

Allergic contact dermatitis caused by mushrooms

A case report and literature review

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Abstract

The first author is allergic to skin contact with mushrooms of *Suillus americanus*, *S. granulatus*, *S. grevillei*, *S. luteus*, or *S. neoalbidipes*. Symptoms develop between one and two days after contact and last for approximately a week, disappearing completely without treatment. Symptoms consist of reddening, swelling, and itching, at the sites of contact with pileus cuticle mucilage of all five species. Pore layer tissues (tested for *S. americanus* and *S. luteus*) also produced strong reactions, as did pileus trama (tested for *S. luteus*). Spores from spore prints (tested for *S. americanus* and *S. luteus*) produced no reaction. The reaction can be avoided by wearing gloves when handling allergenic species and by washing hands promptly after working with these species. Similar cases, reported from North America, Europe, and Russia, involve *Agaricus*, *Boletus*, *Lactarius*, *Paxillus*, *Ramaria*, and *Suillus* species. Several cases involve allergy to multiple species or genera. Symptom severity varies, presumably with intensity of exposure. In one case, symptoms were renewed following ingestion. Most cases demonstrate delayed allergic contact sensitivity.

Introduction

Development of allergic eczematous contact dermatitis caused by handling mushrooms is unpredictable prior to the first experience, as compared with the known effects of ingesting mushroom toxins. However, after sensitization to a particular mushroom species, individuals may experience allergic dermatitis symptoms merely by making skin contact. Awareness of the symptoms of this type of allergic reaction should assist allergic individuals in making the association be-

tween these symptoms and the eliciting mushroom species, thus reducing the likelihood of repeated exposure. The purpose of this paper is to characterize this form of allergy, based on the personal experiences of the senior author and review of similar reports in the literature.

Case report

J.B. is a 41-year-old male plant pathologist whose work involves the relationships between fungi and

trees. In the autumn of 1979, he developed severely itching, patchy, red swellings on his face and neck, one to two days after working in the field for the first time with *Suillus americanus* mushrooms. The positions of swellings corresponded with locations he had touched on his face and neck while collecting and dissecting specimen mushrooms. The allergic response lasted for nearly a week, and disappeared without a trace. An association between the mushroom and the allergic response was made, and he subsequently avoided handling this species until the autumn of 1986. His only other known allergies are sensitivity to poison ivy and an intermittent summer sinus allergy of moderate intensity and unknown cause.

In the autumn of 1986, using a template, J.B. deliberately applied pileus cuticle mucilage from several *Suillus* species onto adjacent sites on his upper medial arm. The species tested were *S. neoalbidipes* Palm & Stewart, *S. americanus*, *S. granulatus* (L.:Fr.) Kuntze, and *S. luteus* (L.:Fr.) S.F. Gray. Symptoms were first noticed between one and two days after contact. Three days after contact, the severity of reaction varied greatly. Only a slight reaction was produced by *S. neoalbidipes*. All species tested caused reddening, swelling, and severe itching, restricted to the sites of application. No blistering was noted.

In the autumn of 1990, upon collecting *S. grevillei* (Kl.) Sing. for the first time, J.B. tested both the mucilaginous pileus cuticle and crushed tissue from the mushroom pore layer (hymenium and associated trama) for allergenicity. For comparison, analogous tissues from fresh collections of *S. americanus* and *S. luteus* were also tested. Both the pileus cuticle and pore layer were tested because mushroom hunters commonly remove these tissues prior to cooking *Suillus* mushrooms. All six tissues produced the characteristic symptoms previously described.

Subsequently, spore prints were made for both *S. americanus* and *S. luteus*. Spores taken from both a one-week-old spore print of *S. americanus* and a fresh spore print of *S. luteus* failed to induce symptoms, whereas pileus trama tissue (underlying the mucilaginous pileus cuticle) of *S. luteus*

generated characteristic symptoms. Since the pileus trama tissue does not contain basidiospores, it appears unlikely that spores are a significant source of allergen in this case.

Cases from the literature

We are aware of two cases of allergic contact dermatitis caused by *Agaricus* species. In the case of one healthy male commercial mushroom picker, *Agaricus campestris* Fr. caused itching, blistering, inflammation, and swelling of fingers used to pick mushrooms, and of the eyelids, presumably where rubbed with contaminated fingers [1, 2]. The patient reportedly had worked for about a year as a picker before first experiencing symptoms. No respiratory allergies were known for this individual. Patch tests with the mushroom gave 'violent' positive results.

In the case of a healthy female mushroom picker, *Agaricus bisporus* (Lange) Moeller and Schaef. caused hand eczema [3]. The patient's tenure on the job prior to allergic reaction was not reported. This patient had no symptoms of respiratory allergy, and developed no allergic reactions from eating *A. bisporus*. Patch testing with spore-bearing mushroom pileus gave + + + reactions at 72 h in three tests using mushrooms from different mushroom-growing facilities. Other patch tests gave + + + reactions to mycelia and to spores, and + + reactions to stipe and to pileus without spores, all at 72 h. Patch testing of 25 control individuals, including two other pickers at the same mushroom-growing facility, all gave negative results.

There is a report in the Russian literature of contact dermatitis caused by a *Paxillus* species [4, 5]. The patient picked this one species of mushroom in the morning, noticed that his hands began to itch later that same morning, and developed severe eczema of the wrists and hands by the evening of the same day. By the following day, symptoms on the patient's wrists and hands included severe swelling, itching, violet discolor-

ation, and development of small to large blisters filled with clear fluid. A dark brown crust developed between the patients fingers. As symptoms worsened, a dermatologist was consulted. Treatments were administered, and the patient recovered completely in 10 days. No respiratory allergies were reported with the summary of the patient's prior medical history. No record of the patient's previous contact(s) with the same mushroom species was presented. No patch tests were reported.

Two cases of allergic contact dermatitis caused by wild edible mushrooms were reported in 1941 from Sweden [6]. In the first case, a woman who had peeled and cut mushrooms for at least 10 years recalled symptoms developing during September of 1937, 1938, and 1940, after working with mushrooms. She had not worked with mushrooms in 1939. Symptoms consisted of redness and swelling of the face, ear and hands. No other allergies were known. Patch tests with *S. luteus* and *Boletus edulis* Bull.:Fr. were strongly and weakly positive, respectively. Patch tests with *A. campestris* and *Lactarius deliciosus* (L.:Fr.) S.F. Gray were negative. No symptoms resulted from eating the mushrooms parboiled or stewed.

In the second case [6], another woman recalled symptoms first developing after having peeled and cut mushrooms for about 20 years. Symptoms developed annually in September, and consisted of severely itching red eruptions on the face and hands, leaving the eyelids swollen nearly together. No other allergies were known. Results of patch tests were: *S. luteus*, strongly positive; *L. deliciosus* and *Ramaria flava* (Fr.) Quel., positive; *B. edulis* and *A. campestris*, negative. No symptoms resulted from eating *A. campestris* or *Lepiota procera* (Fr.) Kummer fried, but 6–8 h after eating a fried mixture of *S. luteus*, *L. deliciosus* and *R. flava*, the patient noticed itching in the old patch test locations for those 3 fungi. Symptoms continued to develop, with the patch test locations becoming itchy, red and swollen, and with a burning sensation in the face and hands.

The possibility of skin and eye irritation as a

result of handling lorchels (*Gyromitra esculenta* Fr.) has also been reported [7].

Reports submitted to the NAMA Mushroom Poisoning Case Registry, up to 30 June 1987, have been summarized [8]. The only 3 reported cases of contact dermatitis on record involved the genus *Suillus*. At that time, 2 of the 3 records of poisonings caused by *S. granulatus* reported allergic facial contact dermatitis; the third case involved gastrointestinal and other constitutional symptoms. All 5 cases of poisonings caused by *S. luteus* reported principally gastrointestinal symptoms and no contact dermatitis. The sole report concerning *S. americanus* involved J.B.'s case of contact dermatitis.

Discussion

There are relatively few reports of allergic contact dermatitis caused by mushroom handling. This fact has led some authors to suggest that allergies to handling mushrooms are very rare [9]. Nevertheless, existing reports originate from around the world and implicate a diverse group of mushroom species. Important discourses on mushroom poisoning devote little space to treatment of the subject. Ammirati et al. [10] devote a paragraph to true allergic reactions to mushrooms, essentially for the purpose of acknowledging their existence while placing them beyond the scope of their coverage. Though understandable, this approach in most texts on mushroom poisoning may have led to underappreciation of the potential for extremely discomforting allergic reactions, such as those described here. While allergies are relatively personal phenomena, compared to more classical forms of mushroom poisoning, it is significant that allergic individuals need merely handle effective specimens in order to evoke a reaction.

We are aware (K.W. Cochran, personal communication) of another unreported case of contact dermatitis caused by *S. granulatus*. In this case, severe symptoms of swelling, reddening and

itching are elicited by local concentrations of airborne spores (e.g., in a closed room where mushrooms are being dried for storage) as well as by skin contact with mushrooms. Also, the case presented by Hopkins [1] is not represented in the NAMA Registry. These cases, and the fact that J.B.'s experiences with *S. granulatus*, *S. luteus*, and *S. grevillei* have only recently been reported to the registry, underscore the point that such cases occur more frequently than reports indicate. We take this opportunity to acknowledge the value of the registry, to encourage all parties with relevant information to contribute to the registry, and to emphasize that the value of such a registry is associated with its completeness as well as with its accuracy.

Prolonged periods, during which multiple exposures occur without symptom development, appear to be necessary, in many cases, for sensitization to the contact allergens present in mushrooms. Sensitization appears to occur suddenly, with full expression of symptoms on the first occasion of allergic response. Several of the cases cited apparently involve acquired sensitivity. The remaining cases presented do not provide enough background information to exclude the possibility of delayed sensitivity. Cochran's observation [8] that the reports of allergic contact dermatitis in the NAMA registry all involve mycologists supports the previous observations of Hellerstrom [6] and Hopkins [1] that repeated contact with ultimately allergenic mushroom species may be required for development of allergic sensitivity. Interestingly, J.B. was sensitive to both *S. americanus* and *S. grevillei* upon first encounters with these species. However, he had handled the other tested species of *Suillus* on numerous previous occasions. Mushrooms of *S. americanus* and *S. grevillei* probably contain antigens which are cross-reactive with those occurring in the other *Suillus* species to which J.B. was already sensitive. Alternatively, the allergen involved may occur in the mushrooms of all of these *Suillus* species.

Allergies to multiple mushroom species, in some cases even representing different genera,

may be relatively common. These allergies could be explained by the distributions of allergens in various mushroom species. In some cases, such as J.B.'s, cross-reactive antigens or a single allergen may occur in a variety of mushroom species. Similarly, since both of Hellerstrom's patients [6] were tested with all fungi, their patterns of allergic responses might be explained if *S. luteus* and *B. edulis* possess a common allergen, and if *S. luteus* shares a second allergen in common with *L. deliciosus* and *R. flava*. Alternatively, in such cases, allergic individuals may be sensitive to multiple allergenic compounds.

The similarities in symptoms and etiologies of the cases described above are remarkable. The modest apparent differences could be due to various physiological anomalies presented by individual sensitivities to various allergens. Also, different mushroom species (and even different strains of the same mushroom species) undoubtedly possess different spectra of allergens. Both of Hellerstrom's patients reacted strongly to *S. luteus*, one of the allergens affecting J.B. Unlike J.B., however, all of the published cases we found describe symptom development on the patients' hands as well as on their faces. Also, one of Hellerstrom's patients reportedly experienced renewed symptoms from eating fried mushrooms of the same species about a month after patch tests had been administered. In contrast, consumption of either *S. americanus* or *S. luteus* did not evoke symptoms in J.B.'s case.

Finally, the magnitude and duration of contact may be important in determining the severity of symptoms experienced. Most of the reported cases appear to involve extensive contact with the allergenic mushroom species. Preparation of *Suillus* species mushrooms for cooking involves extensive handling (e.g., removal of the mucilaginous pileus cuticle and the pore tissue layer). J.B. successfully avoids symptom development by wearing gloves when collecting allergenic mushrooms, and/or by washing his hands promptly and thoroughly after collecting or working with them. Most other sensitized individuals can probably also avoid allergic reaction in this way.

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