

TO THE PROBLEM OF ALLERGIC REACTIONS TO LATEX IN SURGICAL MEDICAL WORKERS

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Abstract. *In recent years, against the backdrop of coronavirus infection, allergic reactions among medical workers have become a global public health problem and need to be addressed both at the level of individual countries and the global community.*

Key words: *latex, immunoglobulin E, medical workers.*

К ПРОБЛЕМЕ АЛЛЕРГИЧЕСКИХ РЕАКЦИЙ НА ЛАТЕКС У МЕДИЦИНСКИХ ХИРУРГИЧЕСКИХ РАБОТНИКОВ

Аннотация. *В последние годы на фоне коронавирусной инфекции аллергические реакции у медицинских работников стали глобальной проблемой общественного здравоохранения и требуют решения как на уровне отдельных стран, так и мирового сообщества.*

Ключевые слова: *латекс, иммуноглобулин E, медицинские работники.*

INTRODUCTION

Sensitivity to plant allergens has increased throughout the world in recent decades. The problem of sensitization to latex is becoming especially relevant. First of all, this is due to an increase in contact with latex both during various medical procedures and in everyday life. In the context of the coronavirus infection caused by SARS-CoV-2, latex and nitrile gloves were preferred over vinyl and polyethylene gloves due to their higher durability as part of biosecurity measures. This expanded manufacturers' interest in the design and manufacture of rubber gloves [12].

Occupational allergies to latex allergens in our country have not been studied enough and require a special approach, since in the context of the coronavirus pandemic, more latex medical products began to be produced and used [18].

As epidemiological studies have shown, the proportion of occupational allergic diseases is 2-15% of all cases of allergy. For example, in Finland about 400 cases of occupational asthma are registered annually, and in the UK - up to 1500 cases. In industrialized countries, isocyanates cause asthma in 2-10% of workers, in Colombia, Canada, food allergies are often caused by cedar wood in about 10% of employees. The literature describes occupational asthma in a cook after exposure to carrots. Often there are data of allergic reactions in workers under the influence of cleaning, detergents.

Industrial chemical allergens can be represented by haptens such as metal sensitizers, aldehydes, anhydrides, artificial polymeric compounds, rubbers, latex, resins, etc. Occupational allergic skin diseases often carry a poor prognosis. The problem of diagnosis and prevention of contact dermatitis is of no small importance, since the incidence of occupational contact dermatitis tends to increase.

According to the literature, occupational hand dermatitis is often found in Western European countries. Occupational allergic dermatitis is characterized by frequent relapses, often leading to temporary disability.

MATERIALS AND METHODS

We conducted a survey using a questionnaire developed by us, consisting of 32 questions, among medical personnel aged 18-69 years (n=520), men - 83 (15.96%), women - 437 (84.04%) surgical clinics in Tashkent.

RESEARCH RESULTS

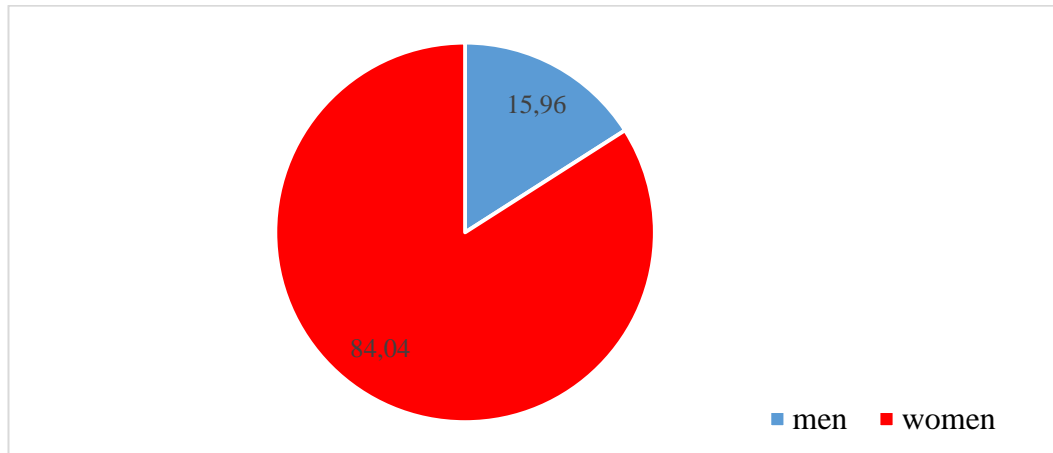


Figure 1. Distribution of respondents by gender.

Among doctors, men prevailed (n=74), among middle and junior medical personnel, on the contrary, women (n=437).

The average age of men was 40.9 years (maximum age - 64 years, minimum - 24 years), the average age of women was 39.3 years (maximum age 69 years, minimum - 18 years).

Thus, the average age of the medical staff of the surgical clinic was 39.5 years (the maximum age is 69 years and the minimum is 18 years).

The study of the professional composition showed the following results (see pictures 2).

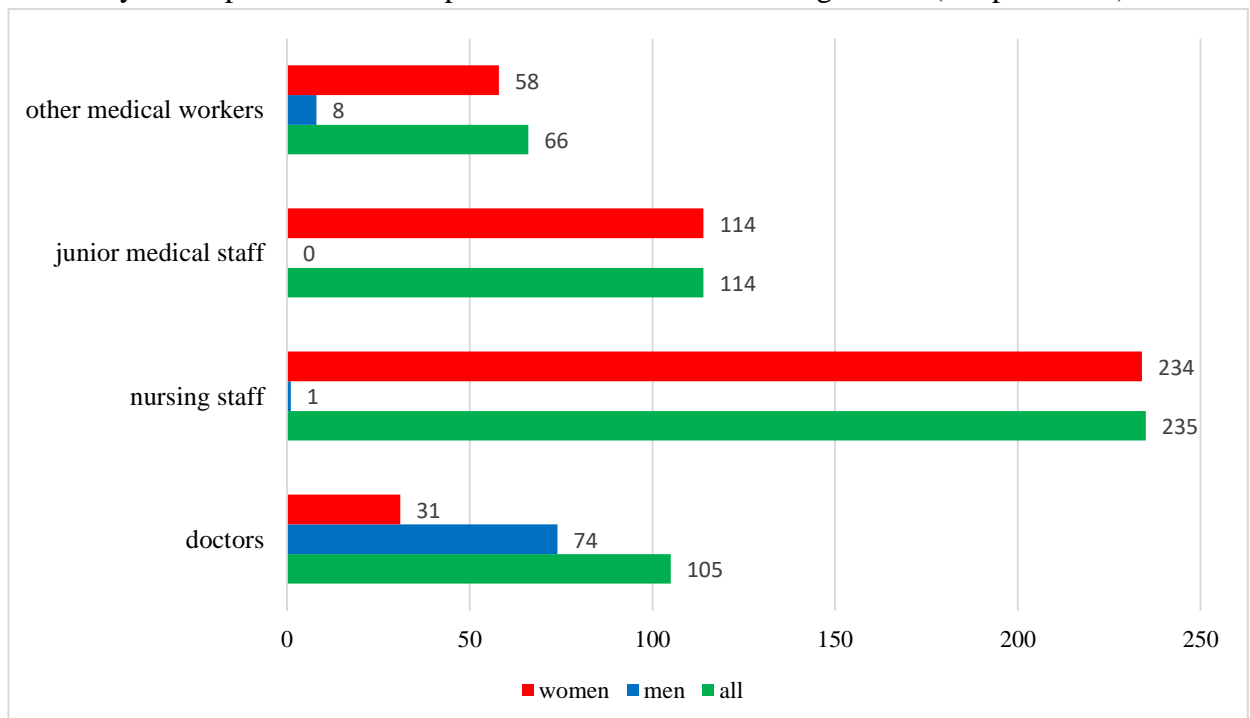


Figure 2. Distribution of medical personnel by profession.

Relatively healthy male health workers accounted for 77.02%. The main diseases that occur in men are shown in Figure 3.

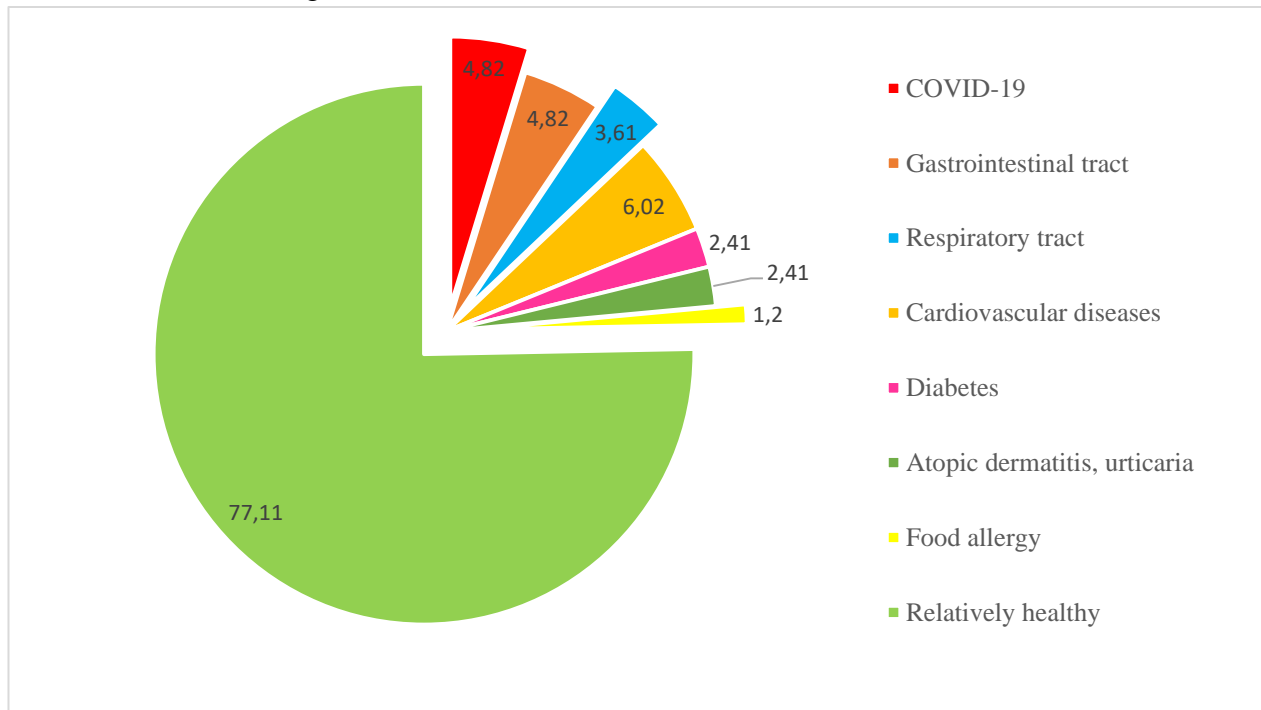


Figure 3. Distribution of comorbidities among surveyed men (n=83), %.

Among female medical workers, relatively healthy people accounted for 70.02%. The main diseases that occur in women are presented in the figure below.

Thus, in men, cardiovascular diseases prevailed, followed by gastrointestinal and respiratory pathologies.

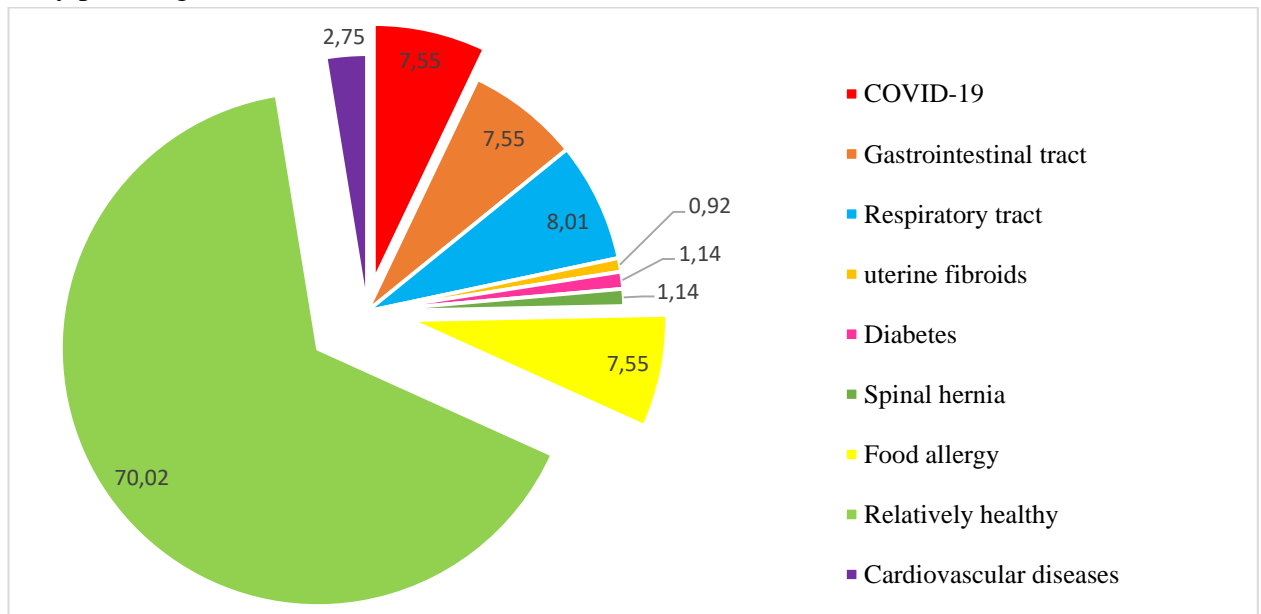


Figure 4. Distribution of comorbidities among surveyed women (n=437), %.

Thus, pathologies from the respiratory tract prevailed in women, followed by gastrointestinal diseases and food allergies. Allergic reactions to latex gloves, food products

(eggs, legumes, peach, strawberries, tomato, nuts), dust, perfume and antibiotics have been identified among medical personnel.

Among animal allergens, allergic reactions were caused by cat and dog allergens in the form of respiratory symptoms.

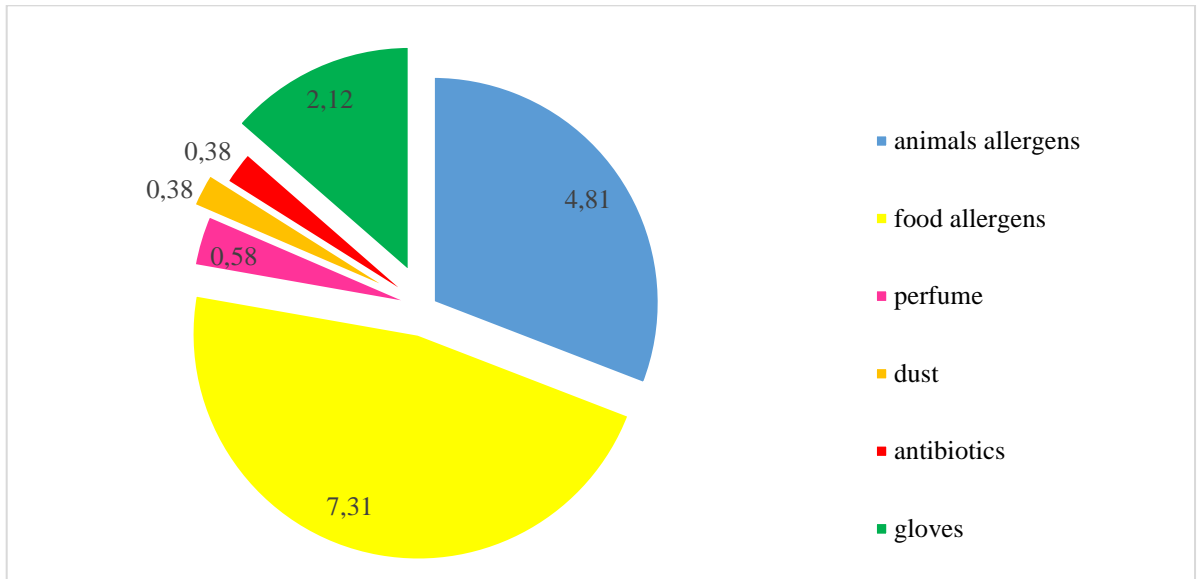


Figure 5. The frequency of occurrence of allergens among the medical staff of surgical clinics (n=520), %

Allergies to food, medical devices (latex gloves), dust, and other allergens have been reported in both male and female healthcare workers.

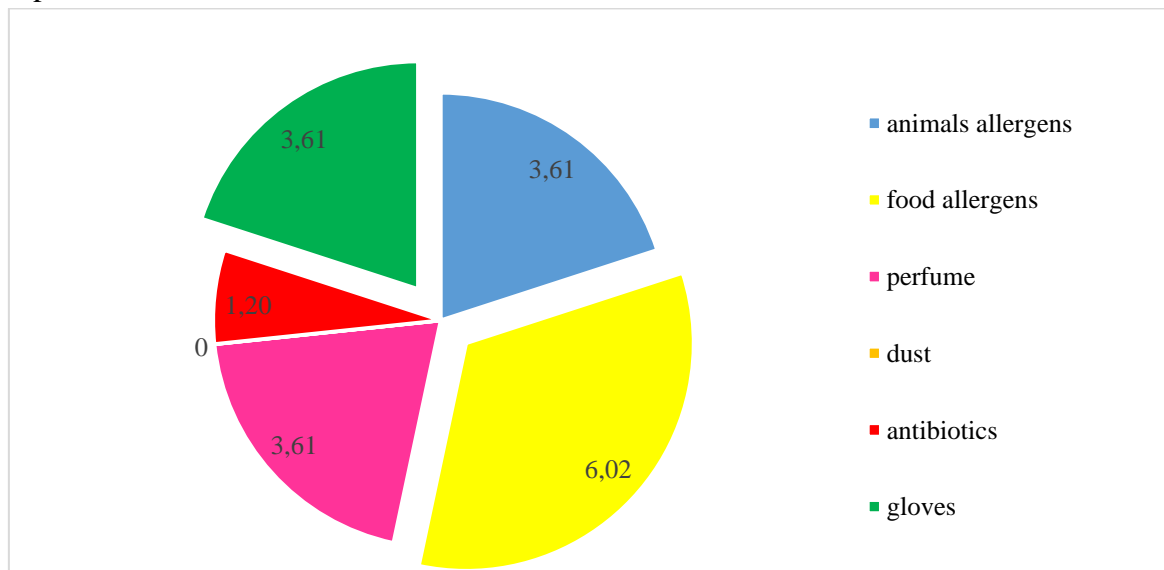


Figure 6. The frequency of occurrence of allergens among the medical staff (men) of surgical clinics (n=87), %

Foods such as eggs, nuts, citrus fruits, peaches, strawberries, legumes caused respiratory and gastrointestinal symptoms in 6.02% of men and 7.55% of women.

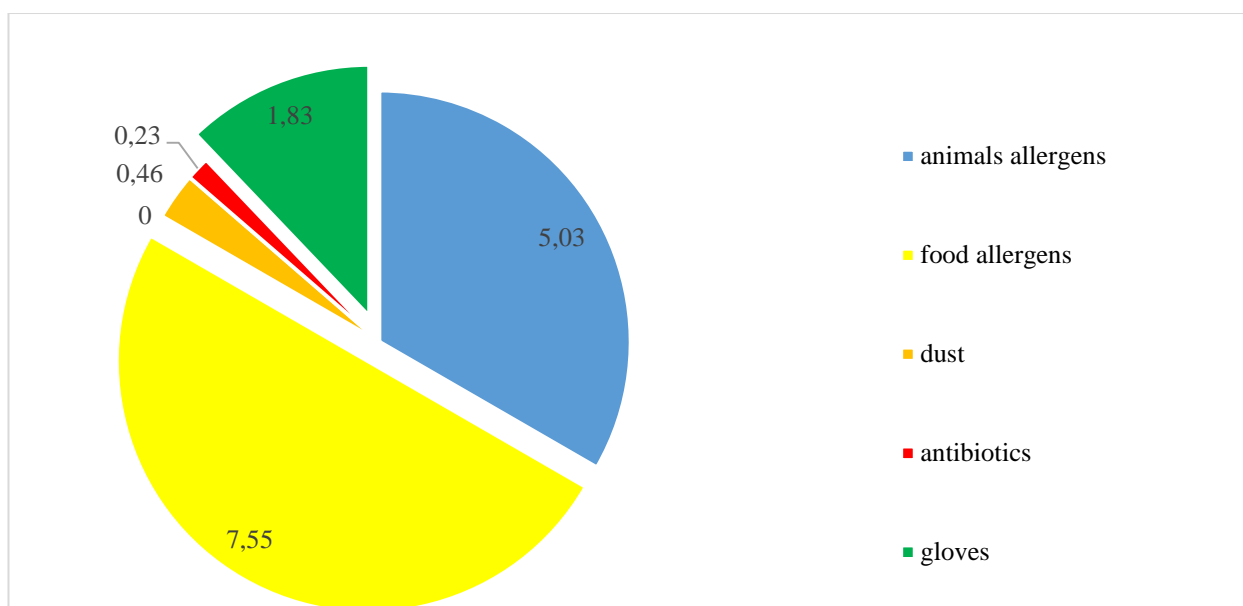


Figure 7. The frequency of occurrence of allergens among the medical staff (women) of surgical clinics (n=437), %

Latex gloves caused allergic skin reactions in 3.61% of male and 1.83% of female healthcare workers.

DISCUSSION

The latex allergy problem is an example of a «new allergy» that suddenly emerges with enormous consequences for the health of patients and the economy. More than 12 million tons of natural latex are produced annually from rubber, but a limited number of latex-derived products have been approved and regulated by government agencies such as the FDA [18].

The prevalence of latex allergy ranges from 0.8 to 6.5% and is the second cause of perioperative anaphylaxis. The main risk factors are a healthcare worker or latex manufacturer, many hours of use of latex gloves or products, exposure to other hand irritants, a history of atopy, neural tube closure defects, or multiple surgeries at an early age [1].

Natural rubber latex allergy affects 0.3% to 1% of the general population, and its prevalence is higher among health care workers (range, 2.8%-17%) [3].

The problem is that most finished products are not labeled for latex. Latex-fruit syndrome is a type of cross-reaction, for example sensitization to Hev b 8 (profilin), has no clinical significance. Sensitization to other latex proteins can cause clinical manifestation, the relationship between allergens and the severity of clinical manifestations has no correlation. The cross-reactive allergen responsible for the development of latex-fruit syndrome has not yet been determined, although it is believed that these could be latex proteins Hev b 5, 6 and 11. Recent studies have contributed to the characterization of 15 latex allergens and to analyze specific IgE antibodies against components of latex allergens. Significant progress has been made in understanding and preventing latex allergy, although the disease may still be a cause of concern worldwide [10, 13, 16, 17, 18].

Proteins of natural rubber latex and certain fruits, vegetables (banana, kiwi, tomatoes, potatoes, carrot and watermelon) contain homologous proteins, which can cause «latex-fruit» syndrome in sensitized patients [2, 4].

In the context of coronavirus infection, adverse reactions to natural latex can have undesirable consequences, especially among healthcare professionals. Latex allergy can manifest as either immediate hypersensitivity or delayed hypersensitivity (contact dermatitis) [3, 15]. Latex allergy has also become a well-known problem among healthcare workers while wearing gloves or inhaling aerosolized particles [11].

Natural rubber latex (NRL) allergy is commonly diagnosed according to medical history, skin allergy tests, and serological analyses. However, skin tests are increasingly being abandoned because of (I) their time-consuming nature, (II) latex preparations for skin tests being not commercially available, and (III) the use of in-house prepared test solutions is becoming ever more difficult due to increasing regulatory hurdles [14].

Patients allergic to latex may experience symptoms after eating certain foods, like fruits, vegetables and seeds. This characterizes the latex-pollen-fruit syndrome and is due to cross-reactivity of allergens from different sources called pan-allergens, such as lipid transfer proteins (LTP), storage proteins and profilins [7].

More frequent occurrence of latex allergy was detected among nurses [8].

Latex is a natural rubber (cis 1,4-polyisoprene), which has been widely used as an industrial product since the second half of the 19th century. Currently, ~99% of natural rubber is made from latex, the milky sap of the rubber tree *Hevea brasiliensis*. The prevalence of latex allergy among patients with allergic diseases proceeding according to the type of immediate hypersensitivity with the participation of immunoglobulin E specific antibodies in our country is about 20%.

Sensitivity to latex is dangerous because the symptoms can be in the form of systemic (allergic rhinitis, conjunctivitis, generalized urticaria, Quincke's edema, anaphylactic shock) reactions. In medical practice, a prick test is often used, which has contraindications, since during an exacerbation of the disease (chronic non-infectious and infectious, allergic, occupational diseases), in old age, highly sensitive skin, in pregnant women, in children under 5 years of age, it is not recommended to carry out this test [9].

Contact with latex may trigger allergic symptoms such as acute urticaria or contribute to the onset of respiratory symptoms such as coughing, shortness of breath, choking, etc. After a few minutes or hours after contact with latex, allergy symptoms may occur. For an effective diagnosis, we need the following steps for examining suspects for latex sensitivity: 1. Compile a questionnaire to identify risk groups. 2. Draw up an algorithm for further actions. 3. Laboratory stage. 4. Elimination - elimination of latex and further therapy.

The use of gloves and products made from latex and exposure to environmental allergens in the work environment are risk factors for the development of occupational allergies. Occupations exposed to latex products, such as food workers, hairdressers, cleaners, and manufacturers of natural latex products, are also at risk of developing occupational allergies. It is very important to detect occupational allergic diseases at an early stage in order to apply strategies for their prevention [5, 6].

Thus, the COVID-19 pandemic requires a special approach to the vulnerable category of persons' sensitive to latex. Recent epidemiological data illustrate the importance of this problem as an interdisciplinary one. As such, it still requires a comprehensive solution. Of particular relevance is the development of complex diagnostic measures that should be accessible to the patient and at the same time informative to establish both sensitization and allergy to latex.

In the manufacture of latex gloves, for ease of use, powder is often used, which has a role in causing reactions to latex products. Natural latex proteins turn into an aeroallergen - they are sorbed on powder (corn starch). Thus, reactions from the respiratory tract caused by aeroallergens can develop simultaneously with skin reactions due to contact with latex [12].

In the context of coronavirus infection, occupational contact with latex allergen is every day for medical workers who work in intensive care units, virological laboratories, in departments of the sanitary and epidemiological welfare and health services, etc. Often they have to change gloves 20-50 times a day. According to a survey of medical workers, on average they change gloves more than 30 times per working day. Among practically healthy individuals without indications of atopic diseases, latex sensitization occurred in < 1%, and among medical workers up to 12%, among patients with allergic diseases about 15-20%.

In the context of coronavirus infection, the frequent wearing of gloves, frequent medical procedures and the use of latex-containing products dictate the need to solve this problem. Since, in addition to medical workers, representatives of public utilities, employees of food enterprises, shops, warehouses, and pharmacies often come into contact with latex products. Scientific work to identify risk groups, early diagnosis of latex sensitivity can contribute to the prevention of unwanted local and systemic reactions.

Thus, elimination - breaking contact with latex remains the main method of preventing not only sensitivity to latex, but also the formation of atopic manifestations to other allergens.

CONCLUSION

Based on the above experimental data, a review of domestic and foreign literature, a questionnaire to identify risk factors for latex allergy can be recommended to people with atopy in the family, before hiring such people, if allergic or occupational diseases are suspected in individual workers in contact with latex products .

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