Introduction

Allergy to furry animals is a significant clinical problem. Exposure to animal allergens conditioning the development of immune response and the occurrence of clinical symptoms is not only limited to contact with pets, such as cats or dogs, but it may also result from occupational hazard. Pets, livestock, laboratory animals or bred for hobby purposes can cause allergies. For some, exposure to animal allergens is associated with the development of allergic diseases, the symptoms of which substantially reduce the quality of life, and can sometimes lead to serious disorders that impair normal functioning.

The number of commonly defined allergen molecules in animals is constantly growing.

Most allergen molecules in animals belong to the lipocalin family that also demonstrates the highest prevalence of potential cross-reactions.

The diagnosis of IgE-mediated allergy, including furry animals, is complex. It may be based on broad diagnostic panels, covering numerous allergens and they might constitute a screening method, or it could rely on methods selected individually to address the needs of a specific/an individual patient. A great number of diagnostic tests is available for the diagnosis of animal allergy, ranging from skin tests through specific IgE testing to molecular panels and challenge tests.

Currently, most information on the diagnosis and prevalence of the allergy to furry animals focuses on the two most common pet species – dogs and cats. However, it is worth noting that the growing popularization of "atypical" pets means that diagnostic methods must "keep up" with the evolving needs of patients, which is reflected, for example, in changes in the composition of tests offered by individual manufacturers.

The ailments that dominate among patients with animal allergy are primarily: allergic rhinitis, allergic conjunctivitis, atopic bronchial asthma, food allergy, allergic contact dermatitis, and even anaphylactic shock. The method of treatment should be tailored to the individual patient, taking into consideration his or her allergic profile, course of allergy, economic possibilities and therapeutic goals. Allergy treatment, regardless of its etiology, always requires caution, and qualification for certain types of therapy should be preceded by a thorough and accurate diagnosis.

Aim of the study

The aim of the study was to analyse sensitisation to allergen components of selected furry animals on the grounds of the results of the ImmunoCAP ISAC and Allergy Xplorer-ALEX molecular tests.

Material and methods

The study was retrospective. The analysis was conducted in 2012–2023 and included 1553 patients who were suspected of suffering from hypersensitivity to various allergens, both inhalant and alimentary, which was revealed in a medical history or other auxiliary tests; thus, the patients were qualified/eligible for molecular diagnostics based on multiparametric tests. The basic demographic data of the study population were examined in relation to the results of detailed allergy diagnostics. Immunological tests were carried out using two very sensitive immunofluorescence methods: ImmunoCAP ISAC (Thermo Fisher Scientific) and Allergy Xplorer – ALEX1/ALEX2. At the time of the research, the manufacturers of both tests made modifications to the allergen composition which was taken into account in the statistical analysis of the results obtained.

The asIgE concentration ≥ 0.3 ISU-E in ImmunoCAP ISAC and asIgE concentration ≥ 0.3 kU/l in Allergy Xplorer – ALEX were considered elevated/positive which follow common practice in scientific research, and are in accordance with the recommendations of test manufacturers.

Due to the subject of the study, out of all the results obtained (the group of participants in the study) the ones selected and subjected to further statistical analysis were only those that showed a positive test result, i.e. asIgE ≥ 0.3 kU/l or ≥ 0.3 ISU-E, for at least one animal allergen.

All tests were carried out in the Laboratory of Immunology and Allergology, operating at the Clinic of Allergology, Clinical Immunology and Internal Diseases of Jan Biziel University Hospital No. 2 in Bydgoszcz. An experienced laboratory diagnostician performed the methodology of immunological tests in accordance with the manufacturer's instructions and standards appropriate for a particular procedure.

The scientific study was approved by the Bioethics Committee of the Nicolaus Copernicus University in Toruń at the Ludwik Rydygier Medical College in Bydgoszcz (No. KB 297/2023 of 11/07/2023).

Results

Both ImmunoCAP ISAC and Allergy Xplorer – ALEX results showed a comparable incidence (39% vs 38%) of allergy to any animal. Based on the analysis of the data obtained from ImmunoCap ISAC and Allergy Xplorer – ALEX, it can be concluded that the most common allergy is to cats (31% vs 30% in ImmunoCAP ISAC vs Allergy Xplorer – ALEX), followed by dogs (22% vs 26% respectively), and horses (9% vs 10%, respectively). In the presented findings, elevated asIgE was most commonly found for the following allergen components: Fel d 1 (25% in ImmunoCAP ISAC vs 27% in Allergy Xplorer – ALEX), Can f 1 (15% in ImmunoCAP ISAC vs 15% in Allergy Xplorer – ALEX), and for Fel d 4 and Can f 5 (12% each) in ImmunoCAP ISAC, and Can f 6 (12%) in Allergy Xplorer – ALEX. In the entire study population, allergy to furry animals was demonstrated in ~ 35% of women (36% in ImmunoCAP ISAC vs 34% in Allergy Xplorer – ALEX) and in ~ 44% of men (43% vs 44%, respectively). In ImmunoCAP ISAC, the highest number of people allergic to animal allergens was indicated in the 13-19 age group (25.3%), and the lowest in the 23-37 age group (24.7%). In ALEX, the highest number of people allergic to animal allergens was identified in the age group up to 18 years (35.6%), and the lowest in the 19-38 age group (31.9%). The allergic profiles of patients in the case of hypersensitivity to individual animals were also characterised. In addition, component diagnostics was taken into account when describing the importance of cross-reactions in the investigated population. . Monosensitization in the case of animal sensitization was analysed and systematised distinguishing its different definitions. Moreover, an attempt was made to assess the usefulness of the analysed tests in the diagnosis of allergy to furry animals.

Conclusions

Allergens from furry animals are a common cause of allergy in the study population. Most of the respondents were allergic to cats (about 30%), dogs (about 24%) and horses (about 9%). Allergy to furry animal allergens was more common in men (44% vs. 35%). No significant differences were observed between individual age groups. Serum lipocalins and albumin are responsible for the most common cross-reactions in animal allergens. Monosensitization to one allergen, i.e. lipocalin, is rare, as opposed to allergy to several different lipocalins at the same time. Allergy Xplorer – ALEX and ImmunoCAP ISAC are both useful tests in the diagnosis of allergy to furry animals. Monosensitization in allergy to furry animals can be considered at three main levels: monosensitization to one animal species , monosensitization to one family

of allergen proteins, and monosensitization to one specific allergen molecule. Neither of the tests analysed, i.e. ImmunoCAP ISAC and Allergy Xplorer – ALEX, included all of the allergen components of individual animals that have been described so far making it impossible to detect and diagnose the entire potentially allergic population. The analysed methods of determining IgE concentrations directed against allergen molecules vary, and the choice of the appropriate diagnostic tool should be tailored to the clinical situation of the patient.