public utilities households (dishwashers, gardeners, maids), patients with allergic diseases to certain foods, people with atopy in the medical history, manifested by symptoms of asthma, rhinoconjunctivitis, dermatitis and eczema.

It should be noted that the problem of latex allergy is an example of a "new allergy" that suddenly appears with vast consequences for the health of patients and the economy of the country. Over 12 million tons of natural rubber latex is produced worldwide each year, but a limited number of latex-derived products have been approved and regulated by government agencies such as the FDA. Most finished products are not labeled for the latex allergen, which can be a problem for individuals with latex sensitization.

Among allergic reactions to latex, cross-reactions to food and latex in sensitized individuals are of particular importance. Latex fruit syndrome is a variant of cross-reaction, for example with sensitization to Hev b 8 (profilin) has no clinical significance. Sensitization to other latex proteins can cause clinical manifestations, the relationship between allergens and the severity of clinical manifestations is not correlated. The cross-reactive allergen responsible for the development of latex-fruit syndrome has not yet been identified, although it is believed that these proteins may be latex proteins Hev b 5, 6 and 11. Recent studies have contributed to the characterization of 15 latex allergens and the analysis of specific IgE antibodies against latex allergen components. Significant progress has been made in the understanding and prevention of latex allergy, although the disease may still be a concern worldwide [14, 15, 16].
It should be noted that the majority of birch pollen allergic patients sensitized to the main allergen with a moderate cross-reaction, Bet v 1, develop symptomatic plant food allergy, many pollen allergic patients do not develop allergic reactions to profilins in plant foods. The clinical relevance of sensitization to glycoproteins carrying cross-reactive carbohydrate determinants (CCDs) appears to be even more limited – many patients with CCD sensitization show symptoms of allergy to a limited range of sources despite their ubiquitous IgE reactivity[11].
Based on the foregoing, the timely diagnosis and identification of the frequency and characteristics of the clinical course of allergy to latex and the development of approaches to the treatment and prevention of the disease among the working population seem to be relevant and necessary.

The aim of the research - identification of latex allergy among patients with allergic diseases using immunoblot panels (R-Biopharm, Germany) of allergens for in vitro diagnostics to identify risk groups among workers in various industries and in patients with symptoms of intolerance to a number of plant foods for the subsequent development of early diagnosis approaches, recommendations for the prevention of this pathology.

Materials and methods of research. We conducted our own study aimed at identifying allergen-specific IgE to latex in patients with allergic diseases using immunoblot panels of RIDA gLine allergens from R-Biopharm (Germany). This test allows you to quantitatively measure the concentration of allergen-specific IgE (IU / ml) in the blood serum by the method of immune analysis, the results are also expressed in RAST-classes.

Results and Discussion
40 patients with allergic diseases, aged from 14 to 70 years old, were examined in the Republican Scientific and Specialized Allergological Center, of which 6 patients (15%) had allergen-specific IgE to latex with a concentration of more than 0.35 IU/ml in the blood serum. 83.3% of patients were sensitized to nuts (peanut, hazelnut, almond, Brazil nut, coconut, walnut) and tree pollen (alder, elm, hazel, willow, poplar, birch, beech, maple, oak) and herbs (plantain, wormwood, ragweed). The profilins in latex that cause latex fruit syndrome are officially called latex allergens. Profilins can cause severe anaphylactic reactions to peanuts and soybeans [8]. In 66.6% of patients, sensitization to mold fungi (Mucor mucedo, Rhizopus nigricans) was detected, in 33.5% of patients to Alternaria Alternata and Penicillinum notatum,

which is charaterized as a “latex- mushroom” syndrome. Sensitization to house dust mites Dermatophagoides pteronyssinus and Dermatophagoides farinae was detected in 66.6% of patients.

In our case, latex sensitization was detected mainly in young patients (average age 26.5 years), the frequency of sensitization to latex among adult patients was 12.5%, in children 2.5%. Patients with latex sensitization under the age of 30, is - 33.3%, in 30-39 years of old patients is 66.7%.

Thus, patients with an appropriate history and in the presence of sensitization to latex are recommended to exclude contact with a causally significant allergen, latex products, in persons who are professionally in contact with them, it is necessary to address the issue of changing working conditions, professional selection or change of professional activity, the use of air-purifying devices etc. For each patient with latex sensitization, it is recommended to draw up an individual treatment plan and take preventive measures; the main role should be given to stopping contact with the allergen (rubber toys, bath mats). In the presence of food allergies and sensitization to latex, the elimination of foods that give cross-reactions is recommended. All children with allergic reactions to latex should be referred to an allergist, who further chooses treatment approaches individually for each patient. To prevent latex allergy, it is necessary to use educational programs for medical workers and the public, carefully study the packaging and composition of the product, and discuss the problems of latex allergy in allergy schools, which is relevant in a hot climate [2].

For the prevention of anaphylaxis and the development of allergic reactions of an immediate type, with intolerance to foods that have cross-antigens with latex, it is advisable to timely detect sensitization for the organization of subsequent preventive measures and career guidance for patients.

CONCLUSIONS

1. In people that are sensitized to latex, the symptoms of allergic rhinitis and skin symptoms predominate.
2. Sensitization to latex is more common in patients with allergic diseases of a young age; the average age is 26.5 years.
3. Hidden sensitization to latex is often accompanied by "latex-mushroom", "latex-pollen" syndromes in patients with allergic diseases.
4. The likelihood of latex-fruit syndrome manifestation is lower in children compared to adult patients, which may be due to different frequency of contact with latex.

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