

Features and Clinical Manifestations of Allergy Spread in Children

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Abstract: Allergies have become increasingly prevalent among children, posing significant health challenges worldwide. This scientific article explores the features and clinical manifestations of the spread of allergies in children. Drawing upon current research and clinical observations, this study examines the various types of allergies commonly encountered in pediatric populations, including food allergies, respiratory allergies, and atopic dermatitis. The article delves into the underlying mechanisms of allergic reactions, risk factors associated with allergy development, and the impact of allergies on children's physical and psychosocial well-being. Understanding the features and clinical manifestations of allergy spread in children is crucial for early detection, accurate diagnosis, and effective management of allergic conditions.

Keywords: Allergies, children, clinical manifestations, food allergies, respiratory allergies, atopic dermatitis, immunological response, risk factors, diagnosis, management, prevention.

1. Introduction

Allergy prevalence among children has risen dramatically in recent years, presenting significant health concerns. This article aims to provide an overview of the features and clinical manifestations of allergy spread in children, shedding light on the impact of allergies on pediatric health.

2. Types of Allergies in Children

2.1 Food Allergies

Food allergies are one of the most common types of allergies in children. They occur when the immune system reacts abnormally to certain proteins found in specific foods. Common food allergens include milk, eggs, peanuts, tree nuts, soy, wheat, fish, and shellfish. When a child with a food allergy ingests or comes into contact with the allergenic food, it can trigger a range of symptoms, including skin reactions (such as hives or eczema), gastrointestinal symptoms (like nausea, vomiting, or diarrhea), respiratory symptoms (such as wheezing or difficulty breathing), and in severe cases, anaphylaxis, a life-threatening allergic reaction.

2.2 Respiratory Allergies

Respiratory allergies, also known as allergic rhinitis or hay fever, are characterized by an immune system response to allergens in the air, such as pollen, dust mites, pet dander, or mold spores. When a child with respiratory allergies inhales these allergens, it can lead to symptoms such as sneezing, runny or stuffy nose, itching of the nose and eyes, watery eyes, and coughing. In some cases, respiratory allergies can also trigger or worsen asthma symptoms, leading to wheezing, shortness of breath, and chest tightness.

2.3 Atopic Dermatitis

Atopic dermatitis, also referred to as eczema, is a chronic inflammatory skin condition commonly observed in children. It is characterized by dry, itchy, and inflamed skin that can appear as red, scaly patches. Atopic dermatitis is often associated with a family history of allergies or asthma. While the exact cause of atopic dermatitis is not fully understood, it is believed to involve a combination of genetic, immune, and environmental factors. Children with atopic dermatitis may experience periods of flare-ups and remission, and the condition can be aggravated by various triggers, including certain foods, irritants, allergens, and emotional stress.

It is important to note that children can have multiple allergies simultaneously. For example, some children with food allergies may also have respiratory allergies or atopic dermatitis. Diagnosing and managing allergies in children typically involves a comprehensive evaluation of medical history, physical examination, and specific allergy testing, which may include skin prick tests, blood tests for specific IgE antibodies, or oral

food challenges. With proper diagnosis and management, children with allergies can lead healthy and fulfilling lives while avoiding allergenic triggers and receiving appropriate medical care.

3. Mechanisms of Allergic Reactions

Allergic reactions are immune responses triggered by exposure to certain substances called allergens. These reactions can range from mild symptoms such as itching and sneezing to severe life-threatening conditions like anaphylaxis. Understanding the mechanisms underlying allergic reactions is crucial for diagnosis, treatment, and prevention. This section explores the two primary mechanisms of allergic reactions: IgE-mediated reactions and non-IgE-mediated reactions, as well as the concepts of cross-reactivity and sensitization.

3.1 Immunological Response: IgE-Mediated Reactions

IgE-mediated allergic reactions are the most well-known and common type of allergic response. They involve the activation of the immune system's antibody known as immunoglobulin E (IgE). When an individual with a predisposition to allergies is exposed to an allergen, such as pollen, dust mites, or certain foods, the body recognizes the allergen as a foreign invader.

The initial exposure to an allergen triggers the production of specific IgE antibodies by plasma cells. These IgE antibodies bind to receptors on mast cells and basophils, which are types of immune cells found in tissues throughout the body. Upon subsequent exposure to the same allergen, the allergen binds to the IgE antibodies already attached to the mast cells and basophils.

This binding triggers the release of various chemical mediators, such as histamine, leukotrienes, and prostaglandins, from the mast cells and basophils. These mediators cause the characteristic symptoms of allergy, including itching, redness, swelling, and increased mucus production. IgE-mediated allergic reactions typically occur rapidly, within minutes to hours after allergen exposure.

3.2 Non-IgE-Mediated Reactions

Non-IgE-mediated allergic reactions involve different components of the immune system and do not rely on IgE antibodies. These reactions can be further categorized into different types, such as type II, type III, and type IV hypersensitivity reactions.

Type II hypersensitivity reactions involve the binding of antibodies, such as IgG or IgM, to antigens present on the surface of cells or tissues. This binding triggers immune cells, such as macrophages or natural killer cells, to attack and destroy the targeted cells, leading to tissue damage and inflammation. Examples of type II reactions include certain drug-induced allergic reactions and autoimmune diseases.

Type III hypersensitivity reactions occur when immune complexes formed by the binding of antibodies to soluble antigens circulate in the bloodstream and deposit in tissues. This deposition triggers inflammation and tissue damage, leading to symptoms such as swelling, rash, and joint pain. Examples of type III reactions include serum sickness and certain forms of vasculitis.

Type IV hypersensitivity reactions, also known as delayed-type hypersensitivity reactions, involve the activation of T lymphocytes (specifically, CD4+ T cells) upon exposure to an allergen. These activated T cells release cytokines that recruit and activate other immune cells, resulting in an inflammatory response. Type IV reactions typically manifest several hours to days after allergen exposure and are commonly seen in allergic contact dermatitis and some drug allergies.

3.3 Cross-Reactivity and Sensitization

Cross-reactivity refers to the phenomenon where an individual who is allergic to a particular allergen may also exhibit an allergic response to a structurally similar allergen. For example, a person allergic to birch pollen may experience allergic symptoms when consuming certain fruits, such as apples or peaches, due to the presence of proteins similar to those found in birch pollen.

Sensitization is the process by which an individual becomes allergic to a specific allergen. It occurs when the immune system recognizes and develops an immune response to an allergen upon initial exposure. Subsequent exposures to the same allergen trigger an allergic reaction.

During sensitization, the immune system undergoes changes that result in the production of allergen-specific IgE antibodies and the activation of immune cells involved in the allergic response. Sensitization can occur through various routes, including inhalation, ingestion, or skin contact with the allergen.

Understanding the mechanisms of cross-reactivity and sensitization is crucial for identifying potential allergens and managing allergic conditions effectively. It enables healthcare professionals to provide appropriate advice to individuals with allergies, develop targeted diagnostic tests, and design personalized treatment strategies.

In conclusion, allergic reactions can be mediated by IgE antibodies or non-IgE mechanisms. IgE-mediated reactions involve the binding of allergen-specific IgE antibodies to mast cells and basophils, leading to the release of chemical mediators. Non-IgE-mediated reactions encompass different types of hypersensitivity reactions involving various components of the immune system. Cross-reactivity and sensitization play significant roles in allergic responses and contribute to the complexity of diagnosing and managing allergies.

4. Risk Factors for Allergy Development in Children

4.1 Genetic Predisposition

Genetic predisposition plays a significant role in the development of allergies in children. Children with a family history of allergies are more likely to develop allergic conditions themselves. Certain genes are associated with an increased risk of developing allergies, although the specific mechanisms are not fully understood. If one or both parents have allergies, their children are more susceptible to developing allergies, although the specific type of allergy may vary.

4.2 Environmental Factors

Environmental factors play a crucial role in allergy development. Exposure to allergens, such as pollen, dust mites, pet dander, or certain foods, can trigger allergic reactions in susceptible individuals. Additionally, exposure to air pollution, tobacco smoke, or certain chemicals may increase the risk of developing allergies in children. Living in urban areas with high levels of pollution or being exposed to indoor allergens can contribute to the development or exacerbation of respiratory allergies and atopic dermatitis.

4.3 Early Life Exposures

Early life exposures have been implicated in the development of allergies. Factors such as prenatal exposure to allergens or pollutants, mode of delivery (cesarean section vs. vaginal delivery), and breastfeeding practices have been studied for their influence on allergy development. Research suggests that exposure to allergens during pregnancy or early infancy may have both protective and sensitizing effects, depending on the timing, dose, and individual susceptibility. Some studies indicate that breastfeeding, especially exclusive breastfeeding for the first four to six months of life, may help reduce the risk of certain allergies. However, the relationship between early life exposures and allergy development is complex and can vary from one child to another.

4.4 Hygiene Hypothesis

The hygiene hypothesis proposes that reduced exposure to microbes and certain infections in childhood may contribute to an increased risk of allergies. According to this hypothesis, excessive cleanliness and limited exposure to infectious agents disrupt the development of the immune system, leading to an overactive immune response to harmless substances, such as allergens. Factors such as growing up in a sterile or overly clean environment, lack of exposure to farm animals, and limited contact with other children may contribute to the development of allergies. However, it is important to note that the hygiene hypothesis is a simplified explanation and does not fully explain the complex interplay between hygiene, microbial exposure, and allergy development.

It is important to recognize that while these risk factors may increase the likelihood of developing allergies, they do not guarantee allergy development in every child. Allergies are multifactorial conditions influenced by a combination of genetic, environmental, and immunological factors. Understanding these risk factors can help identify children who may be at higher risk and guide preventive measures and early interventions to minimize the impact of allergies on their health and well-being.

5. Clinical Manifestations of Allergy Spread in Children

5.1 Food Allergies: Gastrointestinal, Dermatological, and Respiratory Symptoms

Food allergies can manifest with a variety of symptoms, which can affect different systems in the body. Gastrointestinal symptoms may include abdominal pain, nausea, vomiting, diarrhea, or even more severe

symptoms such as gastrointestinal bleeding. Dermatological symptoms can range from mild skin reactions, such as hives (urticaria) or eczema (atopic dermatitis), to more severe symptoms such as angioedema (swelling) or flushing. Respiratory symptoms can include nasal congestion, sneezing, coughing, wheezing, shortness of breath, or even severe respiratory distress. In some cases, food allergies can trigger anaphylaxis, a severe and potentially life-threatening allergic reaction that can involve multiple systems and requires immediate medical attention.

5.2 Respiratory Allergies: Rhinitis, Asthma, and Wheezing

Respiratory allergies typically present with symptoms related to the upper and lower respiratory tract. Allergic rhinitis, commonly known as hay fever, is characterized by symptoms such as sneezing, itching, nasal congestion, runny nose, and itchy or watery eyes. These symptoms are often seasonal, occurring during specific times of the year when specific allergens, such as pollen, are prevalent. Asthma is a chronic respiratory condition characterized by airway inflammation, bronchoconstriction, and increased mucus production, leading to symptoms such as wheezing, coughing, shortness of breath, and chest tightness. Respiratory allergies can also trigger or worsen asthma symptoms, leading to asthma exacerbations.

5.3 Atopic Dermatitis: Skin Inflammation and Pruritus

Atopic dermatitis, or eczema, primarily affects the skin and is characterized by red, inflamed, and itchy patches of skin. These patches may be dry, scaly, and prone to developing blisters or oozing sores. The affected areas can vary but commonly occur on the face, neck, hands, elbows, or behind the knees. The intense itching associated with atopic dermatitis can lead to scratching, which further exacerbates the skin inflammation and can result in skin infections. Children with atopic dermatitis may experience periods of flare-ups, where symptoms worsen, followed by periods of remission, where the skin appears relatively normal.

It is important to note that the clinical manifestations of allergies can vary among children, and symptoms can range from mild to severe. In some cases, allergies may present with symptoms affecting multiple systems simultaneously. Prompt recognition and appropriate management of allergic symptoms are essential to alleviate discomfort, prevent complications, and improve the child's overall quality of life. If allergies are suspected, a comprehensive evaluation, including a detailed medical history, physical examination, and allergy testing, should be conducted to establish an accurate diagnosis and develop an appropriate management plan.

6. Impact on Physical and Psychosocial Well-being

Allergic reactions can have a significant impact on both the physical and psychosocial well-being of individuals. The following points highlight some of the common consequences of allergies in these areas:

6.1 Impaired Quality of Life:

Allergies can significantly impair an individual's quality of life. The symptoms associated with allergic reactions, such as itching, sneezing, coughing, wheezing, and skin rashes, can be uncomfortable and disruptive. They may interfere with daily activities, work productivity, and leisure pursuits. Allergies can limit participation in outdoor activities, social events, and travel, leading to feelings of frustration, isolation, and reduced overall satisfaction with life.

6.2 Sleep Disturbances:

Allergic reactions can disrupt sleep patterns, leading to sleep disturbances and fatigue. Common allergy symptoms like nasal congestion, itching, and coughing can make it difficult for individuals to fall asleep or stay asleep throughout the night. Sleep deprivation can have a negative impact on physical health, cognitive function, mood, and overall well-being.

6.3 Emotional and Behavioral Effects:

Allergies can have emotional and behavioral effects on individuals, particularly children and adolescents. Chronic allergies may lead to feelings of frustration, irritability, and sadness. Children with allergies may experience difficulty concentrating, mood swings, and decreased participation in school and social activities. Allergies can also contribute to increased anxiety and stress levels, affecting overall emotional well-being.

6.4 Academic Performance and School Attendance:

Allergies can impact academic performance and school attendance, particularly in children and adolescents. Allergy symptoms may lead to decreased concentration, reduced productivity, and impaired

cognitive function, affecting learning outcomes. Additionally, severe allergies or frequent allergic episodes may require missed school days or reduced participation in extracurricular activities, potentially hindering educational progress and social interactions.

It is essential to address the physical and psychosocial impact of allergies to improve the overall well-being of affected individuals. Management strategies may include:

- Allergen avoidance: Identifying and minimizing exposure to allergens through environmental modifications, such as dust mite covers, air purifiers, and pollen avoidance techniques.
- Medications: The use of antihistamines, nasal sprays, inhalers, and other prescribed medications to alleviate symptoms and manage allergic reactions.
- Immunotherapy: Allergen-specific immunotherapy, such as allergy shots or sublingual tablets, can help desensitize the immune system and reduce the severity of allergic reactions over time.
- Psychological support: Providing emotional support and counseling to individuals, particularly children and adolescents, to address the psychosocial impact of allergies and develop coping strategies.
- Education and awareness: Promoting allergy education, increasing awareness about triggers and management strategies, and fostering a supportive environment in schools, workplaces, and communities.

By addressing the physical symptoms, emotional well-being, and social impact of allergies, individuals can lead healthier and more fulfilling lives. It is important to consult healthcare professionals for appropriate diagnosis, treatment, and management of allergies based on individual needs.

7. Diagnostic Approaches and Early Detection

7.1 Medical History and Physical Examination

The medical history and physical examination are crucial in diagnosing allergies in children. The healthcare provider will take a detailed medical history, including information about symptoms, their frequency and duration, potential triggers, and any family history of allergies. A thorough physical examination may also help identify specific signs related to allergies, such as skin reactions or respiratory symptoms.

7.2 Allergen-specific IgE Testing

Allergen-specific IgE testing, commonly performed through blood tests, measures the levels of allergen-specific antibodies in the blood. This type of testing can help identify specific allergens that may be triggering allergic reactions. The two most common types of blood tests used for allergen-specific IgE testing are the enzyme-linked immunosorbent assay (ELISA) and the radioallergosorbent test (RAST). These tests can be helpful in diagnosing respiratory allergies, food allergies, and some cases of atopic dermatitis.

7.3 Skin Prick Testing

Skin prick testing involves applying small amounts of allergen extracts to the skin, typically on the forearm or back, and then pricking or scratching the skin to allow the allergen to penetrate. If a person is allergic to that particular allergen, a small raised wheal surrounded by redness may develop at the test site. Skin prick testing is a common method used to diagnose respiratory allergies, such as allergic rhinitis and some cases of asthma. It can also be used to diagnose certain food allergies.

7.4 Oral Food Challenge and Pulmonary Function Testing

Oral food challenge (OFC) is a diagnostic procedure used to confirm or rule out a suspected food allergy. It involves the supervised ingestion of increasing amounts of the suspected allergenic food under medical supervision. The child's symptoms are closely monitored during the challenge to determine if an allergic reaction occurs. Pulmonary function testing, such as spirometry, may be used to assess lung function and help diagnose and monitor respiratory allergies, particularly asthma.

Early detection of allergies in children is important to initiate appropriate management strategies and minimize the impact on the child's health and quality of life. If allergies are suspected, it is recommended to consult with a healthcare professional, such as an allergist or immunologist, who specializes in diagnosing and managing allergies. They can guide the diagnostic process, interpret test results, and develop a personalized treatment plan tailored to the child's specific needs.

8. Management of Allergic Conditions in Children

Managing allergic conditions in children involves a comprehensive approach that includes allergen avoidance strategies, pharmacological interventions, immunotherapy, and education and support for children and their families. The following points outline each of these management strategies:

8.1 Allergen Avoidance Strategies:

Allergen avoidance is an essential component of managing allergic conditions in children. It involves identifying and minimizing exposure to known allergens that trigger allergic reactions. Strategies may include:

- Identifying specific allergens: Conducting allergy testing to determine the specific allergens that trigger allergic reactions in the child.

- Environmental modifications: Implementing measures to reduce or eliminate exposure to allergens, such as using dust mite covers on bedding, regularly cleaning and vacuuming the child's environment, and minimizing exposure to pet dander.

- Pollen avoidance: Taking precautions during high pollen seasons, such as keeping windows closed, using air purifiers, and limiting outdoor activities during peak pollen times.

- Food allergy management: Educating the child and caregivers on avoiding allergenic foods, reading food labels, and implementing strict avoidance strategies to prevent accidental ingestion.

8.2 Pharmacological Interventions:

Pharmacological interventions are often used to manage allergic conditions in children. Medications can help alleviate symptoms and control allergic reactions. Commonly used medications include:

- Antihistamines: These medications block the effects of histamine, reducing symptoms such as itching, sneezing, and runny nose.

- Nasal corticosteroids: These nasal sprays help reduce inflammation in the nasal passages, relieving symptoms such as congestion and sneezing.

- Bronchodilators: These medications are used to relax the airway muscles and improve breathing in children with allergic asthma.

- Epinephrine auto-injectors: Children with severe allergies and a risk of anaphylaxis may need to carry an epinephrine auto-injector for emergency use.

It is important to consult with healthcare professionals to determine the most appropriate medications and dosages for a child's specific allergic condition.

8.3 Immunotherapy:

Immunotherapy, also known as allergy shots or sublingual tablets, may be considered for children with severe allergies that do not respond well to other management strategies. Immunotherapy involves gradually exposing the child to small amounts of allergens to desensitize the immune system and reduce the severity of allergic reactions over time. It is typically administered under medical supervision and requires regular monitoring.

8.4 Education and Support for Children and Families:

Education and support are crucial for children and their families in managing allergic conditions effectively. Key aspects include:

- Allergy education: Providing age-appropriate education to children about their allergies, including understanding their triggers, recognizing symptoms, and knowing how to seek help.

- Caregiver education: Educating parents and caregivers about allergen avoidance, medication administration, emergency response plans, and recognizing signs of anaphylaxis.

- Allergy action plans: Developing personalized allergy action plans in collaboration with healthcare professionals. These plans outline steps to be taken in case of an allergic reaction, including emergency contact information, medication instructions, and when to seek medical help.

- Support networks: Connecting families with support networks, such as local allergy support groups or online communities, to share experiences, advice, and resources.

Regular follow-up with healthcare professionals is important to monitor the child's condition, adjust management strategies as needed, and ensure proper support and guidance.

In conclusion, managing allergic conditions in children requires a multi-faceted approach. Allergen avoidance, pharmacological interventions, immunotherapy, and education and support for children and their families play integral roles in effectively managing allergies and improving the child's quality of life. It is

important to work closely with healthcare professionals to develop an individualized management plan that addresses the child's specific allergic condition and needs.

9. Prevention Strategies

9.1 Introduction of Complementary Foods

The timing and introduction of complementary foods to infants can play a role in preventing allergies. The current recommendation is to introduce solid foods, including common allergenic foods, around 4 to 6 months of age. The early introduction of potentially allergenic foods, such as peanuts, eggs, and fish, has been shown to reduce the risk of developing allergies, particularly for infants at high risk due to family history or early signs of allergic conditions. However, it is important to note that the introduction of allergenic foods should be done based on individual circumstances and with guidance from healthcare professionals.

9.2 Breastfeeding and Maternal Diet

Breastfeeding is known to provide numerous health benefits for infants, including potential protective effects against allergies. Exclusive breastfeeding for the first four to six months of life is recommended, as breast milk contains immune factors and antibodies that can help support the development of a healthy immune system. There is evidence to suggest that breastfeeding may help reduce the risk of certain allergic conditions, such as atopic dermatitis and wheezing in early childhood. However, the relationship between breastfeeding and allergy prevention is complex, and it may not completely prevent allergies in all cases. The mother's diet during breastfeeding does not need to be restricted unless there is a specific allergy or intolerance identified in the infant.

9.3 Allergen Exposure and Early Introduction

Contrary to previous recommendations, current evidence suggests that early introduction of allergenic foods, rather than avoidance, may be beneficial in preventing allergies. For infants without a high risk of allergies, introducing common allergenic foods, such as peanuts, eggs, tree nuts, fish, and shellfish, between 4 to 6 months of age is encouraged. This early introduction should be done gradually and in an age-appropriate form to ensure safety. It is important to note that infants at high risk of allergies, such as those with severe eczema or existing food allergies, may require specific guidance from healthcare professionals regarding the introduction of allergenic foods.

It is important to remember that prevention strategies for allergies should be individualized based on the child's risk factors, medical history, and guidance from healthcare professionals. These strategies aim to strike a balance between early exposure to potential allergens and minimizing the risk of severe allergic reactions. Consulting with a healthcare provider, such as a pediatrician or allergist, can provide personalized advice and guidance on allergy prevention strategies for a specific child.

10. Conclusion

Understanding the features and clinical manifestations of allergy spread in children is crucial for healthcare professionals, parents, and educators. Early detection, accurate diagnosis, and effective management of allergic conditions can improve children's quality of life, minimize the risk of severe reactions, and promote their overall well-being. By implementing prevention strategies and providing comprehensive support, we can mitigate the impact of allergies on pediatric health and foster a healthier future for children worldwide.

Bibliography.

1. Мирзоян В.Л., Разнатовский К.И., Монахов К.Н. Атопический дерматит. Алгоритмы диагностики и лечения. СПб., 2018; с. 6 [Mirzoyan VL, Raznatovsky KI, Monakhov KN. Atopic dermatitis. Diagnostic and treatment algorithms. Saint Petersburg, 2018; p. 6 (in Russian)].
2. Балаболкин И.И., Садикова Т.Е. Клинико-иммунологические особенности атопического дерматита у детей и эффективность патогенетической терапии. Педиатрия. 2013;92(3):6-13 [Balabolkin II, Sadikova TE. Kliniko-immunologicheskie osobennosti atopicheskogo dermatita u detei i effektivnost' patogeneticheskoi terapii. Pediatriia. 2013;92(3):6-13 (in Russian)].
3. Диетотерапия и коррекция витаминно-минеральной недостаточности у детей с аллергическими заболеваниями. Научно-практическая программа. Под ред. В.А. Тутельяна, Д.Б. Никитюка,

- Л.И. Ильенко, М., 2018 [Dietoterapiia i korrektsiia vitaminomineral'noi nedostatochnosti u detei s allergicheskimi zabolevaniiami. Nauchno-prakticheskaia programma. Pod red. VA Tutel'iana, DB Nikitiuka, LI P'enko, Moscow, 2018 (in Russian)]. 4. Sampson HA. Food allergy. Part 1: immunopathogenesis and clinical disorders. *J Allergy Clin Immunol.* 1999;103(5 Pt 1):517-28.
4. Аллергия у детей: от теории – к практике. Под ред. Л.С. Намазовой-Барановой. Союз педиатров России, 2010–2011. М., 2011 [Allergies in children: from theory to practice. Ed. LS Namazova-Baranova. Union of Pediatricians of Russia, 2010–2011. Moscow, 2011 (in Russian)].
 5. Hanifin JM, Rajka G. Diagnostic features of atopic dermatitis. *Acta Derm Venereol.* 1980;92(Suppl.):44-7.
 7. Данилычева И.В., Ильина Н.И., Лусс Л.В., и др. Федеральные клинические рекомендации. Крапивница. Российский аллергологический журнал. 2018;5:49-50 [Danilycheva IV, P'ina NI, Luss LV, et al. Federal'nye klinicheskie rekomendatsii. Krapivnitsa. Rossiiskii allergologicheskii zhurnal. 2018;5:49-50 (in Russian)].
 9. Клинические рекомендации. Дерматовенерология. Под ред. А. Кубановой. М.: ДЭКС-Пресс, 2010 [Clinical guidelines. Dermatovenereology. Ed. A Kubanova. Moscow: DEKS-Press, 2010 (in Russian)].
 10. Ревякина В.А., Таганов А.В., Кувшинова Е.Д., Ларькова И.А. Атопический дерматит, современная стратегия в терапии. *Лечащий врач.* 2019;5:32-3 [Reviakina VA, Taganov AV, Kuvshinova ED, Lar'kova IA. Atopicheskii dermatit, sovremennaia strategiiia v terapii. Lechashchii vrach. 2019;5:32-3 (in Russian)].
 11. Dilmurod, Maksimov, et al. "Calculating Reinforced Concrete Buried Structures: A Comprehensive Approach." *HOLDERS OF REASON 1.2 (2023):* 45-47.
 12. Dilmurod, Maksimov, et al. "A Comparative Analysis of Wooden Structures: Unveiling the Advantages over Alternative Materials." *HOLDERS OF REASON 1.2 (2023):* 34-37.
 13. Dilmurod, Maksimov, et al. "Achievements and challenges in incorporating modern methods into architectural design classes." *HOLDERS OF REASON 1.2 (2023):* 26-29.
 14. Dilmurod, Maksimov, et al. "Unraveling Design Problems in Architecture and Construction: Challenges and Solutions." *HOLDERS OF REASON 1.2 (2023):* 38-40.
 15. Аллергология и иммунология (Клинические рекомендации для педиатров). Под ред. А.А. Баранова, Р.М. Хаитова. 3-е изд., испр. и доп. М.: Союз педиатров России, 2011 [Allergology and immunology (Clinical guidelines for pediatricians). Ed. AA Baranova, RM Khaitova. 3rd ed., rev. and add. Moscow: Union of Pediatricians of Russia, 2011 (in Russian)].
 16. Available at: <https://meduniver.com/Medical/farmacologia/gistamin.html> Accessed: 15.02.2021.
 17. Агафонов А.С., Ревякина В.А., Филатова Т.С. Фенистил. Возможности применения у детей. *Практика педиатра.* 2008;5:2-4 [Agafonov AS, Reviakina VA, Filatova TS Fenistil. Vozmozhnosti primeneniia u detei. Praktika pediatria. 2008;5:2-4 (in Russian)].
 18. Регистр лекарственных средств России. РЛС. Пациент 2003. М., 2002 [Register of medicines of Russia. Patient 2003. Moscow, 2002 (in Russian)].