

AN EPIDEMIOLOGICAL STUDY OF ALLERGY TO LABORATORY ANIMALS

Farzan A.V.¹, Ardehali M., Pilehchian L.R., Moosawi M.

L'allergie aux animaux de laboratoire est l'une des maladies professionnelles les plus gênantes pour les personnes en contact avec ces animaux. Les réactions d'hypersensibilité de type I prédominent dans ce domaine. Les allergènes ont été caractérisés à l'aide de méthodes modernes. Les principaux allergènes d'animaux de laboratoire sont des protéines spécifiques provenant de l'urine. On distingue trois groupes de symptômes. A cette étude, ont été soumises les personnes à haut risque, exposées aux animaux de laboratoire en 1992-1993 en Iran : vétérinaires, médecins, chercheurs, techniciens... Ils étaient au contact avec les poils, la peau, l'urine, les fèces, la salive et le sérum de souris, de rats, de lapins, de hamsters et de cobayes et exposés de diverses façons : manipulations, injections, prélèvements, opérations... La prévalence de cette allergie était de l'ordre de 23 p. cent. La prévalence est apparemment supérieure chez les techniciens, davantage en contact avec les animaux que les autres. Les réactions allergiques les plus importantes ont été observées chez les personnes exposées aux souris. Trois p. cent des personnes atteintes ont montré tous les symptômes, y compris ceux des yeux et du nez, de la peau et de l'asthme ; 44 p. cent seulement des symptômes oculaires et nasaux et 11 p. cent seulement des symptômes cutanés. Le tabac, le type de travail sont des facteurs de risque. Une réduction de l'exposition aux allergènes de ces animaux et une augmentation de la ventilation sont utilisées pour la prévention.

INTRODUCTION

Allergic reactions occur usually in persons working with laboratory animals. Many different animals such as mouse, rabbit, guinea pig, hamster, cow, horse, pig, goat, poultry, cat and dog are caused skin, eye and respiratory allergic reactions. During the last years more people has engaged in work with laboratory animals, since the use of these animals in research, pharmaceutical, biological science, medicine, veterinary medicine, dentistry and etc. has increased. Hypersensitivity reaction to animal allergens as an occupational zoonosis is the most annoyed disease in personnel working with laboratory animals.

IMMUNOLOGY

Type one hypersensitivity reactions (anaphylactic reactions) are predominant in allergy to animals, however type III or immun complex could be important in these reactions, if the persons inhale organic dust. Type I reaction occurs in individuals who are predisposed to develop increased amounts of IgE in response to antigens. IgE antibodies bind to mast cells. Adsorption of the corresponding allergen triggers the release of histamine and other mediators from the sensitized mast cell. Common example of this reaction are hay fever, urticaria and asthma.

ALLERGENS

Using the modern immuno-biochemical methods such as ELISA, RIST (radio-immunosorbent-test), RAST (radio-allergo-sorbent-test), HPLC, and ion exchange chromatography it has been possible to characterize the allergens. Prealbumin, albumin and alpha-2-globulin are the main allergens. Although urine, faeces, fur, hair, dander, skin, saliva, brain tissue and air in laboratory animal rooms are also source of allergens. These include mold spores and proteins in food that might be aerosolized. Therefore allergens are wherever the animals are kept, and it's impossible to be in contact with the animals without having contact with allergenic materials.

EPIDEMIOLOGY

During 1992-93 we surveyed laboratory animals allergy in the people engaged in work with these animals at 2 research institutes, 3 pharmaceutical manufactures and 2 facility centres of breeding laboratory animals and 4 faculties include veterinary medicine, pharmacology, dentistry and medicine faculties in Iran. They include veterinarians, pharmacologists, physicians, dentists, researchers and technicians. They exposed to mice, rats, rabbits, hamsters and guinea pigs in the many ways such as injection, sampling, handling, management, feeding and etc. 11 personnels out of population of 48 persons who exposed to laboratory animals had allergic reactions. They had clinical manifestations of hypersensitivity, that's prevalence of 23% (table I).

¹ Department of Animal Bacteriology and Vaccine Production, Razi Vaccine and Serum Research Institute, Teheran, Iran P.O. Box 11365-1558

Table I
Prevalence of allergy to laboratory animals

Animal	Exposed	With ALA	Percent
Mouse	14	4	28
Rat	8	2	25
Hamster	7	1	14.2
Rabbit	9	2	22
Guinea pig	10	2	20
Pooled	48	11	23

SYMPTOMS

There are three groups of symptoms :

1. Eye and nose symptoms include nasal congestion, rhinorrhea, sneezing, red and itching of the eyes, watery discharge and nasal stenosis.
2. Skin symptoms include localized uricaria, eczema, wheal and flare.
3. Chest symptoms that's mainly asthma, cough and dyspnoea. The symptoms were observed rapidly (5 to 10 minutes) after contact with allergens. Anaphylactic reactions with severe systemic effects like hypotension and shock seem to be an extremely rare manifestation of allergy to laboratory animals. Table I shows the frequency of symptoms in this study. 21 persons had eye and nose signs. 9 persons experienced skin reactions, 5 persons asthma and skin symptoms and 4 persons only asthma. 8% of them had eyes, nose and skin disorders, 6% asthma, eyes and nose symptoms. In 3-4% of personnel all symptoms were observed.

Table II
Requency symptoms among affected persons

Symptoms	Affected	Percent
Eye/nose	21	44
Skin	9	19
Asthma/skin	5	11
Asthma	4	8
Eyes/nose/skin	4	8
Asthma/eyes/nose	3	6
All symptoms	2	3-4

DIAGNOSIS

Diagnosis of allergy to laboratory animals was based on history of patients and clinical findings. We looked for the connection between allergic symptoms and exposure to animal allergens. The family history of allergy is also important, since atopy predisposes a person to type I allergic reactions. Specific antibodies against animal allergens were determined by RAST. Skin prick test with allergenic material was performed. If the reaction was positive, skin wheal and flare reactions were demonstrated in subjects when diluted corresponding allergens are injected subcutaneously. Almost all asthmatic individuals react positively to both skin prick test and RAST.

RESULTS

Our study has showed a prevalence of 23%. In the group of technicians were observed clinical manifestations more than others, since they contacted with mice, rats, rabbits, hamster and guinea pigs in the all ways. The most of allergic reactions occured in persons who exposed to mice (table III). 75% of affected persons exposure to laboratory animals less than others, however, they contacted with animals alternatively.

The cross-reactivity between allergens from different animals was observed. Rats have frequently spontaneous nephropathy with proteinuria which develops with age, therefore rats urine is a rich source of allergens. Duration of exposure is important so that short periods of high exposure are possibly more important than lower exposure over longer time. Type of job, smoking and atopy are the risk factors for allergy to laboratory animals.

Table III
Relation between occupation and allergy to laboratory animals

Occupation	Exposed	Positive	Percent	Animal	Contact ways
Veterinarian	11	3	27	M/R/Ra/G.p	Inj/Sam
Pharmacologist	17	3	18	M/R/Ra	"
Dentist	4	1	25	M/H	"
Physician	3	0	0	M	"
Researcher	7	2	28	M/R/Ra/H	"
Technician	6	2	30	M/R/Ra/H/G.p	All ways
Pooled	48	11	23		

PREVENTION

Reduced exposure to the laboratory animal allergens is used. Methods include reduction of direct animal contact time, increasing the room ventilation and using exhaust hoods, filter caps on animal cages and protective clothing or respirators when working with laboratory animals.

DISCUSSION

During this study we found some persons with allergic reactions to laboratory animals had leaved their jobs thus our survey was based on persons who working with animals at the same time. We suppose further works are necessary for description different aspects of this occupational zoonosis. We hope this study will be useful for later epidemiological research in this field.

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