

Systemic allergic contact dermatitis due to consumption of raw shiitake mushroom

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Summary

Shiitake (*Lentinus edodes*) is a mushroom that is very popular in Asian cuisine. After ingestion of the raw fungus, dermatitis may occur in rare cases, and is commonly assumed to be a toxic reaction. We report a 52-year-old man who developed a generalized pruritic papulovesicular eruption 2 weeks after daily consumption of uncooked shiitake mushrooms. Prick-to-prick and scratch tests with uncooked mushrooms resulted in an eczematous reaction at 24 h that peaked at 72 h and persisted for 1 week. In contrast, no cutaneous reactions could be elicited in 20 healthy people. We conclude that our patient had systemic allergic contact dermatitis due to consumption of raw shiitake mushroom.

Shiitake mushrooms (*Lentinus edodes*) are a traditional food ingredient in Asia. Although generally well tolerated, adverse reactions have been reported, including: (i) a generalized shiitake dermatitis caused by the ingestion of raw mushrooms;^{1–3} (ii) rare cases of localized allergic contact dermatitis and protein contact dermatitis;^{4–6} (iii) one case of contact urticaria;⁴ (iv) cases of allergic asthma; and (v) cases of chronic hypersensitivity pneumonitis induced by the spores of shiitake mushrooms.

Generalized shiitake dermatitis is a skin condition that usually occurs 1–2 days after the ingestion of raw shiitake mushrooms. To date, it has been described in about 100 patients, predominantly Japanese,^{1–3,5} and is characterized by a distinctive clinical picture with pruritic erythematous papules and papulovesicles that are partly arranged in an unusual linear pattern. We report a patient with an unusual presentation of shiitake dermatitis in whom extensive skin testing was performed. Based on these tests we conclude that the

patient's rash represented systemic allergic contact dermatitis to raw shiitake mushroom.

Report

A 52-year-old man presented with sudden development of an extensive pruritic skin eruption. The man was a sales assistant in a health-food shop. Before the onset of the skin disease, he had eaten raw shiitake mushrooms daily over 2 weeks.

On physical examination, the patient was found to have generalized erythematous papules and papulovesicles with accentuation on the forearms, hands and legs (Figs 1a–d). Some haemorrhagic vesicles were also present on the legs (Fig. 1d). Occasionally, the papules were arranged in a linear, flagellate-like pattern (Fig. 1b). Examination of the mucous membranes found a mild stomatitis and injection of the conjunctivae. The eruption was accompanied by fever of up to 37.9 °C and general malaise.

Results of laboratory investigation revealed a mild leucocytosis ($9.35 \times 10^9/L$; normal $4–9 \times 10^9/L$), relative neutrophilia (76%; normal 50–75), increased total serum IgE (184 kU/L; normal < 100) and IgE antibodies to house dust mite (3.35 kU/L; normal < 0.35). C-reactive protein, serum lipids, liver and kidney results were within the normal range.

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Figure 1 (a–c) Acute rash occurring in a 52-year-old man 2 weeks after daily ingestion of uncooked shiitake mushrooms. (a) Erythematous papules in a linear pattern on the trunk (arrows); (b,c) areas of coalescent papulovesicles; (d) haemorrhagic papules on the medial ankle of the right leg.

On histopathological examination of a skin biopsy, spongiosis of the epidermis, dermal oedema, and a perivascular and periadnexal lymphohistiocytic infiltrate with masses of eosinophils were found.

Prick-to-prick and scratch tests with uncooked shiitake mushroom were negative after 20 min, but an eczematous reaction developed at 24 h, which peaked at 72 h and persisted for 1 week (Table 1, Fig. 2). Patch testing with raw mushrooms was negative, as were all skin tests with cooked mushrooms (Table 1). No

cutaneous reactions were seen in 20 previously unexposed subjects with the same tests.

In view of the patient's history, the clinical picture and the results of skin testing, a diagnosis of systemic allergic contact reaction to shiitake was made. Treatment with a short course of oral methylprednisolone and the advice to stop eating raw mushrooms resulted in complete resolution within 9 days. The patient later tolerated roasted shiitake mushrooms without any problems.

Test	Time course							
	Uncooked				Cooked			
	20 min	48 h	72 h	1 week	20 min	48 h	72 h	1 week
Prick-to-prick	–	+	+	+	–	–	–	–
Scratch	–	+	+	+	–	–	–	–
Patch	ND	–	–	–	ND	–	–	–

+, Positive; –, negative; ND, not done.

Table 1 Skin tests carried out using shiitake mushroom in this patient.



Figure 2 Positive reactions occurring in the prick-to-prick test with uncooked shiitake mushrooms at 48 h. Note the papules present after 48 h (inset). No reaction was seen with cooked shiitake mushrooms.

Shiitake dermatitis may occur after ingestion of uncooked mushrooms in certain people, indicating: (i) that it can only be elicited in sensitive patients and (ii) that the eliciting substance is temperature-sensitive. Several components of shiitake mushrooms have been identified. Of these, lentinan, a polysaccharide extract from the mushroom mycelia, has been used as an antitumour drug in Japan. After treatment, some patients developed cutaneous side-effects similar to shiitake dermatitis. Thus, although not directly proven, lentinan has been implicated as the causative substance for shiitake dermatitis.¹ Interestingly, a thermally induced conformation transition of lentinan has been described previously.⁷

Shiitake dermatitis is thought to represent a toxic reaction to raw mushrooms.¹ The fact that relatively few cases have been reported to date despite the extremely widespread global consumption of shiitake mushrooms indicates systemic allergic contact reaction as an alternative explanation for shiitake dermatitis. However, to date skin tests have been performed in only a few patients.^{1,8,9}

Our patient's history and clinical presentation differed from previously published cases by: (i) later onset; (ii) mucosal involvement; (iii) systemic symptoms; and (iv) a positive delayed prick-to-prick test reaction to uncooked shiitake, indicative of a type IV immune

response to a component present in fresh but not cooked mushroom. The negative patch test results do not necessarily conflict with that interpretation as they may have been caused by a lack of antigen penetration. In fact, this would be expected if we assume that the polysaccharide lentinan is the causative agent. In view of the negative skin test reactions in 20 control patients, a nonspecific toxic response is an unlikely explanation for the positive prick-to-prick test in our patient, although cofactors such as a genetic predisposition could in principle account for selective toxicity.^{3,10} Interestingly, a positive delayed prick-to-prick test to raw mushrooms has been reported previously in three patients with shiitake dermatitis.^{2,4}

We propose that a prick-to-prick test should be included in the assessment of this condition to improve its diagnosis and the understanding of its pathogenesis. As Asian cuisine has become very popular in Europe and the USA, it is likely that dermatologists will be increasingly confronted with patients presenting with shiitake dermatitis.

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