



Is it necessary to avoid all legumes in legume allergy?

To the Editor

Legumes are a staple food in the diet of many communities worldwide. They are regarded by the WHO as an essential food group because of their high protein content and low price.¹ High rates of legume consumption have resulted in increased rates of allergic sensitisation and reactions; in Spain for example, where legumes are popular, they are the fifth commonest cause of food allergy in children under 5 years old.² There is in addition a high rate of cross-reactivity between different legumes, so that individuals allergic to one are often allergic to others—but not necessarily all.^{2,3} Information to advise families on dietary avoidance is, however, limited as there is a paucity of research into legume allergy per se (excluding peanut and soya) because they are not widely consumed.

In the UK, legumes are prominent in the diets in the minority of families, usually those originating from south Asia. In east London, we had the unique opportunity to study legume allergy as our hospital serves a south Asian population with a large community of Bangladeshi origin in whom legumes are an essential part of their diet. We report from our clinic population the prevalence of allergy to different legumes, rate and nature of cross-reactivity, and the value of the prick-to-prick test to these legumes as a tool to predict clinical reactivity and guide the management of these patients.

We retrospectively identified from our electronic records all children with confirmed allergy to lentils, beans, chickpeas, and/or green peas. Diagnosis was based on a reported clinical reaction, supported by a positive allergy test (as defined by a skin prick test (SPT) weal diameter ≥ 3 mm more than the negative control) and/or positive open oral food challenge. We identified 32 eligible patients; 26 (81%) of whom were of Bangladeshi origin, 5 were from India (15.6%), and one patient (3.4%) was white British. Our study included children from 7 months up to 16 years with median age of 5.5 years. The first allergic reaction to any legume occurred at median age of 1.8 years. We offered these families further allergy assessment; all provided oral consent as the evaluation afforded extended care to their children. We performed prick-to-prick tests (PTP) for 12 legumes: red lentil, green lentil, urid dhal (black lentil), yellow lentil (mung dahl), masoor dahl (brown lentil), cannellini bean, red kidney bean, haricot bean, aduki bean, chickpea, green pea, and toor dhal (pigeon pea). Only 3 of our patients had legume allergy alone as 8 also had asthma, 13 had rhinitis, 27 had eczema, and 29

had other food allergies. Amongst patients with other food allergies, 19/32 (59.4%) were eating peanut and 27/32 (84.4%) soya. In more detail, 17 patients were including in their diet both peanut and soya, 10 patients only soya, and two patients only peanut, and three children were avoiding peanut and soya.

The majority of patients presented with a single legume allergy; only 9 (28%) had had reactions to more than one legume. Red lentils were the most common reported culprit food (possibly because red lentil and chickpea are the most commonly consumed legumes) either alone (15/23) or with other legumes. Chickpeas were the next most common allergen—10 in total; alone in 4 and with red lentils in 5. Allergic reactions were reported to 7 other legumes. The reaction presentation was commonly severe as 13 had had anaphylaxis, although 10 had had cutaneous symptoms only. Two-thirds (22/32) of children were tolerating other legumes, more than one legume in 6, and in one instance, a child was tolerating four legumes. However, 10 (31%) were not consuming any other legumes in their diet (Table 1).

The PTP results to the 12 legumes for our 32 patients are shown in Table 2. We note three main patterns of reaction to PTPs; 17/32 had 8 or more negative PTPs; 8/32 had only 1 or 2 negative SPTs; and the remaining 7 tested positive to 3–7 legumes. However, in many instances patients experienced allergic reactions despite a PTP of 0 mm (14) and similarly some patients demonstrated tolerance despite a positive PTP.⁶

We were able to perform ROC curves on four legumes where there were sufficient clinical data to allow us to assess the validity of the PTP as a diagnostic tool. We concluded that the prick-to-prick test for red lentil is a fair test with area under the curve (AUC) of 0.70 (95% confidence interval (CI) 0.504–0.867, $P = .045$) and a cut-off of 3.50 mm has 60% sensitivity and 100% specificity. Similar assessments were poor for chickpea (AUC of 0.61; 95% CI 0.346–0.879; $P = .04$ and cut-off point of 3.50 mm has 20% sensitivity and no false positives); good for green pea (AUC 0.89; 95% CI 0.599–1.00; $P = .01$ and cut-off point of 3.5 mm has 100% sensitivity and 67% specificity); and poor for mung dahl (AUC of 0.67; 95% CI 0.272–1.000; $P = .04$ and cut-off of 4.75 mm has 40% sensitivity but with no false positives).

Our observations are the first description of legume allergy in the UK. They reflect the need for greater awareness by clinicians in areas where traditionally these allergies were uncommon. Most studies into legume allergy originate from countries and communities where legume ingestion is common, but with global migration

TABLE 1 Clinical presentation of legume allergic children

Pt no	Age assessed	Onset age	Legume tolerance and clinical reactivity		
			Reported allergic reaction	Reaction symptoms	Regularly safely consumed
1	4	0.4	Red lentil	Skin, DIB, wheeze, GI	Green pea
2	2	1	Red lentil, mung dahl	Skin	Haricot bean
3	13	1	Red lentil	Skin	Chickpea, kidney bean, haricot bean, green pea
4	5	0.6	Red lentil	Skin, GI	None
5	1	1	Red lentil	Skin, cough, stridor, GI	Chickpea
6	3	2	Red lentil	GI	Mung dahl
7	6	2	Red lentil	Skin, GI	Haricot bean
8	1	0.4	Red lentil	Skin	Chickpea
9	4	1	Green lentil	Skin, DIB, tight throat, GI	Chickpea
10	2	1.1	Chickpea, mung dahl, toor dahl, urid dahl, kidney bean	Skin	Green pea
11	3	2	Red lentil	Skin, GI	None
12	1	0.4	Red lentil	Skin	None
13	7	1	Red lentil	Skin, wheeze, GI	None
14	10	2	Red lentil, chickpea	Skin, DIB, tight throat, GI	Kidney bean
15	5	0.5	Red lentil	Skin	Chickpea
16	1	0.5	Chickpea	Skin	None
17	2	0.8	Orange lentil	Skin, DIB, GI	Red lentil, haricot bean
18	8	1	Red lentil, green pea	Skin, wheeze, GI	Chickpea, toor dahl, mung dahl
19	2	0.9	Red lentil	Skin	None
20	6	2	Black lentil	Skin, wheeze, GI	Mung dahl, kidney bean
21	16	5	Red lentil	Skin, DIB, wheeze	Green lentil, haricot bean
22	1	0.9	Red lentil, chickpea	Skin, DIB, GI	None
23	7	5	Chickpea	Skin, throat itching, GI	Haricot bean
24	11	8	Chickpea	Skin	Red lentil
25	10	1.6	Haricot bean	Skin, DIB, wheeze, GI	Red lentil, chickpea
26	14	0.9	Red lentil, chickpea	Skin, tight throat	None
27	4	1.6	Red lentil	Skin, tight throat	Chickpea
28	7	4	Red lentil, mung dahl	Skin, DIB, wheeze, GI	Kidney bean
29	8	1	Red lentil, chickpea, mung dahl	Skin, DIB, tight throat	None
30	4	2	Chickpea	Skin, GI	Red lentil
31	2	0.6	Red lentil	Skin	Chickpea, kidney beans
32	3	0.5	Mung dahl, red lentil, chickpea	Skin, GI	None

Note: Age expressed in years.

Abbreviations: DIB, Difficulty in breathing; GI, Gastrointestinal symptoms; Pt, patient.

clinicians may in the future be in contact with migrant communities with traditional dietary habits influencing their allergic presentations. In our population, red lentil and chickpea were the commonest causes of clinical allergy. A similar predominance of lentil allergy was shown by Yavuz et al in children in Turkey,⁴ whilst chickpea has been reported as the commonest allergic legume in India.⁵ Other studies have also identified cross-reactivity amongst chickling pea, chickpea, and lentil⁶ and between blackgram, lentil, lima bean, and pea.⁷

Our observations suggest that sensitisation determined by prick-to-prick tests to legumes is a poor guide to the presence of a clinical allergic reaction in our population. These are atopic children in whom there is presumably a high incidence of environmental legume exposure, as these are commonly consumed in their households and are thus risk of developing sensitisations. Whilst negative PTP tests cannot therefore exclude allergy to a specific legume, they might be useful as a guide to further supervised contact. Where families are keen to include other legumes into their child's diet, our observations

TABLE 2 Prick-to-prick results to 12 legumes tested in the legume allergic children

Pt No.	Mung dahl	Green lentil	Red lentil	Cannellini beans	Chickpeas	Kidney beans	Urid Dahl	Toor Dahl	Aduki bean	Haricot bean	Green pea	Masoor dahl	-ve SPTs
1	0	3.5	1	2	0	3	1	3	1.5	2	<u>3</u>	2.5	2
2	0	0	0	0	0	0	0	0	0	<u>0</u>	0	0	12
3	3	1	6	0	<u>2</u>	<u>0</u>	2	3	1	<u>0</u>	<u>3</u>	3	3
4	0	2	0	0	0	0	0	0	0	0	0	0	10
5	2	0	7	0	<u>0</u>	0	0	0	5	0	7	0	8
6	<u>0</u>	3	0	0	0	0	0	1	0	0	0	0	10
7	1.5	0	1.5	0	0	0	0	0	1.5	<u>0</u>	4	0	8
8	2.5	0	0	0	<u>0</u>	2	2.5	0	0	0	3.5	2	7
9	0	4	7	1	<u>7</u>	2	5	2	0	4	6	10	1
10	6.5	2	7.5	3.5	8.5	0	3.5	3.5	4	3	<u>5.5</u>	3.5	1
11	0	0	4	0	0	0	0	0	0	0	0	0	11
12	0	0	8	0	5	0	0	0	0	0	5	0	9
13	7	14.5	8.5	0	9	3	7	7	8	6.5	12.5	7	1
14	2	1	0	2	0	<u>0</u>	2	3	0	0	3	0	6
15	0	7.5	1	0	<u>0</u>	0	0	0	0	0	4	2	8
16	2.5	0	2	0	1	0	0	0	0	0	0	2	8
17	1	5	<u>3</u>	0	0	0	0	0	0	<u>0</u>	7	0	8
18	<u>0</u>	2	6	0	<u>2</u>	0	0	<u>0</u>	0	0	4	0	8
19	3.5	9.5	8	0	7	3.5	6	7	6.5	4.5	10.5	8	1
20	<u>3</u>	0	14	1.5	6.5	<u>2.5</u>	6	4	7	3.5	12.5	7	1
21	1	<u>8.5</u>	7.5	0	5	0	0	3	0	<u>0</u>	11	3	5
22	0	4.5	0	0	0	0	0	0	0	0	0	0	11
23	0	0	1	0	0	1	0	4.5	0	<u>0</u>	0	0	9
24	1.5	0	<u>0</u>	0	0	0	0	3.5	0	0	1.5	2	8
25	0	2	<u>2</u>	5	<u>0</u>	3	0	0	0	10	0	0	7
26	0	10.5	9	0	2	0	0	0	2	0	3	0	7
27	0	0	0	0	<u>0</u>	0	0	0	0	3	0	0	11
28	2	12.5	7.5	2	6	<u>2</u>	2	4	3	0	10	4	1
29	0	14.5	9	0	2	0	3	5	0	3	11	0	5
30	1	2	<u>3</u>	2	1	4	3	3	3	0	4	4	1
31	1	1	0	0	<u>0</u>	<u>1</u>	0	0	0	0	0	0	9
32	7	0	9	0	2	0	0	0	0	0	5	0	8

Note: Number in bold: Patient has had clinical reaction to that legume. Numbers underlined: Patient has eaten that legume without symptoms.

Abbreviations: Pt. no., patient number; -ve SPTs, number of negative skin prick tests.

would suggest that this be conducted under medical supervision. Therefore in communities where legumes are a dietary staple, we would recommend further evaluation to avoid unnecessary dietary exclusion.

In conclusion, whilst we recognise that our report has limitation in that we assessed a small number of children, the assessment was retrospective and we did not confirm allergy with oral food challenges; we feel that it highlights important considerations in children with legume allergy. Routine skin prick tests for legumes are limited in their extent of testing to chickpea, mixed beans, lentils (unspecified), and peas. Patients will benefit from

the broader tests that we performed at least as a guide to food selection for further oral challenges. This may well therefore be an approach to allow families to include more legumes into their children's diets.

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CONFLICT OF INTEREST

The authors have no conflict of interest.

AUTHOR CONTRIBUTIONS

Konstantinos Kakleas: Evaluation of cases; prick-to-prick tests; statistical analysis; data interpretation; manuscript elaboration. Lee Noimark: Manuscript elaboration. David Luyt: Manuscript elaboration. Gary Foley: Manuscript elaboration.

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