

From the Municipal Out-patient Clinic for Allergic Diseases in Children,
Copenhagen, Denmark (Physician-in-chief: E. Winge Flensburg, M.D.)

ALLERGY TO HORSE DANDER IN ASTHMATIC CHILDREN

*A follow-up study of the effect of treatment
with horse dander extract.*

By

ERIK RYSSING

Allergy to horse dander is not uncommon as a cause of asthma in children in the city of Copenhagen, Denmark. The purpose of this study was to investigate the effect of treatment with extract of horse dander in such cases.

MATERIAL

Of 963 asthmatic children in this clinic, 61 (41 boys and 20 girls) gave a positive scratch test to horse dander. Table I illustrates the classifications of clinical sensitivity into which these children were grouped according to the criteria of *Salén & Juhlin-Dannfelt* (13) and *Juhlin-Dannfelt* (7, 8). The simple definitions given in this table are basic to the understanding of this presentation. Table II illustrates the number of children with clinical, subclinical and latent allergy according to the criteria noted in Table I.

The allergy to horse dander was latent in about half the cases. In four children this had developed into clinically manifest allergy by the time they were 2½ years old.

Table III indicates that the larger the skin reaction the greater is the chance that the child is clinically sensitive to horse dander.

TABLE I

Allergic state	Skin test	Clinical sensitivity	Provocation test
Latent	+	0	0
Subclinical	+	0	+
Clinically sensitive (manifest)	+	+	+
Past history of clinical sensitivity	+	0	0

TABLE II

Allergic state	Age in years			
	2-5	6-10	11-15	Total
Clinical (manifest) + subclinical	11	11	9	31
Latent	7	11	12	30
Total	18	22	21	61

TABLE III

	Size of scratch test to horse dander				Total
	+	++	+++	++++	
Clinical allergy...	0	5	11	10	26
Subclinical	3	0	0	2	5
Latent	19	6	5	0	30

TABLE IV

Symptoms resulting from contact with horses in the 26 patients with clinically manifest allergy to horse dander.

Asthma	17
Rhinitis	17
Conjunctivitis	8
Dermatitis	3

Table IV illustrates the various types of symptoms produced by contact with horses. As might be expected, many of the patients showed multiple symptoms.

TREATMENT

In our opinion, specific desensitization treatment with horse dander extract is indicated only in those patients who are clinically or subclinically sensitive to horse dander.

Twenty-seven children (17 boys and 10 girls) of whom twenty-three had clinical allergy and four subclinical allergy to horse dander have received treatment. This is started routinely with a 1/10,000,000 dilution in the following doses: 0.10, 0.20, 0.40, 0.70 cc. and continued with dilutions of 1/1,000,000, 1/100,000, 1/10,000, 1/1000 and sometimes 1/100 up to the highest tolerated dose. Injections are given subcutaneously three times a week to start. Later the interval is lengthened to one week, two weeks, three weeks and a month. The maximum interval at which the dose of horse dander may be increased in one month. In addition, all patients are advised to avoid contact with horses and products derived from horses.

FOLLOW-UP STUDIES

Table V classifies the patients in whom follow-up studies were made. These studies included observations of the effect of exposure of these children to horses and provocation tests. The provocation tests were either sniff tests with dried horse dander extract or inhalation tests for 15 minutes with aqueous horse dander extract. For this purpose, a dilution of 1/1000 is employed to start with and, if no reaction occurs, the concentration is gradually increased to dilutions of 1/100 and sometimes 1/20.

TABLE V

	Boys	Girls
Patients with clinical (manifest) or subclinical allergy to horse dander who received specific treatment	17	10
Patients with latent allergy to horse dander	22	6
Patients with clinical (manifest) or subclinical allergy to horse dander who have not received specific treatment...	0	3
	39	19

TABLE VI—For

Sex	Year of birth	Allergic state	Treatment started	Duration of treatment Months	Number of months from cessation of treatment	Reaction to scratch test	
						Before	After
M	1946	C	Feb. '54	9	0	++++	+
M	1939	C	Oct. '52	25	0	++++	+
F	1941	C	Sept. '52	26	0	++++	+
F	1944	C	6 months in 1946 and from June 1950	6+24 and +28	0 0	++++	+ +
M	1946	C	April '52	31	0	+++	++
M	1945	C	Dec. '51	35	0	++++	+
M	1946	C	May '51	46	0	++	+
M	1944	C	May '51	4	37	++++	++
M	1941	C	Nov. '51	14	22	++++	+
M	1948	SC	June '52	22	16	++++	+
F	1943	C	Nov. '50	23	29	+++	+
F	1946	C	Oct. '50 June '51 and from Dec. '51	9 +15	20	+++	+
F	1943	C	Oct. '46 + from Aug. '51	32 +43	2 0	++	— +

Abbreviations: Allergic State: C = clinical, SC = subclinical.

Symptoms at the provocation tests; N = nasal, B = bronchial, E = eye,

explanation, see the text.

Before treatment		During and after the treatment	
Exposure to horses	Provocation tests	Exposure to horses	Provocation tests
1950 and '51 asthma in circus	Oct. '53 N+B by nasal and inhal-test 1 %	March '55 in a horse-stable, no sympt.	Nov. '54 no symptoms by nasal test
o sympt. in circus 1950. Asthma in a forge in June 1952	Sept. '52 N+B by inhal. 1 %	June '53 no sympt. by touching a horse	Nov. '54 no sympt. by inhal. 1 %
July-Oct. '50 N+B on visits in a horse-stable.	Sept. '52 N+B by nasal test	June '54 no sympt. in circus	Nov. '54 no sympt. by nasal test
1946 N+B repeatedly contact with horses	June '50 +B by inhal. 1/10,000	June '52 no sympt. during riding. 1953 no sympt. during riding or in horse-stable	
1951 N+B+E in circus. Aug. '52 N+B+E on riding, B by horses	Dec. '51 +B by inhal. 1 %	No sympt. in July '54 in horse-stable and in Aug. by touching a horse	
Frequent asthma, horse-stable in the yard.	Dec. '51 +N+B by inhal. 1/10,000	Summer '54 twice in circus without sympt.	Nov. '54, April '55 no sympt. by inhal. 1 %
1949 N+B+C by horses, +C on riding, in circus, by horses	Feb. '51 +B +itch. by inhal. 1/1000	1954 no sympt. on passing a horse	March, April '55 no sympt. by inhal. 1 %
	May '51 N+B by inhal. 1 %	1954 daily contact to horses. o sympt. in July, Oct. 3 + 1 week	
Summer '51 N+itching in circus and on riding	Dec. '51 N+B by inhal. 1 %	No sympt. in 1953, '54 in circus. Touches horse daily without sympt.	
	June '52 N+B by inhal. 1/1000	July '55 no sympt. circus	In Aug. '55 no sympt. by inhal. 1 %
Nov. '50 asthma in circus	Oct. '50 +B by inhal. 1/1000		No sympt. by nasal test in March '54 and inhal. 5 % March '55
May '52 asthma on a farm	Sept. '50 + B by inhal. 1/1000	Aug. '54 no sympt. in circus	Nov. '54 no sympt. by inhal. 1% and 1/1000
Oct. '46 N+ asthma in horse-stable		Aug. '49 no sympt. in a horse-stable. 1951 July daily in a stable, and March '55 without sympt.	

C = cutaneous symptoms.

TABLE VII—For

Sex	Year of birth	Allergic state	Treatment started	Duration of treatment Months	Number of months from cessation of treatment	Reaction to scratch test	
						Before	After
M	1950	C	Aug. '54	3½	0	+++	+++
M	1948	C	Sept. '54	6½	0	++++	+
M	1943	C	April '54	7	0	++	++
F	1943	SC	March '54	12	0	+	+
F	1951	C	Nov. '54	12	0	+++	+
F	1939	C	June '52	27	0	++++	(+)
M	1942	C	April '54	3	5	+++	+
F	1938	C	Jan. '51	3½	44	++	++++
M	1939	SC	March '54	5	6	+	+
M	1940	C	June-Sept. '50 April-July '51	4 +3	41	++++	+++
M	1938	SC	Oct. '53	11	4½	++++	+
F	1936	C	May '50	23	31	+++	++++
F	1936	C	April '49	27	38	+++	++
	1937	C	March-June '44 + from Dec. '49	3 +25	35	+++	+++

Abbreviations: Allergic State: C = clinical (manifest), SC = subclinical.

Symptoms at the provocation tests; N = nasal, B = bronchial, E = eye,

explanation, see the text.

Before treatment		During and after the treatment	
Exposure to horses	Provocation tests	Exposure to horses	Provocation tests
Dec. '53 nasal sympt. by a fur-coat of foal skin			Dec. '54 N+B by nasal test
Summer '53 +N in circus			Feb. '55 +N by nasal test
1945 +N+E+C horse-car, '49+N+B+C in circus, +B+C after riding	March '54 N+B by nasal test	July '54 in horse-stable more times without sympt.	Nov. '54 +N+B by nasal test
1952 in horse-stable and in '53 in circus without sympt.	Jan. '54 +N by nasal test		Nov. '54 no sympt. by nasal test, March '55 (+)N
Before '53 asthma in farms. May '53+B in circus.		Nov. '54 +B in a horse-stable	
May '52 +N+B+E in circus, +N+E standing by a horse		No sympt. by contact with horses in summer '54	Nov. '54 +N + cough by nasal test
1950-'51-'52 +N+B by riding	March '54 +N by nasal test	June '54 no sympt. in circus	Dec. '54 +N+B by nasal test
1945, '47 +N+B+E in a horse-stable, by riding. Asthma in circus	Dec. '50 +B by inhal. 1/1000	Every summer +N+E by horse-cars	
	Jan. '54 +N by nasal test	June '54 dyspnea in a horse-stable	Feb. '55 +N by nasal test
Before 1950 +N+E by circus and horses trap-pings		Summer '54 +N in circus and in a horse-stable	
	Aug. '53 +N+B by nasal test. Oct. '53 +B inhal. 1 %		Feb. '55 (+)N by nasal test
1947 +B in horse-stable, 1949 +B riding		Dec. '54 asthma in horse-stable	
1949 +N+B in circus		'51-'55 only +N by riding and currying	
1943 and '48 +N+B by horses, '49 +B in circus	Nov. '49 +N+B by inhal. 1/1000	Aug. '52 +B in a farm, summer '54 no sympt. on touching a horse	Dec. '54 +B by inhal. 1 %

C = cutaneous symptoms.

For the purpose of control sniff tests, pine pollen is used and control inhalation tests are made with physiological saline solution. The solutions are atomized by a Barach spray with an oxygen tension of about 0.5 atmospheres. The allergen containing mist is inhaled through a mask (3, 12). The tests are positive if clinical reactions, nasal or bronchial, are encountered.

The results of treatment of the 27 patients in Table V with clinical or subclinical allergy to horse dander are indicated in Table VI, which reviews the children whose allergy has disappeared and in Table VII which reviews the children whose allergy to horses has persisted clinically or subclinically.

Table VI demonstrates the following:

(1) The intensity of the reaction to the scratch tests in these patients has diminished considerably.

(2) Natural exposure and provocation tests have become negative. Every one of these patients has been exposed or had provocation tests two or more times and the extracts used in the inhalation tests were stronger than those before treatment.

(3) It is remarkable that five children are still free from manifestations of allergy to horses 16, 20, 22, 29 and 37 months respectively even after the treatment had been discontinued.

(4) Ten patients have received treatment for twenty-two months or more and three patients for four, nine, and fourteen months respectively.

Table VII demonstrates:

(1) The results of the scratch tests are variable.

(2) Natural exposure and provocation tests are still positive.

(3) Only four patients of this group have received treatment for twenty-three months or more. In two patients, the tolerance was higher than before treatment as the scratch test had diminished in intensity and exposure to horses produced only nasal symptoms instead of asthma. Since the observation periods of the patients in Table VII are among the longest in the investigation, perhaps the effect of treatment has dis-

appeared. In two patients, clinical allergy on exposure to horses persisted throughout the course of the treatment.

Twenty-five of the patients have received treatment with other extract and seven patients with bacterial vaccines.

THE NATURAL HISTORY OF CLINICAL ALLERGY TO HORSE DANDER

This problem is elucidated by a follow-up investigation of a special control group and from reports in the literature.

Tables VI and VII indicate that clinical allergy to horse dander may persist up to eight years without disappearing spontaneously, and Table VIII reviews seven untreated patients whose clinical sensitivity to horses has persisted for many years.

DeBesche (5) in 1937 stated as follows: "With the possible exception of a few children, I have never known anyone to become entirely free from horse asthma with advancing years. If this disease once manifests itself in an individual, it remains with him practically speaking, for the rest of his life." In 1918, he (4) had mentioned nine patients who had asthma due to horses from childhood and in four of these patients the asthma had persisted 24, 36, 30 and 38 years.

TABLE VIII

Case No.	Sex	Present age in years	Age in years at appearance of first symptoms of clinical allergy to horse dander	Duration in years of clinical allergy to horse dander
1	M	10	5	5
2	M	23	14	7
3	M	15	4	11
4	F	19	8	11
5	M	14	2	12
6	M	37	25*	12
7	M	32	7**	25

* Treated for one year with horse dander extract at 2 years of age.

** Treated for 6 months at 20 years of age and for 19 months at 28 years with horse dander extract.

Walker (15) referred to a group of patients suffering from rhinitis due to horse dander since childhood. *Rackemann & Edwards* (10) found an increased tolerance in twelve out of 114 patients sensitive to animal danders after periods ranging from one to seventeen years. Thus it would appear that the tendency for allergy to horses to disappear spontaneously is negligible and that the increase of tolerance shown after one to three years of treatment (Table VI) must be primarily the result of the hyposensitization treatments.

If the patient's asthma was influenced by allergy to horses to a considerable degree, one would expect those who had recovered from horse asthma to have a better prognosis but Table IX does not show that this is clearly the case.

TABLE IX

Course of the Asthma	Clinical sensitivity to horse dander	
	Disappeared (Table VI)	Still present (Table VII)
Much improved	7	7
Somewhat improved	3	5
Unchanged	3	2

TABLE X

Reactions to the scratch tests at the first and last examinations of the 28 children who originally exhibited latent allergy to horses.

Reactions at the first examination		Reactions at the last examination			
+	17	0	+	++	+++
++	6	8	8*	0	1**
+++	5	3	2	0	1
		1	1	0	3
	28	12	11	0	5

* At this time one of these patients had a clinical and another a subclinical allergy to horse dander.

** This patient now has a subclinical allergy to horse dander.

LATENT ALLERGY TO HORSE DANDER

Table X indicates that the intensity of the scratch test has also decreased in those patients with latent allergy to horse dander. In spite of our advice, twenty-five of these patients have not avoided contact with horses. These contacts were as follows:

Riding	11 patients
Horse stable or contact with horses without riding	9 „
Visits to circus	5 „

Clinical allergy to horses has developed in one of these patients and subclinical in another.

DISCUSSION

Most authors report good results with specific treatment (2, 7, 11, 14, 15), especially in those cases which have only slight contact with horses. The duration of the treatment has varied from a few months (7, 11, 15) to one year or more (14). The effect of treatment has seldom been followed up by subsequent investigation and *Juhlin-Dannfelt* (7) as well as *DeBesche* (5) are very pessimistic concerning its value.

Our treatment for two to three years has proven efficient and corresponds with experience in the treatment of pollen allergy (1, 6). It is remarkable that the effect lasts for years and that allergy to horses has not become clinically manifest again despite the fact that more patients have been exposed to larger concentrations (Table VI). *Walker* (15), *Unger* (14) and *Rackemann & Edwards* (10) have had similar experiences. It is also quite probable that allergy to horse dander is of slight importance as long as the patient can avoid direct contact with horses. *De Besche* (5) and *Rackemann & Edwards* (10) agree on this point but *Unger* (14) and *Feinberg* (6) recommended hyposensitization treatment for all patients, considering it impossible to avoid contact with horse dander completely.

This investigation demonstrates the feasibility of alleviating

clinical and subclinical allergy to horse dander and since it is almost impossible, at least in Copenhagen, to avoid horse dander or other horse products completely, specific therapy is recommended in all cases of clinical and subclinical allergy.

SUMMARY

The case histories of sixty-one asthmatic children who reacted positively on scratch testing with horse dander were analyzed and fifty-eight of these patients followed up.

Clinical allergy to horse dander may start as early as 2½ years of age. Positive reactions to horse dander by the scratch test indicates in at least half of the cases tested a clinical or subclinical allergy to horses, regardless of the age of the child.

Of twenty-eight patients with latent allergy to horses, a follow-up investigation disclosed subsequent development of clinical allergy to horses in one patient and subclinical in two others.

Taking into consideration the spontaneous variation in tolerance of allergic patients and the negligible tendency for allergy to horse dander to disappear spontaneously, the author concludes that avoidance together with treatment with horse dander extract for two or three years is capable of developing an increase of tolerance to such an extent that the allergy to horses may be said to be overcome (13 patients). In two out of four patients treated for approximately two years, the tolerance has increased but is not complete and in two patients it remained unchanged. The longest period of observation without treatment was 37 months.

Specific therapy is recommended in all cases of clinical and subclinical allergy to horses.

REFERENCES

1. *Abramson, H. A.*: Somatic and Psychiatric Treatment of Asthma; Baltimore, Williams and Wilkins, p. 318, 1951.
2. *Cooke, R. A.*: Allergy in Theory and Practice; Philadelphia, Saunders, p. 127, 1947.

3. *Damgaard, K.*: The significance of the provocative test for specific treatment of asthmatic children. *Ugeskr. f. laeger*, 113, 1503, 1951.
4. *DeBesche, A.*: Hypersensitiveness and asthma, especially in relation to emanations from horses. *J. Infect. Dis.*, 22, 594, 1918.
5. *DeBesche, A.*: On asthma bronchiale in man provoked by various kinds of animals. *J. Infect. Dis.*, 92, 209, 1937.
6. *Feinberg, S. M.*: Allergy in Practice, 2nd ed. Chicago, Year Book Publishers, 536, 1946.
7. *Juhlin-Dannfelt, C.*: Allergie, Leipzig, Karl Hansen, 307, 1943.
8. *Juhlin-Dannfelt, C.*: The importance of the provocation test in allergic diseases. *Nord. Med.*, 29, 333, 1946.
9. *Rackemann, F. M.*: Studies in Asthma. A clinical survey of 1074 patients with asthma followed for two years. *J. Lab. and Clin. Med.*, 12, 1185, 1926/27.
10. *Rackemann, F. M. & Edwards, M. D.*: Medical Progress. Asthma in children. *New England J. Med.*, 246, 815 and 858, 1952.
11. *Rynes, S. E.*: A critical analysis of animal dander reactions. *J. Allergy*, 8, 470, 1938.
12. *Ryssing, E.*: The results of provocative tests with inhalant allergens in asthmatic children. *Acta allerg.*, XIV, 433, 1959.
13. *Salén, E. B. & Juhlin-Dannfelt, C.*: About the so-called latent allergy. *Acta Med. Scand.*, 86, 505, 1935.
14. *Unger, L.*: Bronchial asthma. Springfield, Ill. Thomas, 1945, p. 103.
15. *Walker, I. C.*: Frequent causes and the treatment of perennial hay-fever. *J.A.M.A.*, 75, 782, 1920.

This document is a scanned copy of a printed document. No warranty is given about the accuracy of the copy. Users should refer to the original published version of the material.