

Clinical Studies on Bronchial Asthma Caused by Contact with Hamsters

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The morbidity of allergic diseases has been increasing explicitly in recent years, possibly due in part to pets being kept inside the house more frequently. Asthmatic symptoms induced by contact with small rodents including hamsters, rats, mice and guinea pigs are already known among persons handling laboratory animals as occupational hazard. More recently, however, these pets are also the source of asthmatic allergens in the general people.¹ The Dzungarian hamster in particular is the most popular little pet, owing to its smaller size and milder disposition compared with that of the conventional golden hamster. We studied the clinical features of patients with asthma who had experience in keeping Dzungarian hamsters during medical consultation at our hospital.

SUBJECTS AND METHODS

The subjects were nine patients (7 males and 2 females; age range 20 to 51 years; mean age 38 years) who attended the hospital

SUMMARY Bronchial asthma induced by contact with hamsters and other small rodents is receiving higher attention from the medical profession not only because of the problem of laboratory animal allergies (LAA), but also because of increasing household allergens for asthma, since keeping these pets has become more common in Japanese homes. The present report describes our studies on the backgrounds of nine patients with asthma who kept Dzungarian Dwarf hamsters as household pets. The following features were recognized among patients with bronchial asthma induced by contact with hamsters: 1) earlier onset of symptoms than for keeping other household pets, at an average of 14.7 months or within 12 months in 78% of the cases following the start of pet keeping; 2) adults ranging from their late 30s to 40s who have children of primary school age; 3) dwelling in apartments; 4) relatively high level of serum IgE and ECP; 5) positive for both immediate and late type asthmatic responses on an inhaling induction test; and 6) rapid remission after the cessation of pet keeping.

with adult bronchial asthma and who owned Dzungarian hamsters. We examined clinical background factors, eosinophil counts in the peripheral blood, serum eosinophil cationic protein (ECP) levels, serum radioimmunosorbent test (RIST) and serum radioallergosorbent test (RAST) scores of serum IgE for each subject. Furthermore, an inhalation induction test was carried out according to the standard method of Makino *et al.*² using hamster antigen supplied in the Hollister-Stier Co., Ltd. kit, Germany.

RESULTS

The nine subjects were classified by the degree of severity according to the "Guidelines for Prevention and Management of Asthma 1998" compiled by the Immunity & Allergy Study Group (Japanese), Ministry of Health and Welfare³ as follows: 3 cases in step 1, 5 in step 2, and 1 in step 3. Sub-

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Table 1 Characteristic of patients with asthma induced by hamster

Case no.	Sex	Age	Age at onset	Breeding time until the onset of asthma	Breeding no. of hamsters	Types of home	Childhood BA	Classify severity
1	M	20	19	12 M	1	Condominium	-	Step 1
2	M	24	23	12 M	1	Condominium	-	Step 1
3	M	48	30	12 M	1	Condominium	+	Step 2
4	F	39	33	18 M	unknown	Condominium	+	Step 2
5	M	51	49	12 M	6	Condominium	+	Step 2
6	F	39	38	6 M	3	Condominium	-	Step 2
7	M	41	40	12 M	1	Condominium	-	Step 3
8	F	42	39	36 M	20	Condominium	-	Step 1
9	M	43	42	12 M	1	Houses	+	Step 2

Table 2 Allergic characteristics of patients with asthma induced by hamster

Case no.	%Eosinophil in peripheral blood	Serum ECP ($\mu\text{g/l}$)	IgE RIST (U/ml)	IgE RAST									Allergic disease	BPT	
				HD	D	T ₁₇	G ₃	M ₅	M ₃	E ₁	E ₂	E ₈₄		IAR	LAR
1	4	25	1,800	2	5	4	2	1	2	3	2	3	AD	+	+
2	17	17	1,400	2	2	4	0	2	0	0	1	3	AD	+	+
3	8	18.9	3,034	2	2	2	0	0	0	2	0	4	AR	+	+
4	21	21.2	2,000	3	4	3	0	0	0	2	3	3	-	+	+
5	1	20.3	100	0	0	0	0	0	0	0	0	3	-	+	+
6	10	52.7	560	2	0	2	0	0	0	0	0	4	-	+	+
7	7	75.3	4,320	3	3	0	0	0	0	3	0	3	-	+	+
8	2	66.4	220	2	0	3	3	0	0	2	0	3	-	+	+
9	2	39	115	2	2	0	0	0	0	0	0	3	AR	+	+

ECP: eosinophil cationic protein, HD: house dust, D: mite, T₁₇: cedar pollen, G₃: oryza pollen, M₅: *Candida*, M₃: *Aspergillus*, E₁: dog skin, E₂: cat hair, E₈₄: hamster skin, AD: atopic dermatitis, AR: allergic rhinitis, BPT: bronchial provocation test, IAR: immediate asthmatic response, LAR: late asthmatic response

ject characteristics are shown in Table 1. Of the 9 adults, 67% were male, 100% were smokers and 67% were married. All married persons had children of primary school age. The time period from the start of pet keeping to the onset of asthma symptoms ranged from 6 to 36 months (mean 14.7 months). The onset of asthma occurred within 12 months after the start of pet keeping in 7 of the 9 patients. The number

of hamsters being kept ranged from 1 to 20 (mean 4.3), although 5 subjects kept a single animal. Eight subjects (89%) lived in apartments. Four (44%) had an anamnesis of infantile asthma. The eosinophil count in the peripheral blood ranged from 1 to 21% (mean 8.0%). The serum ECP level was high in all the cases from 17 to 75.3 $\mu\text{g/l}$ (mean 37.3 $\mu\text{g/l}$). The RIST score of serum IgE was 100 to 4,320 U/ml (mean

1,505.4 U/ml), and the IgE RAST score was positive in all subjects in response to hamster epithelium. For case 5, no other allergen was recognized which is suggestive of sensitization by a single agent. The complication of non-asthmatic allergy was observed in 2 subjects with atopic dermatitis and 2 with allergic rhinitis (Table 2). All subjects were positive in the immediate asthmatic response (IAR) on the inhalation

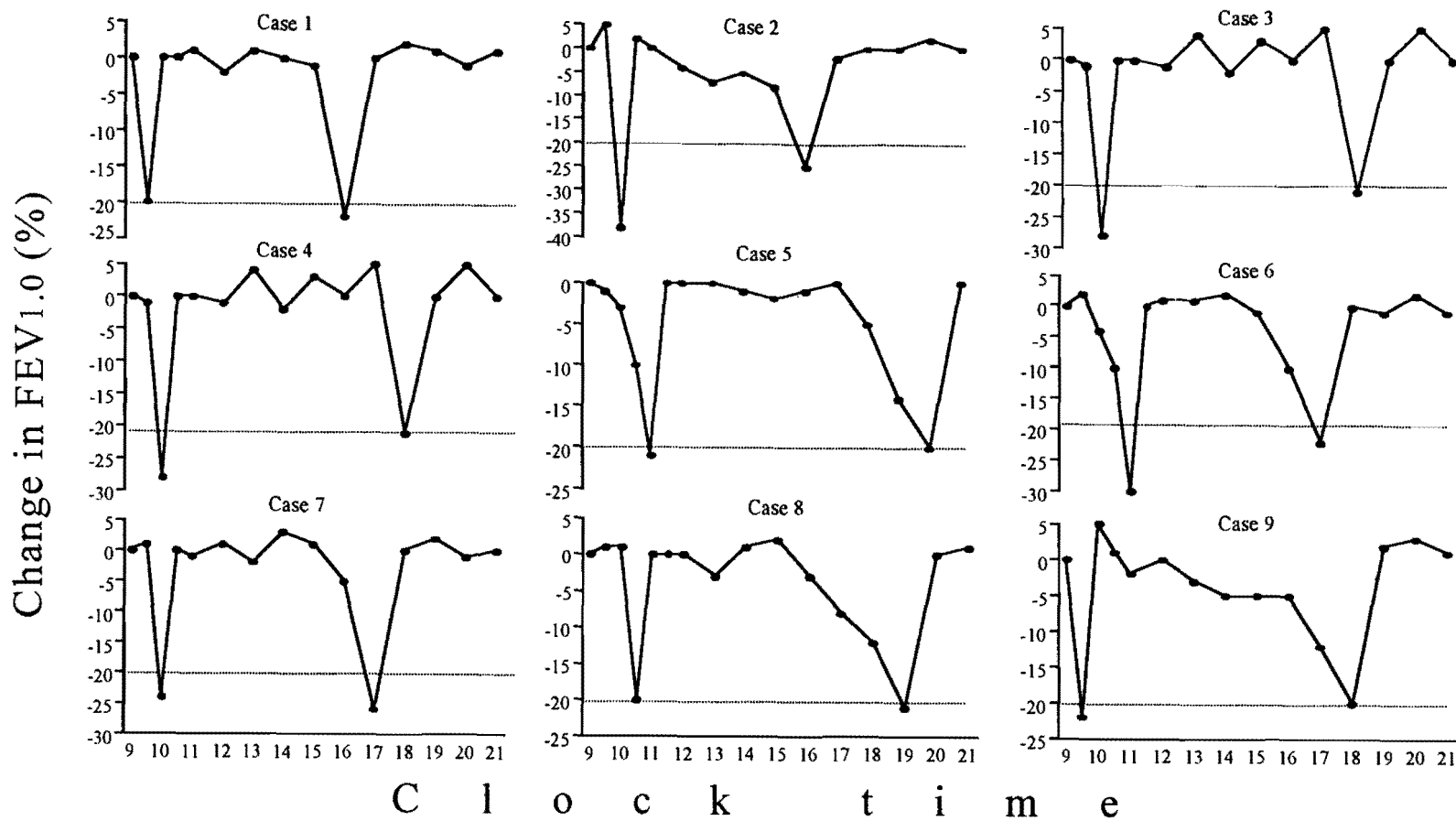


Fig. 1 Changes in FEV1.0 after inhalation of hamster hair-dander allergen.

induction test and the peak flow value declined again in all subjects 7 to 10 hours later. They were also positive in the late type asthmatic response (LAR) (Fig. 1). After listening to the explanation that hamsters were the causative allergen, subjects were persuaded to stop keeping the hamsters and we observed a rapid remission in the asthmatic symptoms within a few days.

DISCUSSION

Asthmatic symptoms caused by contact with the hamsters and other small rodents are now more widespread than the earlier known cases of laboratory animal allergy (LAA). The recent pet boom in Japan has increased the opportunities to keep hamsters and other small animals in general households and this, together with enhanced tight sealing in modern housing, has increased the incidence of asthmatic allergen. Adachi *et al.*⁴ reported in 1993 that hamsters account for about 5% of pet allergens among patients with asthma. In addition, Maeda *et al.*⁵ reported that the number of asthma patients dramatically increased from 1995 among those persons who had experience in keeping hamsters, and in 1997, hamsters and other rodents accounted for 20% of pet animals. All of these findings were reflective of the drastic increase in rodent-caused asthmatic disease.

The authors examined the clinical features of 9 patients with asthma who had experience in keeping hamsters as pets. Many authors such as Maeda *et al.*⁵, Osuna *et al.*⁶, and Akiyama *et al.*⁷ stated that the onset of asthma caused by hamsters occurs more quickly, within a year, from the start of keeping a rodent pet when

compared to that caused by cats or dogs. They attribute this effect to a higher potency of hamster allergen than that of other animals. In our studies, the time span to the onset of the symptoms was 14.7 months in average, and within 12 months for 78% of cases. The reported age of onset of pet-induced adult asthma is in the 30s or 40s. Maeda *et al.*⁵ pointed out that the age of onset has two peaks in patients with allergic disease: at the infantile stage and in adulthood. The later peak is caused by having children who want pets. This trend is more clearly recognized for pet hamsters. In the present study, asthmatic allergy occurred more frequently in parents in their late 30s or 40s with children of primary school age than in the children or other adults sharing the house without a pet hamster. Previous research has stated that asthma occurs more frequently in males and smokers, but further accumulation of data may be required before a definitive conclusion can be reached.

Nakao *et al.*⁸ attributed the increase in asthma cases induced by hamsters and other small pets to tight closure in housing, increased airtightness of rooms, neglected habit of large scale clean-ups at regular intervals, and changes in pet preference due to house conditions and prices. In our studies, 8 out of 9 patients (89 %) were living in apartments.

The causal relationship of the number of pets being kept was not clearly demonstrated in the present study or in the literature. We found in the present study that all subjects had higher serum ECP and serum IgE levels as well as being positive on the IgE RAST score. While Maeda *et al.*⁹ stated that hamster-induced asthma is

characterized by frequent sensitization to a single agent, only 1 out of 9 cases was sensitized by a single agent in the present study, and the remaining 8 were sensitized by multiple factors. As for the inhalation induction test in another trial, 60% of LAA patients who were positive for IAR were also reported to be positive for LAR.¹⁰ Whereas in our study all cases were positive for both IAR and LAR. This difference may be attributed to a higher exposure to hamsters in the homes than in the laboratory.

The first step in the treatment of allergic asthma is to avoid the allergens. The majority of subjects showed a rapid improvement in symptoms upon cessation of hamster pet keeping in the present study. This indicates the high potency of hamster allergen. Given our results, we conclude that clinicians must ask detailed questions about pet keeping when taking a case history in the asthma clinic.

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