

Poisoning from shiitake mushrooms : what's new since 2017 ?

A new review of cases of poisoning with shiitake mushrooms, reported to the French Poison Control Centres between 1 January 2014 and 31 December 2019, shows that the number of poisonings sharply increased in 2018 and 2019; however, the characteristic skin reactions related to the undercooking of these mushrooms remain stable. The provision of information to producers, restaurant professionals and consumers should be reinforced.



An alert in 2015: shiitake mushrooms need to be cooked

In the first issue of Vigil'Anses, we took a look at this curious mushroom that, if consumed raw or undercooked, causes some people to develop a skin reaction, which is sometimes combined with generally moderate digestive symptoms. The skin reaction is called flagellate dermatitis due to its fairly characteristic topography: the entire body is covered with highly pruritic linear lesions, as if the person had been whipped (see photo).

Shiitake mushrooms contain lentinan and trehalose, among other things.

The skin symptoms observed appear to be due to lentinan, a polysaccharide found in shiitake mushrooms that is destroyed by heat. There is no specific treatment and the dermatitis spontaneously regresses within two to three weeks.

The digestive signs are thought to be due to trehalose, which is also prevalent in shiitake mushrooms. Trehalose is a natural sugar that can only be degraded by trehalase, an enzyme in the intestine that is lacking in some individuals. For them, the accumulation of undigested trehalose in the intestine leads it to be fermented, which causes digestive signs such as diarrhoea.

Shiitake mushrooms, native to Asia, have been very common on the European market for the past several years, especially in France where they are grown and produced (see article in Vigil'Anses no. 1, [1]). They are believed to have medicinal properties that help combat certain cancers, high blood pressure and hypercholesterolaemia and stimulate the immune system.

In Japan and China, lentinan is used as a complementary therapy in addition to standard cancer treatments (chemotherapy, radiation therapy, surgery) [2]. However, to date, there have been no applications for authorisation to market it as a medicinal product in the European Union. Due to the mushroom's status as a foodstuff, capsules of dry shiitake extract are sold as food supplements, some of which contain high concentrations of lentinan.

On 21 August 2015, after an alert by the Poison Control Centres and ANSES, a DGCCRF press release informed the general public of the need to thoroughly cook this food¹. On the basis of ANSES's recommendation and in order to inform consumers at the time of purchase of the possible effects of consuming raw shiitake, a Ministerial Order of 5 August 2016² suspended "for a period of one year, the placing on the market intended for the final consumer, whether or not in return for payment, of mushrooms of the species (...) *Lentinula edodes*, when presented fresh, in bulk or prepackaged, if they are not accompanied by clear information informing the consumer of the need for thorough cooking before consumption".

1. http://www.economie.gouv.fr/files/files/directions_services/dgccrf/presse/communique/2015/cp-champignon-shiitake.pdf

2. <https://www.legifrance.gouv.fr/eli/arrete/2016/8/5/EINC1622686A/jo/texte>

And since then? There continue to be cases of poisoning...

The provision of such information has no longer been mandatory since August 2017. A new review of cases of poisoning reported to the Poison Control Centres was necessary to present the authorities with any new measures that needed to be taken. As the previous review had stopped at the end of 2013, the analysis dealt with cases reported to the Poison Control Centres between 1 January 2014 and 31 December 2019, with a focus on patients developing a skin reaction. In fact, after eating shiitake mushrooms, some people experience digestive signs such as nausea, vomiting or diarrhoea. However, these can be non-specific to shiitake mushrooms and have another

cause, for example bacterial contamination due to poor food hygiene or the fermentation described above.

Over the study period, the Poison Control Centres took calls involving 125 individuals developing symptoms related to the consumption of shiitake mushrooms. Seventy (56%) of them complained of at least one skin symptom, including 59 who described a flagellate dermatitis reaction.

The temporal analysis showed that while the total number of cases was higher in 2018 and 2019 than in previous years, the number of people with skin reactions remained stable (Figure 1). The summer months were relatively spared due to pronounced seasonality (Figure 2).

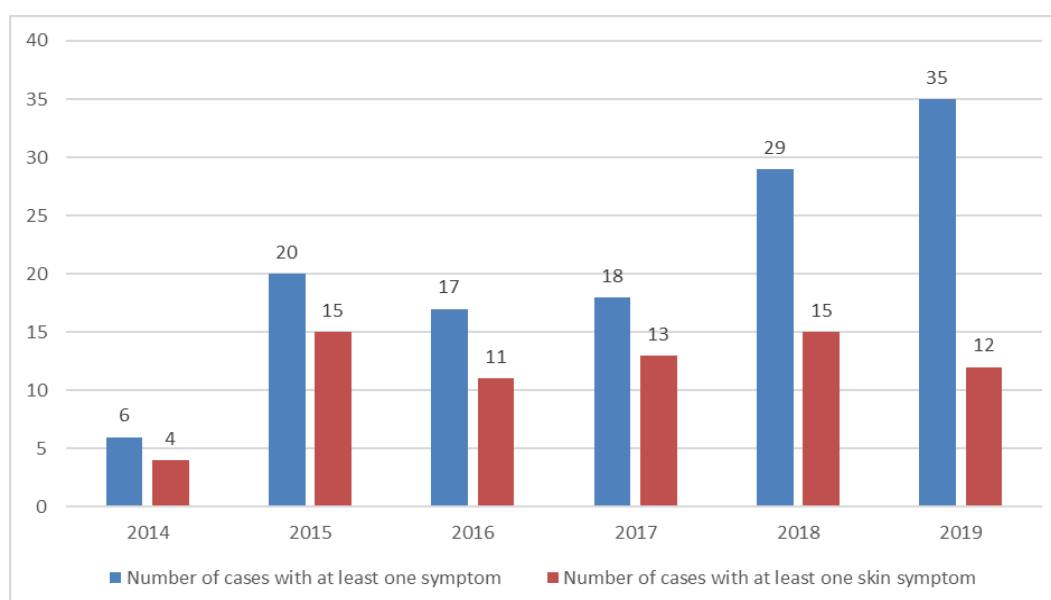


Figure 1: Year-to-year change in symptomatic cases and cases with at least one skin symptom. January 2014-December 2019 (n=125) (source: SICAP)

Who gets poisoned and how?

The 70 individuals who developed skin reactions were fairly young adults, between the ages of 19 and 69 (median: 39), with slightly more men aged 30 to 40. Information about the place of purchase or consumption was available for 41 cases. The shiitake mushrooms had mainly been purchased in supermarkets (61% of cases) or at a farmer's market (17%), or eaten at a restaurant (17%). The skin lesions had appeared on average within 48 hours of consuming the mushrooms, but sometimes the symptoms developed within an hour or conversely at a later time, up to a week following consumption. The mushrooms were consumed fresh in the large majority of cases; the dehydrated form only concerned 15% of cases.

Insufficient cooking was clearly the culprit for the individuals developing skin symptoms: only two of the 70 people said they had thoroughly cooked the shiitake mushrooms (Figure 3). The others had eaten them raw or undercooked (stir-fried, on pizza, or added to soup).

All of the individuals fully recovered, after a time period proportionate to the amount of mushrooms consumed: around four days for consumption of under 60 g, seven days for 60 to 150 g, and 15 days for larger amounts.

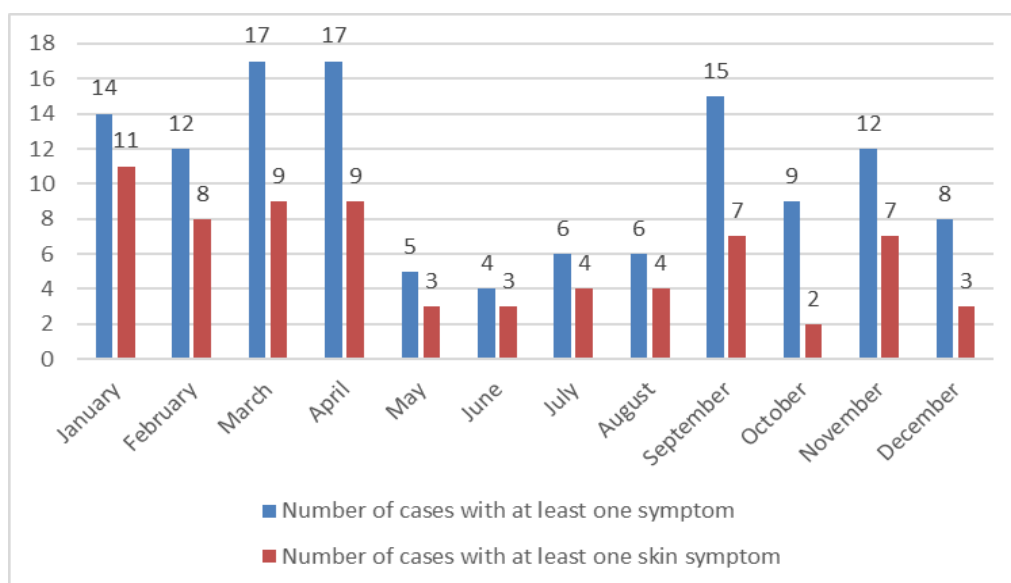


Figure 2: Monthly distribution of symptomatic cases and cases with at least one skin symptom after consuming shiitake mushrooms. January 2014-December 2019 (n=125) (source: SICAP)

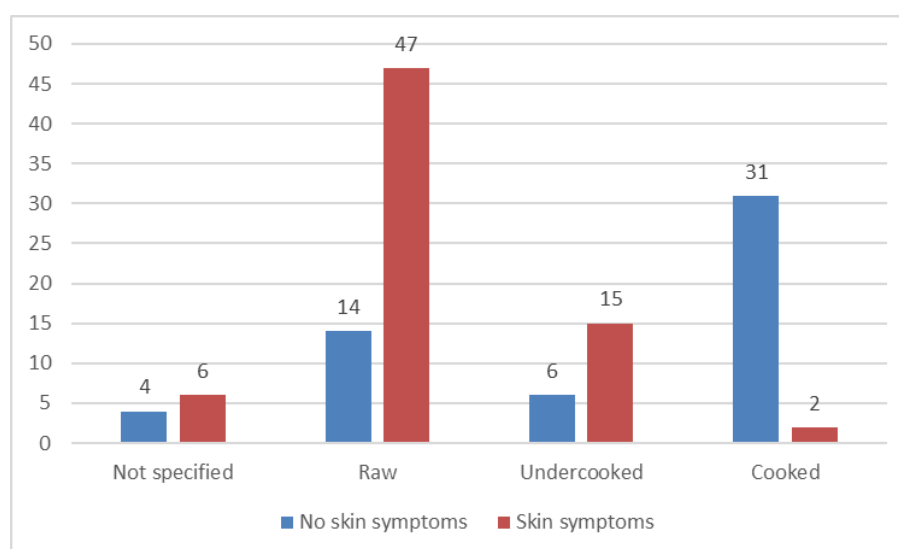


Figure 3: Breakdown of the number of cases with or without skin symptoms based on the method of cooking the shiitake mushrooms. January 2014-December 2019 (n=125) (source: SICAP).

Informing producers, restaurant professionals and consumers

It should be kept in mind that while these figures may seem low, they are merely a pale reflection of reality. Indeed, many cases of shiitake-induced flagellate dermatitis are not reported through calls to Poison Control Centres, in particular because the connection is not always made between the consumption of shiitake mushrooms and the occurrence of lesions, especially when these are of late onset. Following this review, the DGCCRF, ANSES and the Poison Control Centre are once again warning consumers of the risks involved.

On its part, the DGCCRF will launch an informational campaign aimed at shiitake producers to encourage them to include a statement on their products indicating that these mushrooms should be thoroughly cooked. This campaign will also be geared towards restaurant professionals, to remind them that certain modes of rapid cooking, such as stir-frying, are not sufficient to eliminate the risk of toxic dermatitis.

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References :

- [1] Vigil'Anses no. 1, February 2017: Shiitake mushrooms: be sure to cook them if you want to avoid itching! https://vigilances.anses.fr/sites/default/files/VigilancesN1_shiitake_0.pdf
- [2] Zhang M, Zhang Y, Zhang L, Tian Q. Mushroom polysaccharide lentinan for treating different types of cancers: A review of 12 years clinical studies in China. Prog Mol Biol Transl Sci. 2019;163:297-328. doi: 10.1016/bs.pmbts.2019.02.013. Epub 2019 Apr 4. PMID: 31030752.