

Bronchial asthma due to inhaled wood dust: Tanganyika anigré

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Summary

Three cases of bronchial asthma due to wood dust from Tanganyika anigré are reported. All patients were woodworkers and had symptoms of dyspnoea, cough and wheezing, and sometimes itchiness and rhinorrhoea, after exposure to Tanganyika anigré. The intradermal skin tests were positive for antigenic extract of Tanganyika anigré. In two patients the bronchial provocation test with the wood dust and with the soluble extract inhaled by aerosol was positive showing an immediate reaction; in the same patients bronchial hyperreactivity was also found. Atopy was present in one subject. No precipitins or specific IgE were found in patient sera by the immunodiffusion technique or by RAST.

Introduction

In recent years various wood dusts have been found to cause bronchial asthma (Bush *et al.*, 1978; Chan-Yeung & Abboud, 1976; Greenberg, 1972; Innocenti & Angotzi, 1980; Ishizaki *et al.*, 1973; Pickering *et al.*, 1972; Raghuprasad *et al.*, 1980; Sosman *et al.*, 1969). Some patients showed an immediate response to challenge tests with or without a late response and the presence of specific IgE against the wood-dust extract (Bush *et al.*, 1978; Raghuprasad *et al.*, 1980). However other authors (Chan-Yeung & Abboud, 1976; Pickering *et al.*, 1972; Sosman *et al.*, 1969) report late asthmatic reactions with or without serum precipitins against wood dust.

This paper reports three cases of bronchial asthma in woodworkers exposed to Tanganyika anigré.

Case reports

Case (1)

C.M., male aged 34, woodworker for 15 years. He smoked thirty cigarettes daily for several years.

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He began to work Tanganyika anigré 6 months before our examination and 3 months later experienced sneezing, rhinorrhoea, itchiness and lacrimation followed by dyspnoea and wheezing with cough and sputum. The symptoms were present in the work-day and at night and their severity appeared to be correlated with the length of exposure to wood dust. There were no asthmatic symptoms during the week-ends or holidays.

He had no personal history of hay fever or atopic eczema, but his grandfather was asthmatic and one of his sons had atopic eczema.

At the first examination the only abnormal findings were scattered wheezing and râles on auscultation.

Skin tests. Intradermal skin tests were performed with a battery of common inhalants and with extracts of various wood dusts. All skin tests were examined after 20 min and 4-8 hours later for weal erythema and induration.

There were positive immediate reactions to many of the common inhalant antigens and pollens and he showed an immediate and late reaction to the Tanganyika anigré extract.

Immunological studies. Immunodiffusion was performed with antigenic extract of Tanganyika anigré. No precipitins were found in his serum.

No significant level of specific serum IgE was found by the RAST technique, using methyl cellulose discs coupled with aqueous extract of wood dust. The wood extract was prepared by Lofarma (Milano) using coca solution, with a protein concentration of 4.5 g %.

Pulmonary ventilation. Pulmonary ventilation details were as follows:

	Actual	Percentage predicted
VC	5.37 l	123
FRC	3.31 l	95
TLC	6.78 l	109
RV/TLC %	20	
FEV ₁	3.84 l	109
FEV ₁ /VC %	71	
FEF ₂₅₋₇₅	3.06 l/sec	80

Bronchial challenge test. The results of challenge testing are reported in Table 1.

The bronchial challenge test was performed according to the method of Pickering *et al.* (1972) (occupational type test); the patient shook from one tray into another for 30 min the dust of Tanganyika anigré, standing in a box of = 10 m³. The test was

Table 1. Challenge tests in patient C.M.

Materials	Challenge	Maximum fall after challenge (%)	
		FEV ₁	FEF ₂₅₋₇₅
Inert wood dust	30 min	+4	+44
Tanganyika anigré dust	30 min	-32	-67
Tanganyika anigré extract	17 breaths	-16	-59

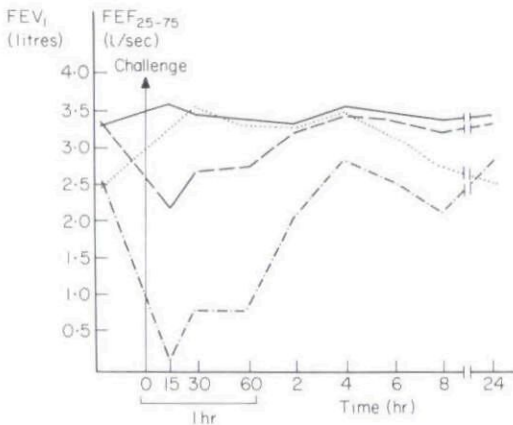


Fig. 1. Inhalation test with *Tanganyika aningré* (BPT₃) and inert wood dust (BPT_c) in patient C.M. BPT₃: —, FEV₁; ---, FEF₂₅₋₇₅. BPT_c: —, FEV₁; ---, FEF₂₅₋₇₅.

performed in an asymptomatic period. Before and 15, 30 and 60 min after the challenge VC, FEV₁ and FEF₂₅₋₇₅ were measured by means of a Pulmotest Godart spirometer. The measurements were repeated at 2, 4, 6, 8 and 24 hr after the challenge. After challenge FEF₂₅₋₇₅ was calculated on the baseline FVC value (FEF₂₅₋₇₅ isovolume) (Sherter *et al.*, 1978).

After challenge the patient experienced an immediate reaction, FEV₁ decreasing by 31% at 15 min, and 2 hr after challenge the FEV₁ and FEF₂₅₋₇₅ returned to the baseline values (Fig. 1). No significant changes in pulmonary function tests were observed after challenge with an inert wood dust.

The specific bronchial challenge test was also performed using an aqueous extract of *Tanganyika aningré*. The soluble extract was administered by aerosol using a Bird nebulizer in IPPB and an oro-nasal mask. After seventeen breaths (2+5+10) FEV₁ and FEF₂₅₋₇₅ decreased respectively by 16 and 51% 15 min after challenge.

Bronchial hyperreactivity. Bronchial hyperreactivity was evaluated by an aerosol of acetylcholine (10 mg/ml) by means of hand nebulizer and of bethanechol (5 mg/ml) by means of a Bird nebulizer in IPPB, increasing the number of breaths to seventy (1+4+5+10+10+20+20).

After five breaths of acetylcholine FEV₁ and FEF₂₅₋₇₅ decreased by 34 and 87% respectively from basal values. After ten breaths of bethanechol the patient experienced dyspnoea and scattered wheezing, and at this time FEV₁ and FEF₂₅₋₇₅ had decreased by 12 and 42% respectively.

Case (2)

M.A., male aged 59, woodworker for over 40 years. He had smoked fifteen cigarettes daily until his illness.

During this period he had worked with many exotic woods such as samba, mahogany, oak and *Tanganyika aningré*. For over 6 years the patient experienced cough and sputum, dyspnoea with wheezing after exposure to wood dust. At first the symptoms were present only in work-days, later dyspnoea and wheezing increased in severity and were elicited by many irritant agents even in week-ends and holidays. He was on therapy with bronchodilators, corticosteroids and antibiotics.

The patient had had psoriasis from the age of 20 and peptic ulcer for about 10 years.

He experienced three episodes of angioneurotic oedema and allergic reaction to penicillin and sulphonamides.

There was no history of bronchial asthma or atopy in his family.

In 1978, the patient showed an immediate response to the bronchial challenge test with the samba wood dust. In the same period a clear immediate skin sensitivity to samba extract was present. No skin reaction was found with the common allergens.

Afterwards the patient stopped using samba, but dyspnoea and wheezing persisted on exposure to other wood dusts, particularly Tanganyika aningré.

Skin test. A positive reaction was observed for chen-chen, iroko, vava, samba and Tanganyika aningré.

Immunological studies. No serum precipitins against Tanganyika aningré extract were found. No specific IgE was found in the serum by RAST.

Pulmonary ventilation. Pulmonary ventilation details were as follows:

	Actual	Percentage predicted
VC	3.29 l	87
FRC	2.58 l	73
TLC	5.28	89
RV/TLC %	37	
FEV ₁	2.41	82
FEV ₁ /VC %	73	
FEF ₂₅₋₇₅	1.76 l/sec	58

Bronchial challenge test. The results of challenge testing are reported in Table 2. The bronchial provocation test was performed with Tanganyika aningré dust by the method previously described. During the exposure the patient developed dyspnoea and cough; scattered wheezing was also present on auscultation. Fifteen minutes after exposure FEV₁ and FEF₂₅₋₇₅ decreased from basal values by 22 and 71% respectively (Fig. 2). Challenge testing with lactose dust caused a slight bronchial reaction (FEV₁ decreased by 10% after 15 min).

A bronchial provocation test was also performed using a soluble extract of Tanganyika aningré. After five breaths FEV₁ and FEF₂₅₋₇₅ decreased by 21 and 77% respectively from baseline values and the patient complained of shortness of breath and wheezing. A decrease of FEV₁ by 29% was also observed after few breaths of diluent.

Table 2. Challenge tests in patient M.A.

Materials	Challenge	Maximum fall after challenge (%)	
		FEV ₁	FEF ₂₅₋₇₅
Lactose dust	30 min	-10	-4
Tanganyika aningré dust	30 min	-22	-71
Diluent	5 breaths	-29	-78
Tanganyika aningré extract	5 breaths	-21	-77

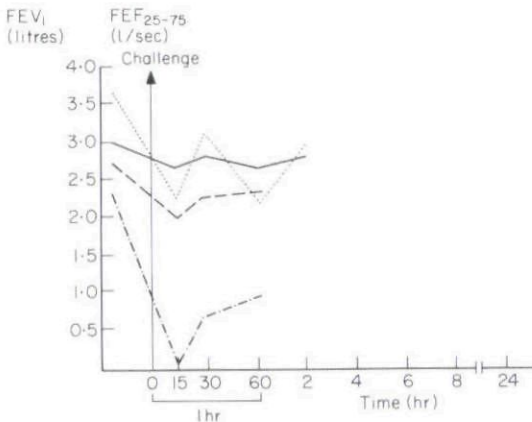


Fig. 2. Inhalation test with *Tanganyika aningré* (BPT_s) and lactose dust (BPT_c) in patient M.A. BPT_s: ---, FEV₁; ····, FEF₂₅₋₇₅. BPT_c: —, FEV₁; - - - -, FEF₂₅₋₇₅.

Bronchial hyperreactivity. After five breaths of bethanechol the patient experienced dyspnoea and cough, and FEV₁ decreased by 34% from baseline value.

Case (3)

T.L., male aged 55, woodworker for over 35 years, with a smoking habit of 7 cigarettes daily for several years.

The patient did not complain of respiratory symptoms until 6 months before challenge testing. Then he started to work with *Tanganyika aningré* and some months later he experienced itchiness, rhinorrhoea, dyspnoea and wheezing after an hour of work with this exotic wood. The symptoms were stopped by administration of bronchodilators, but re-appeared during the following night. He never had symptoms at week-ends or on holidays.

There was no personal or family history of atopy.

Skin tests. The patient had a positive immediate reaction to the intradermal injection of *Tanganyika aningré* extract, and no reaction to the common allergens.

Immunological studies. No precipitins nor specific IgE against extract of the wood were observed in patient serum.

Pulmonary ventilation. Details were as follows:

	Actual	Percentage predicted
VC	4.00 l	112
FRC	3.58 l	110
TLC	6.03 l	109
RV/TLC %	33	
FEV ₁	2.55 l	89
FEV ₁ /VC %	64	
FEF ₂₅₋₇₅	1.43 l/sec	48

Bronchial challenge test. Bronchial challenge testing was performed by occupational type test with *Tanganyika aningré* wood dust. The patient had a slight late reaction with a decrease by 10 to 15% respectively of FEV₁ and FEF₂₅₋₇₅. During the following night the patient had shortness of breath and wheezing.

Discussion

Wood-dust induced bronchial asthma has been well known for several years, but to date no case of occupational asthma due to Tanganyika aningré has been reported. This exotic wood is widely used in the Italian furniture industry, because of its hardness.

In our cases, the diagnosis of occupational asthma due to Tanganyika aningré was based on symptoms of dyspnoea and wheezing arising during the working of the wood and on the positive reaction of skin test with Tanganyika aningré extract. In two patients bronchial provocation testing both with wood dust or with antigenic extract, gave an asthmatic response, but the occupational test appeared to be a better challenge test than the inhalation test.

Only one of the patients was atopic. Atopy does not seem to be a necessary feature for this condition to develop. In two patients non specific challenge testing showed bronchial hyperreactivity characteristic of bronchial asthma.

The symptoms developed in two subjects a short time after starting to work with Tanganyika aningré wood, whilst in the third case (M.A) the symptoms appeared after a long period of work. This patient showed an intense response to non specific challenge testing and a slight response to control testing with lactose dust and diluent. This patient had shown previously, clinical and functional hypersensitivity to samba however he continued his work as a joiner until exposed to Tanganyika aningré dust.

In no case were serum precipitins against the extract of wood dust present. IgE was not detectable by RAST. However, the RAST technique shows only specific IgE against protein fractions of antigenic extract, but the antigenic determinant of wood dust may be a non-protein fraction. Atopy is not present in all patients and different pathological mechanisms may be involved.

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