

COLLECTIVE ASTHMA DUE TO CASTOR BEAN ALLERGY IN OURINHOS, S. P.: FOLLOW-UP STUDY AFTER INDUSTRIAL PROCESSING OF CASTOR BEAN WAS STOPPED

Annelise STRAUSS (1)

SUMMARY

In 1964 a collective outbreak of asthma was investigated in the town of Ourinhos. As castor bean (c.b.) allergy was proven in 26 asthmatics, living near a castor oil extracting industry, industrial processing of c.b. was stopped. At the "Posto de Saúde" in Ourinhos, 4.6 years later a follow-up study of 17 individuals with c.b. allergy, still living in the same area, revealed that 12 had become symptomfree and 2 much improved, since industrial c.b. processing was interrupted. Clinical relapses were experienced by 2 individuals after accidental reexposure to c.b. dust. Positive skin tests in 70% of individuals tested were evidence of persisting hypersensitivity to c.b.. Peanuts, coffee and cotton were found to be new sensitizing agents, possibly originating from industrial sources.

INTRODUCTION

Castor oil is in increasing demand in many industries, due to its specific properties of high viscosity, resistance to heat and pressure variations and its low freezing point. Industrial castor oil is obtained from castor beans (c.b.), *Ricinus communis*, by pressure, heat and solvent extraction, leaving a dry, highly dispersible residue, castor pomace, used as fertilizer.

Castor beans and the residue left after oil extraction contain ricinallergen, one of the most potent allergens known in nature, whose immunochemical and physical properties have been exhaustively studied^{1, 3, 7, 8}.

Castor bean allergy has been observed in professionals, directly handling c.b. and, also in people living in the neighborhood of c.b. processing plants and who may be quite unaware of their exposure to the potent allergenic dust eliminated by these industries.

Collective episodes of asthma due to c.b. allergy have been reported by several investigators^{2, 4, 5, 6, 9}. In Brazil, MENDES & CIN-

TRA⁵ related 150 cases in the town of Bauru, S.P. and STRAUSS⁹ investigated a similar situation in the town of Ourinhos, S.P., where nearly 100 individuals were affected.

In Ourinhos, industrial processing of c.b. was stopped, after c.b. allergy was found responsible. An follow-up study was undertaken 4.6 years later and will be reported.

MATERIALS AND METHODS

At the "Posto de Saúde" in the town of Ourinhos, in May 1969, individuals, known to be allergic to c.b. and who were the subject of a previous report⁹, were submitted to clinical reevaluation and direct skin tests, using the following extracts: castor bean, cotton, peanuts, coffee, house dust, fungi, pyrethrum and hay.

Passive transfer tests were used for titration of c.b. antibody in reaginic sera.

Methods and material used were the same as in 1964 and have been previously described⁹.

(1) Médica Assistente, Serviço de Alergia, Hospital das Clínicas, São Paulo, Brasil.

RESULTS

Local study

Since industrial processing of c.b. was stopped in 1965, the oil extracting industry has worked only with other oily seeds.

In May 1969, cotton bails were stocked in the industrial yards and much cotton dust was on the ground.

Several coffee roasting industries were installed nearby, since 1964.

Clinical study

Seventeen persons, still living in the same neighborhood, were available for the follow-up study. Their age ranged from 5 to 68 years.

Clinically, 4.6 years after industrial c.b. processing stopped (Table I), 12 individuals were completely free of symptoms, 2 felt improved, 2 unchanged and 1 worse. Asthma present in 15 cases in 1964, was still a problem for 3 patients in 1969 (Table II). Rhinitis and conjunctivitis were now the most frequent complaints, besides asthma, in the 5 individuals with persisting symptoms.

TABLE I

Clinical condition of 17 individuals living near an oil extracting industry, 4.6 years after industrial processing of c.b. stopped

Symptoms	No. cases
none	12
mild	2
moderate	2
severe	1

Case 1 is typical: this patient was severely ill in 1964, requiring continuous corticosteroidtherapy. For symptomatic relief of asthma he often passed overnight in an inn, situated 6 km. distant from town, in the company of several other severely affected citizens of Ourinhos. As soon as c.b. processing stopped, he felt improvement and soon all symptoms had disappeared. When seen again in 1969, he was in excellent health.

TABLE II

Clinical data of 17 individuals during c.b. processing season (1964) and 4.6 years later (1969)

Diagnosis	1964	1969
asthma	15	3
rhinitis	10	5
conjunctivitis	4	4
hives	3	1
angioneurotic edema	1	1
bronchitis	1	1
cough	1	1
asphyxia	1	0
cold sweats	1	0
fever	3	0
<i>Precipitating factors</i>		
castor bean dust	13	2
house dust	8	3
insecticide	6	3
dust from oil extracting industry	11	2
cotton dust	0	3
peanuts	0	2
aroma from coffee roasting ind.	0	2
respiratory infections	3	1
physical stress	1	0
meteorological conditions	2	2

Two other cases were relevant. Both were asthmatics, who felt quick clinical remission after c.b. processing stopped. Both were accidentally reexposed to c.b. dust, respectively, after 3.8 and 4.4. years, and immediately felt asphyxiated and suffered an acute, isolated attack of asthma. In both cases, re-exposure had been short: passing near an overturned truck loaded with castor beans in one case, and visiting a neighboring town, where a castor bean processing industry was functioning (Bebedouro) in the other case.

Five individuals with persisting allergic manifestations related the influence of common inhalants, infections, physical stress and meteorological conditions. Also, they felt the influence of peanuts, coffee aroma coming from a coffee roasting industry and cotton dust, coming from the industrial area (Table II).

Immunological study

Skin tests (Table III) with c.b. extract revealed positive reactions in 12 cases, representing a 30% decrease in positivity since

STRAUSS, A. — Collective asthma due to castor bean allergy in Ourinhos, S.P.: follow-up study after industrial processing of castor bean was stopped. *Rev. Inst. Med. trop. São Paulo* 17:79-82, 1975.

TABLE III

Skin tests before and 4.6 years after interruption of industrial c.b. processing

Allergen extract	Via	n.º positive reactions	
		1964	1969
1. castor bean	scratch	17	7
	i.c.		5
total		17	12
2. house dust	i.c.	8	10
3. mixed fungi	"	0	3
4. pyrethrum	"	6	13
5. hay	"	3	7
6. coffee	scratch	0	0
7. cotton	"	0	2
8. peanuts	"	0	2
<i>Titre of reaginic antibody - P.T.</i>			
lowest		1/60	1/1
highest		1/1.800	1/1.000

1964. There was a fall in antibody titre in 8 reaginic sera, tested by passive transfer.

A significant rise in antibody titre was demonstrated only in the sera of the 2 asthmatics, already mentioned, who had both suffered an accidental reexposure to c.b. dust, several months before the follow-up study was undertaken.

Positive skin reactions to peanuts and cotton were found in 2 individuals and seemed of clinical significance.

Although the incidence of positive skin reactions to dust, pyrethrum, fungi and hay had increased, their clinical importance was much less evident in 1969.

CASE REPORT

Bank employee, 31 years old, felt very ill since August 1964, when c.b. processing began in the local industry. Asthma, rhinitis, conjunctivitis, cough, sweating and edema of eye-lids became evident with exposure to wind blowing from the c.b. industry and worsened at night. For relief he spent nights at an inn situated 6 km. out of town. His medication included continuous corticosteroid-therapy (Meticorten-2 tabl./day). Skin tests were strongly positive to c.b. and negative with all other extracts tested.

When c.b. processing stopped, all symptoms disappeared. In 1969 he was asymptomatic and in good physical condition. Skin tests continued positive with c.b. extract.

DISCUSSION

When c.b. allergy was found responsible for a collective outbreak of asthma in the town of Ourinhos, S.P., two options for action seemed logical for preventing further atmospheric pollution by the potent allergenic c.b. dust eliminated by an oil extracting industry: 1) either the source of origin could be suppressed entirely, by stopping the industrial processing of c.b. or 2) the extraction process would have to be modified, in order to reduce discharge of harmful material into the air. The first option was adopted in Ourinhos.

Although several collective outbreaks of asthma due to c.b. allergy have been well documented, no reference could be found in the literature consulted on local follow-up studies, several years after removal of the allergenic sources. The follow-up study in Ourinhos affords a unique opportunity to observe results of such a radical procedure.

The fact that 80% of asthmatic patients became promptly symptomfree and clinically well, when industrial processing of c.b. was stopped, proved that the diagnosis of c.b. allergy, formulated in 1964, was correct and the solution adopted satisfactory for solving a serious problem of public health.

Considering that positive skin reactions to c.b. were still evident in 70% of individuals, 4.6 years after the industrial source of c.b. dust was eliminated, it may be concluded, that immunological memory persisted in most individuals with c.b. allergy.

The clinical relapse suffered by two individuals after accidental reexposure to c.b. dust, is further evidence for the long persistence of hypersensitivity to c.b.

The follow-up study identified peanuts, coffee and cotton dust as allergenic material, possibly from new industrial sources.

RESUMO

Asma coletiva por alergia a mamona na cidade de Ourinhos, S.P.: Reavaliação 4,6 anos após parada de processamento industrial de mamona.

Em 1964 um surto coletivo de asma foi investigado na cidade de Ourinhos. A comprovação de alergia a mamona em 26 asmáticos, morando perto de uma indústria extrativa de óleo vegetal, levou ao fechamento do setor de processamento industrial de mamona.

No Posto de Saúde de Ourinhos foi realizada uma reavaliação clínica e imunológica de 17 asmáticos com alergia a mamona, 4,6 anos mais tarde. Todos os pacientes reestudados moravam ainda na mesma vizinhança. Foi constatado que 12 asmáticos se tornaram assintomáticos e 2 melhoraram consideravelmente, logo após a interrupção do processamento industrial de mamona. Duas pessoas, que ficaram 4 anos totalmente assintomáticos, tiveram recaída clínica imediatamente após reexposição acidental a pó de mamona.

Reações cutâneas positivas a mamona foram observadas em 70% dos casos, refletindo persistência de hipersensibilidade a mamona. Amendoim, café e algodão foram identificados como novos agentes sensibilizantes, possivelmente de origem industrial.

ACKNOWLEDGEMENTS

All allergen extracts were prepared in the Allergy Section, Departamento de Microbiologia e Imunologia, Faculdade de Medicina,

U.S.P., São Paulo. I am grateful to Guiomas Guimarães dos Santos and Maria Veiga for technical assistance.

REFERENCES

1. BERRENS, L. — *The Chemistry of Atopic Allergens*. New York, Karger, 1971, p. 89-98.
2. FIGLEY, K.D. & ELROD, R.H. — Endemic asthma due to castor bean dust. *J.A.M.A.* 90:79-82, 1928.
3. GRABAR, P. & KOUTSEFF, A. — Différenciation, dans le ricin, de la toxine (ricine) et d'un allergène. *Compt. Rend. Soc. Biol.* 117:700-704, 1934.
4. GRIMM, V. — Ver "offentl. a. d. Med. Verwalt." 26:5, 1928. Cit. in HANSEL, K. — *Tratado de Alergia*. Madrid, Labor, 1946.
5. MENDES, E. & ULHOA CINTRA, A.B. — Collective asthma, simulating an epidemic, provoked by castor bean dust. *J. Allergy* 25: 253-259, 1954.
6. ORDMANN, D. — An outbreak of bronchial asthma in South Africa affecting more than 200 persons, caused by castor bean dust from an oil-processing factory. *Int. Arch. Allergy* 7:10-24, 1955.
7. PANZANI, R. — Étude de l'allergie entre la graine de ricin et *Spondylocladium*. *Int. Arch. Allergy* 21:288-293, 1962.
8. SPIES, J.R. & COULSON, E.J. — The chemistry of allergens. XVI. Ion exchange fractionation of the castor bean allergen, CB-1A, and antigenic specificity relationships of the fractions. *J. Biol. Chem.* 239:1818-1827, 1964.
9. STRAUSS, A. — Castor bean allergy. *Rev. Inst. Med. trop. São Paulo* 10:342-348, 1968.

Recebido para publicação em 24/11/1973.