Original Article

Thirty cases of bronchial asthma associated with exposure to pet hamsters

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Summary

Background: The identification, isolation, and elimination of allergen(s) causing bronchial asthma are the most efficient form of treatment. The pet industry has diversified recently, increasing the risk of exposure of pet owners to many unknown antigens. We clinically studied the characteristics of asthma associated with exposure to pet hamsters.

Methods: The study group comprised 30 adults in whom the onset, recurrence, or exacerbation of asthma was triggered by contact with pet hamsters. Clinical characteristics such as sex, age, period required for symptom onset, species of hamster, treatment and disease course, smoking status, and hamster-specific IgE antibodies in serum were studied.

Results: The male: female ratio of the study group was 1:1.3, and mean age was 37.7 years. Patients with no previous history of asthma initially presented with cough, progressing to episodes of asthma. Asthmatic symptoms were associated with hamster contact and ranged in severity from mild to severe. Three patients required hospital admission for treatment. The mean period from the start of hamster exposure to the onset of asthmatic episodes was 15.7 months. Dwarf hamsters were responsible for most cases. The CAP-RAST score for hamster-specific IgE antibodies was 1 to 4 in 22 patients and 0 in 8 patients. Eight patients with a score of 1 or higher for hamster-specific IgE antibodies had a CAP-RAST score of 0 for mite antigen. In these patients, terminating hamster contact resulted in a rapid improvement in symptoms, with no need for further treatment. Twenty-three of the 30 subjects (76.7%) were smokers.

Conclusion: Exposure to pet hamsters is an important risk factor for the onset, recurrence, or exacerbation of asthma. Smoking may also increase the risk of asthmatic symptoms in patients exposed to hamsters.

Key words: bronchial asthma, pet allergy, hamster

Introduction

Rodent-induced allergies were previously considered a type of occupational asthma occurring in laboratory animal workers [1-3]. During the past 7 to 8 years, the number of pet hamsters has increased in Japan [4]. This increase is attributed to the prohibition against dogs and cats in most apartments, the ease of keeping small animals such as hamsters indoors, low cost, and familiarity with hamsters among children because they are well-known cartoon characters. The increasing popularity of hamsters as pets is associated with recent reports documenting the onset, recurrence, or exacerbation of asthmatic episodes triggered by hamsters. We clinically studied the characteristics of bronchial asthma associated with pet hamsters.

Materials and methods

From 1993 through 2002, we surveyed adults with bronchial asthma who presented at the outpatient clinic of Tokyo Medical University Hospital. A total 30 patients with hamster-related episodes of bronchial asthma were identified. Asthmatic symptoms developed for the first time after exposure to pet hamsters in 22 patients. The other 8 patients had recurrence or exacerbation of asthmatic symptoms associated with exposure to

hamsters. Clinical characteristics such as sex, age, period from the start of hamster exposure until the onset or the recurrence or exacerbation of symptoms, species of hamster, treatment and disease course, and smoking status were recorded. In addition, general allergens and hamster-specific IgE antibodies in serum were measured. The patients were interviewed with regard to frequency of asthmatic episodes and the status of hamster contact after diagnosis. Some of the patients were subsequently followed up by means of a mail questionnaire.

Results

Age and sex

We studied 30 adults (13 men and 17 women) who had asthma associated with pet hamsters. Twenty-two patients (11 men and 11 women) had no previous history of bronchial asthma. Two patients (1 man and 1 woman) had a history of infantile asthma, and 6 (1 man and 5 women) had exacerbations of asthmatic symptoms. The male:female ratio was 1:1.3, indicating similar occurrence in both sexes. However, three times as many women as men had recurrence or exacerbation of asthmatic symptoms. The 30 patients ranged in age from 20 to 56 years (mean, 37.7 ± 10.7 years). Initial episodes of asthma occurred similarly in patients 20 to 56 years of age (mean, 37.0 ± 10.6 years). Patients with recurrence or exacerbation of asthma ranged in age from 23 to 58 years (mean, 39.4 ± 11.6 years) (Table 1).

Details of symptom onset

Most initial episodes of asthma were preceded by repeated cough gradually progressing to asthmatic symptoms such as wheezing and dyspnea. Patients with recurrence or exacerbation of asthma also had wheezing and dyspnea. Asthmatic episodes usually occurred after returning home and touching the hamster, especially in the evening. The severity of symptoms ranged from mild to severe. Asthma attacks were triggered by common cold in 3 patients, who were hospitalized. Two patients with exacerbations of asthmatic symptoms required intensive respiratory care.

Table 1. Clinical characteristics of patients with asthma induced by hamsters

Characteristics		Total	First occurrence	Recurrence or exacerbation
No		30	22	8
Age (y)		37.7±10.7	37.0±10.6	39.4±11.6
Sex (M/F)		13/17	11/11	2/6
Breeding period (months)		15.7±32.3	15.6±37.2	16.2±13.0
1 - 6 months		14	11	3
7 - 12 months		8	7	1
> 12 months		8	4	4
CAP-RAST (hamster)	Score 4	4	3	1
	3	9	7	2
	2	5	3	2
	1	4	4	0
	0	8	5	3
Cigarette smoker		23/30 (76.7%)	18/22 (81.8%)	5/8 (62.5%)
Male		11/13 (84.6%)	10/11 (90.9%)	1/2 (50%)
Female		12/17 (70.6%)	8/11 (72.7%)	4/6 (66.7%)

Period required for symptom onset

The mean period from exposure to hamsters until the onset of symptoms in the 30 patients was 15.7 ± 32.3 months (1-6 months, 14 patients; 7-12 months, 8; 12 months or longer, 8). The mean period until symptom onset in the 22 patients with initial episodes of asthma was 15.6 ± 37.2 months (1-6 months, 11 patients; 7-12 months, 7; 12 months or longer, 4). In the 8 patients with recurrence or exacerbation of asthma, the mean period until the development of symptoms was 16.2 ± 13.0 months (1-6 months, 3 patients; 7-12 months, 1; 12 months or longer, 4) (Table 1).

Species of hamster

The species of hamster was surveyed among the 30 patients. In 12 patients, the breed was unknown. Of the other 18 patients, dwarf hamsters belonging to the genus Phodopus were most common. Fourteen patients were exposed to Dzungarian hamsters (*Phodopus sungorus*), and 3 to Roborovski's hamsters (*Phodopus roborovskii*). In addition, 3 were exposed to common golden hamsters (*Mesocricetus auratus*), and 1 was exposed to the European hamster (*Cricetus cricetus*) (including patients exposed to more than 1 breed of hamster). The recent increase in the popularity of dwarf hamsters is reflected in the many patients who had pet hamsters belonging to the Phodopus genus.

Hamster-specific IgE antibodies

Hamster-specific IgE antibodies were measured by the CAP-radioallergosorbent (RAST) test (Pharmacia, Uppsala, Sweden) in all 30 patients. The hamster CAP-RAST score was 4 in 4 patients, 3 in 9 patients, 2 in 5 patients, 1 in 4 patients, and 0 in 8 patients. The relation to mite (*Dermatophagoides farinae*)-specific IgE antibodies produced in response to this common cause of atopic bronchial asthma was also examined. Eight patients with a hamster CAP-RAST score of 1 or higher had a mite CAP-RAST score of 0, indicating sensitization only to hamsters (Figure 1). The mean period of keeping hamsters as pets in these 8 patients was 8 months. Fourteen patients were sensitized to both hamsters and mites, suggesting an association with atopic predisposition. Among the 8 patients with a hamster CAP-RAST score of 0 despite having asthmatic symptoms associated with hamster exposure, 4 had a mite CAP-RAST score of 2 or higher and 4 had a score of 0 (Figure 1). Six of the 8 patients with a hamster CAP-RAST score of 0 were exposed only to dwarf hamsters; the species of hamster in the other 2 patients was unknown.

Treatment response

Symptoms responded to generally used antiasthmatic drugs, such as bronchodilators, leukotriene receptor antagonists, and inhaled corticosteroids. Symptoms promptly resolved on avoidance of contact with hamsters or on discontinuing keeping hamsters as pets. Of the 8 patients sensitized to hamsters alone, 6 required no further treatment on termination of hamster exposure.

Relation to smoking

Twenty-three of the 30 patients (76.7%) were cigarette smokers, including 17 who smoked one pack or more per day. Eleven of the 13 men (84.6%) and 12 of the 17 women (70.6%) were smokers. Eighteen of the 22 patients (81.8%) in whom asthma initially developed after exposure to pet hamsters were smokers.

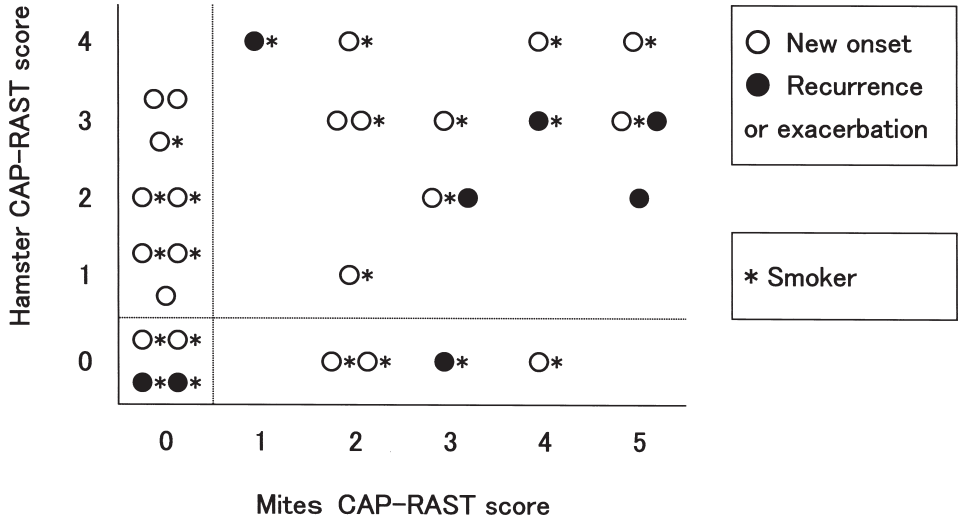

Figure 1. Relation between the hamster CAP-RAST score and mite CAP-RAST score in individual patients, classified according to new onset or exacerbation of asthma and smoking status.

In particular, 10 of the 11 men with initial episodes of asthma (90.9%) were smokers (Figure 1). The Japan Health Promotion & Fitness Foundation reported that the mean rate of smoking in Japan was 26.2% (men, 49.2%; women, 10.3%), suggesting a strong relation between smoking and hamster-induced asthma.

Discussion

Our results suggest that the risk of hamster-induced bronchial asthma cannot be predicted solely on the basis of the presence or absence of an atopic predisposition. In most of our patients, asthmatic symptoms initially developed after exposure to pet hamsters. Virtually none of our patients realized that their symptoms were caused by exposure to their pets, emphasizing the need for detailed interviews of patients on presentation.

There was considerable variation among patients in the time from the start of exposure until the onset of asthmatic symptoms. The shortest period reported was 1 month. We examined whether differences in the time to symptom onset were related to the number of hamsters, but had difficulty in identifying a correlation between these variables because of large fluctuations in the numbers of hamsters kept as pets (owing to their high reproductive capacity).

The hamster CAP-RAST score was initially negative in some patients, including 2 in whom the score became positive during follow-up. The hamster CAP-RAST score may therefore be related to the exposure dose and the sensitization period. The antigens used in the CAP-RAST test are derived from the epithelia of European hamsters and common golden hamsters (*C. cricetu*s and *M. auratus*). These common hamster allergens are usually tested when hamster allergy is suspected. Absence of sensitization to these allergens can occur in patients sensitized by exposure to the dwarf Siberian hamster *(Dzungarian hamster, P. sungorus*) [5]. Siberian hamsters can induce both sensitization and disease, and this species of hamster should be considered as a potential cause of respiratory disease in exposed patients. The lack of sensitization in some of our patients may therefore be related to species-related differences.

The development of a CAP-RAST test for dwarf hamster (*Dzungarian hamster*) antibodies is now being considered. Although the number of patients remains small, our results and those of other studies suggest that persons exposed to dwarf hamsters may lack evidence of sensitization to common hamsters, but may be sensitized to dwarf hamsters. Further studies are needed to confirm this finding. In addition, urine proteins can act as allergens in the epithelia of rodents. Patients can therefore be sensitized only to urine proteins [6] and test negatively for antibodies derived from rodent epithelium.

Our study group comprised adults with asthma. The results of detailed interviews indicated that other family members, particularly children, living in the same environment had no signs or symptoms of sensitization. We therefore considered the possibility that other factors, such as smoking, may have increased the risk of sensitization. However, this assumption is not supported by the findings of a previous study, which reported that smoking does not modify the sensitization risk [7].

Indoor exposure to hamster allergens has frequently been shown to cause asthma in Japan [4, 8, 9]. More recently, similar findings have been reported in Spain [5]. Physicians examining patients with asthmatic symptoms should therefore confirm the presence or absence of exposure to pet hamsters.

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