

Buckwheat Allergy

An Investigation of Asthma Associated with Flour Substitutes Used in the Baking Industry.

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DURING the last year or two when wheat was in short supply in South Africa, various flours, principally cassava and buckwheat, were introduced by the local baking industry and added to the usual wheat flour in the manufacture of bread or even used alone in the preparation of confectionery.

Allergic conditions in millers and bakers, particularly asthma, may occur with any cereal in persons who have become sensitized thereto. Several cases of allergic hypersensitivity in bakers have recently come to our notice where cassava and buckwheat flours were suspected as causative factors.

CASSAVA.

Cassava or manioc is a starch obtained from the root of a tropical plant (*Manihot utilisima*) of the family Euphorbiaceæ, grown in the West Indies, South America, Java and the Malay Peninsula. The flour is the common arrowroot, and in the granulated form is called tapioca. In many parts of the world cassava flour is used in the manufacture of yeast cakes. It is also used for sizing, for the glazing of twine and in the manufacture of laundry starch. No record has been found incriminating cassava as an allergen.

BUCKWHEAT.

Buckwheat (*Fagopyrum vulgare*) is not a true cereal but belongs to the family Polygonaceæ, of which rhubarb and also the weed *Rumex* or dock sorrel are members.

Buckwheat has been cultivated for centuries in Central Asia, but is now also grown in Europe and North America; the edible portion is the fruit ("seeds") of the plant. By itself buckwheat is dark and rather bitter and is therefore generally mixed with some other flour. In Northern countries of Europe and in North America buckwheat cakes are a delicacy, and the flour is extensively used in the preparation of pancake and waffle flours. Buckwheat flour is relatively poor in nitrogenous substances and fat as compared with the more commonly used cereals.

Buckwheat is known to contain a very powerful allergen, and its possible importance as an inhalant allergen in the baking industry where this substance is used is always worthy of consideration.

Smith (1909) first reported hypersensitivity to

buckwheat in man. The following is his patient's own description of the symptoms:

"When I had eaten a small part of a cake (buckwheat) I began to experience great discomfort in my throat, gullet and stomach. I felt as if I had swallowed hot lead. . . . I could not swallow another mouthful of the cake, nor endure the retching caused by what I had already eaten. . . . My eyes were bloodshot, my face was red and swollen, and my lips were knotty with large hives. . . . The following morning I had fully recovered from all traces of my unpleasant experience. . . . Twice I had been served with buckwheat cakes when other cakes were ordered, and each time I had suffered desperately, although but one mouthful was swallowed. On the last occasion . . . my face, eyes, neck, shoulders and hands were hot, inflamed and swollen and my lips were thick with hives. The itching about my neck, shoulders and chest was unbearable; my lungs felt as if they had been so tightened up that I could hardly get my breath. I am seized with long-continued sneezing attacks if exposed for a moment to buckwheat meal that has been scattered about in the dry state."

The interest of this case lies in the extreme hypersensitivity shown by the patient both by the ingestion and by the inhalation of buckwheat.

Highman and Michael (1920) reported a case of angioneurotic oedema of four weeks' duration in a man of 66 years due to the ingestion of buckwheat. There was a sudden swelling of the eyes in the morning after he had eaten buckwheat cakes the previous evening. Skin tests with buckwheat gave a strongly positive reaction. The condition cleared up when buckwheat was eliminated from the diet.

Rowe (1931), in the United States of America, during the routine skin-testing of 500 cases of allergy found that 27 of the patients gave positive reactions to buckwheat, but, in the majority of the cases, the reactions were only of a mild character. He estimated that 1 per cent. of allergic patients were clinically sensitive to buckwheat.

Blumstein (1935) also reviewed 500 consecutive cases of allergic conditions and found 4.8 per cent. skin-sensitive to buckwheat on routine examination. Only 8 of these 19 patients were clinically sensitive to the flour, mainly on inhalation. Most of the cases were found in bakers or those associated with the baking industry and in housewives who did considerable baking. He attempted desensitization in two cases, one of asthma in a baker with little or no success, and one of allergic coryza, with good results. Blumstein concluded that desensitization with an atopen as powerful as buckwheat was still a dangerous weapon in the hands of untrained men and should always be used with caution.

Unger (1945) pointed out that buckwheat was not a common cause of allergic symptoms. He however described the case of a boy aged 2 years, a victim of severe asthma, who was relieved by the elimination from his diet of buckwheat and of rhubarb which had been added to his spinach for palatability. He emphasised the allergic potency of

buckwheat and declared that reactions even to scratch tests in sensitive persons were apt to be very large and that intradermal tests were to be avoided.

The following cases of suspected sensitivity to flour substitutes have come to our notice:

Case 1.—European baker referred to me by a physician in Cape Town in September, 1946 (by correspondence only). Complaints were hay-fever, asthma, conjunctivitis and abdominal pain. The patient had worked for nearly two years in the same bakery without symptoms. His firm recently commenced using buckwheat as a flour substitute. Allergic symptoms occurred within a few hours of the introduction of the buckwheat into the bakery premises. Six hours after first contact with the flour the patient developed severe irritation of the eyes; asthmatic seizures followed later. The symptoms occurred only in the bakery and were associated with the inhalation of the flour. The eating of any baked food containing buckwheat produced in the patient an immediate, acute, epigastric pain.

Skin tests for allergic sensitivity had not been carried out on this patient, but the question of desensitization with buckwheat extract on the basis of the clinical findings came under consideration. Desensitization procedures were, however, not recommended in this case owing to the difficulty of exercising adequate control at a distance in the use of this possibly harmful allergen. It was suggested that desensitization against buckwheat was not as simple a matter as, for instance, desensitization against plant pollens and should not be lightly undertaken; the reactions might be very severe even with dilute extracts; and many workers considered such desensitization both unnecessary and dangerous.

The doctor later reported that considerable relief had been obtained for the patient by the use of a mask and by the administration of an antihistamine preparation. No further information became available about the progress of the case.

Case 2.—European man, 34 years of age, confectioner in Johannesburg, referred to me by Drs. Flax and Garber in November, 1946. There was no history of allergy in the patient's family and his two children were in good health.

Some three months prior to this consultation the patient developed a severe "cold" after going out of a warm house into the cold wind. A dry, persistent, irritable cough supervened, for which medical attention was sought a week later. Coughing continued, but soon its character changed and much phlegm was produced which "tasted like sulphur".

The patient's main complaint subsequently was blockage of the nose. Moderate tightness of the chest soon developed, particularly at night, followed later by severe attacks of asthma. Bronchial casts appeared in his sputum. Attacks of coughing, wheezing and constriction of the chest generally commenced in the daytime some four to five hours after entering the bakery, where he started his work at 5 a.m. He was invariably compelled to leave

his work for half to one hour until the attacks subsided. Bouts of sneezing were frequent whilst at work but never occurred at home. At night he often awakened from sleep with coughing, wheezing and constriction of the chest.

The patient was found to be a thin but well-built person with a good appetite and with no food idiosyncrasies. He had noticed, however, that when he ate buckwheat biscuits he developed a burning sensation in his throat. The patient had been 14 years in the bakery trade and had never had trouble with his chest or suffered from "colds". His general health hitherto had always been good.

The patient reported that when he first worked with cassava flour some four months previously he developed sores on the forearms, but for a short period. Buckwheat was introduced into the bakery two months later.

Skin tests were carried out with a large variety of inhalant substances, including local pollens, animal dander, house dust, feathers, etc., with negative results. Skin tests done with extracts of the commoner cereals (maize, oats, rice, rye, wheat) gave insignificant reactions only.

Scratch tests were carried out with cassava and buckwheat flours with the following result:

Cassava ... Slight (+).

Buckwheat ... Strong (+++) with wheal formation and pseudopodia.

Extracts of buckwheat and cassava flours in buffered saline solution and dilutions thereof were prepared ranging from 1:10,000,000 to full strength. The patient was tested with these dilutions by the scratch method in view of the possible dangers associated with intradermal injections. The results were as follows:

Cassava ... Only the 1:10 and the full strength extracts produced reactions which were slight (+).

Buckwheat ... Dilutions from 1:100,000 upwards produced local reactions only (+) but with a burning sensation at the site of injection. The concentrated extract produced a strong (+++) reaction with typical wheal formation, and also accompanied by a burning sensation at the site of injection.

An attempt at desensitization was commenced with an intradermal injection of 0.1 c.c. of the 1:10,000 solution of buckwheat extract and cautiously continued at twice-weekly intervals with gradually increasing doses until 0.1 c.c. of the 1:100 dilution was being administered in about three months.

No appreciable therapeutic response was evident; the patient still complained of periodical bouts of constriction of the chest and even of severe asthma incapacitating him from work. The patient was advised to try to obtain other employment in the bakery which would not bring him into contact with

buckwheat flour. He was successful in this and further treatment was thus not necessary.

Case 3.—European man, 36 years of age, confectioner in Johannesburg, referred to me in February, 1947, by Drs. Flax and Garber. There was no family history of allergy and the patient has three children, 8, 5, and 2 years of age, all in good health.

The patient has been a confectioner for 22 years, 4 years in the Cape and 18 in the Transvaal. Buckwheat was introduced into the bakery about a year previously. Two months thereafter the patient developed "tonsillitis", attributable to draughts in the bakery building. A few months later he found that his nose became blocked whilst at work. This was followed by much sneezing, running of the nose and watering of the eyes. After a further few months these upper respiratory symptoms were followed by constriction of the chest which occurred periodically, particularly at night, and lasting for one or more hours.

The patient was otherwise in good health without food idiosyncrasies except that he had an aversion to raw onions.

The flour used in the bakery for the manufacture of confectionery consisted of 2 parts each of rye and wheat and 1 part of buckwheat.

Skin tests were carried out on the patient with a large variety of local pollens, animal danders, feathers, house dust and other inhalant substances, as well as with a variety of the usual cereals, with negative results.

Scratch tests were then cautiously carried out with the two commonly used flour substitutes with the following findings:

Cassava ... Negative (-).

Buckwheat ... Strongly positive (+++).

Intradermal skin tests with extracts of cassava flour produced negative reactions.

Extracts of buckwheat prepared in a series of dilutions were used for intradermal skin testing, commencing with a very high dilution.

The results of these skin tests were as follows:

Dilutions	1:10,000,000	...	Nil (-).
	1:1,000,000	...	Nil (-).
	1:100,000	...	Nil (-).
	1:10,000	...	Slight ($\pm$).
	1:1,000	...	Moderate ($+\pm$).
	1:100	...	Strong (+++)
			with typical wheal formation.

In view of the possible danger of constitutional reactions occurring, tests with the still lower dilutions of the extract were not done.

Desensitization of the patient was commenced with the intradermal injections of 0.1 c.c. of the 1:10,000 dilution. After a few injections had been administered, however, the patient left on vacation for two weeks, during which time whilst away from the bakery he was free from symptoms. On returning to work the patient found that buckwheat had been eliminated as a flour substitute in the bakery and further therapeutic desensitization was unnecessary.

SUMMARY AND CONCLUSIONS.

(1) Cassava and buckwheat flours, introduced for a period as flour substitutes in the local baking industry, have come under suspicion as causal agents of allergic symptoms in bakers and confectioners.

(2) Three cases of asthma and allergic coryza are described and considered to be etiologically associated with buckwheat sensitivity.

(3) Clinically, reactions to buckwheat were produced in these cases by the inhalation of the flour, and in two of the cases symptoms were also provoked by the eating of baked buckwheat products.

(4) Allergic skin tests with cassava and buckwheat flour extracts confirmed sensitivity to buckwheat; cassava sensitivity, however, could not be demonstrated.

(5) In neither of two cases submitted to skin-testing procedures were unduly severe reactions observed. The explanation probably lies in the fact that the cases under review were not as highly sensitive to buckwheat as those previously described in the literature.

(6) Attempts at desensitization were made with buckwheat extract in two cases. Treatment was not completed in either case, but in one patient there was no evidence of amelioration of symptoms after three months of such therapeutic measures.

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The Christchurch Hospital Medical Manual. Edited by C. T. Hand Newton, M.D., F.R.A.C.P., F.R.C.S. (Edn.). N. M. Peryer, Ltd., Christchurch, New Zealand. Price 15s.

This little book was obviously designed for use inside the Christchurch Hospital, but it is such a mine of information that it would be of considerable use to any hospital superintendent or worker for reference purposes.

It contains directions for liaison between the hospital and the various departments such as the department of Pathology, the Blood Bank, the Radiological department and the Radiotherapy department. In addition, there are sections devoted to diet and nutrition. There are various sections which contain much of interest and value to all who are interested in hospital administration, and the book concludes with useful tables for reference purposes.