

Leszek SATORA*
Halina GOSZCZ**
Krzysztof CISZOWSKI**

Poisonings resulting from the ingestion of magic mushrooms in Kraków

Zatrucia grzybami halucynogennymi w Krakowie

Chair of Clinical and Environmental Toxicology
Jagiellonian University Medical College
Kraków, Poland

*Poison Information Centre
Head: *Dorota Targosz*, Ph.D.

**Department of Clinical Toxicology
Head: Prof. *Janusz Pach* M.D., Ph.D.

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Hallucinogenic mushrooms, also called "magic mushrooms", are becoming a more frequent cause of abuse, especially among young people, who use them experimentally for recreational purposes. In the autumn of 2004, several people were admitted to and observed in the Department of Clinical Toxicology in Kraków after they had used magic mushrooms to experience hallucinatory sensations. Three of them had visual hallucinations, and the fourth experienced both visual and auditory hallucinations followed by the exogenous psychosis after use of *Psilocybe semilanceata*. One person was hospitalised for several days while the others were observed in the emergency department. The main source of information for patients about hallucinogenic mushrooms was the internet. In the cases discussed the mushroom poisoning caused no organ damage and the symptoms disappeared in about 6 hours.

Introduction

The use of hallucinogenic mushrooms containing substances which affect the central nervous system and cause hallucinations, has been known to people since earlier times [18]. Hallucinogenic substances are found in mushrooms commonly gathered in the Central and North Europe. The main psycho-active compounds of these mushrooms are tryptamine derivatives grouped as hallucinogenic indole alkaloids including: psilocybin, psilocin [12], baeocystin and norbaeocystin [4,7]. At present these indole alkaloids have certain applications medically [11]. The fly agaric (*Amanita muscaria*), is also used to provide hallucinations [5,9,15]. Mushroom poisonings in Poland are common, especially in summer and autumn and are associated with traditional wild-mushroom picking and cookery [14]. The oral ingestion of magic mushrooms is becoming more and more common in Poland [14,15].

Case series

Case 1

A 29-year-old man admitted to the toxicological admission room at night and stated that he had ingested some 60 fruiting bodies of the liberty cap (*Psilocybe semilanceata*). He had eaten these mushrooms some 5 hours before being admitted in 2 portions – 20 followed by 40 items. Information about magic mushrooms, a detailed

Grzyby halucynogenne stanowią coraz częstszą przyczynę zatruc, szczególnie wśród osób młodych, eksperymentującymi z substancjami psychoaktywnymi. Jesienią 2004 roku w Klinice Toksykologii udzielono pomocy kilku osobom, które spożyły grzyby w celu wywołania halucynacji. U trzech z nich wystąpiły halucynacje wzrokowe, u czwartej zaś, 29-letniego mężczyzny, łysiczka lancetowata (*Psilocybe semilanceata*) wywołała halucynacje wzrokowe i słuchowe a następnie psychozę egzogenną. Jedną osobę pozostawiono na kilkudniowej obserwacji w Klinice, pozostałe były zaopatrzone w trybie ambulatoryjnym w Izbie Przyjęć. Źródłem informacji o grzybach halucynogennych był dla pacjentów Internet. W obserwowanych przypadkach zatrucie grzybami nie doprowadziło do uszkodzeń narządowych, a objawy ustępowały po około 6 godzinach.

description of their growth-sites, the appearance and features of particular specimens and methods for their preparation had been obtained via the internet. The mushrooms were eaten fresh without any culinary preparation. At the time of admission, the patient was conscious and was able to communicate verbally, appeared to be slightly overexcited, with a breathing rate of 16 respirations per minute, a blood pressure (BP) of 150/100 mmHg, a pulse rate of 100 beats per minute (bpm) and a body temperature 35.8 degrees Celsius. In the physical examination he displayed dilated pupils and pronounced tendon reflexes were observed. As established during the medical examination, after about 30 minutes, he exhibited an elevated mood and merriment with concomitant nausea and vertigo, but without evident balance impairment. Shortly afterwards he had visual hallucinations (fig. 1) The patient then became disoriented. The mycological examination confirmed the presence of mushroom spores of *Psilocybe semilanceata*. The patient was given activated charcoal and an intravenous drip of isotonic fluids. ECG during the admission showed regular sinus rhythm, 98 bpm, PQ interval 220 ms, flat and negative T waves in III lead, without any arrhythmia and features of recent ischemia. Since a return of psychotic disturbances was considered a possibility (flash-back) he was admitted to the Department of Clinical Toxicology for further observation. During subsequent a few days observation the patient exhibited no physical symptoms and no other symptoms recurred. The monitoring of circulatory parameters showed a gradual normalisation of BP to of 120/80 mmHg by 16 hours after mushrooms had been ingested. The pulse rate was also normal at 72 to 84 bpm. The results of laboratory tests did not reveal any pathological changes. The patient was

Address for correspondence:
Dr Leszek Satora
Poison Information Center
Jagiellonian University Medical College
Os. Złotej Jesieni 1
31-826 Kraków, Poland
Tel./Fax: + 48 (+12) 64-68-905
e-mail: satora@wp.pl

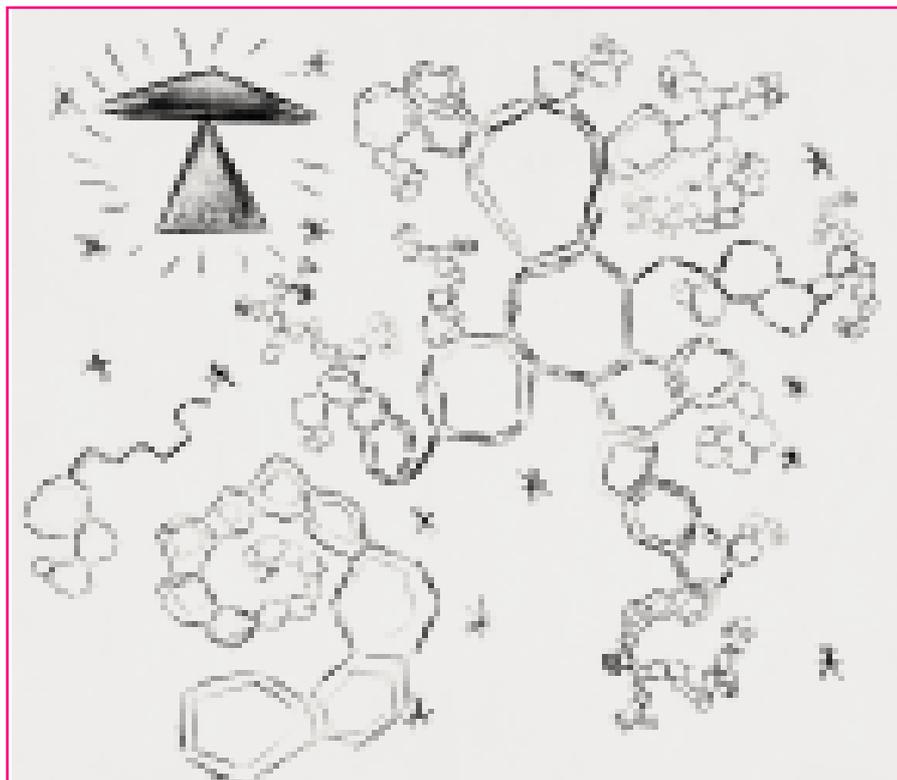


Figure 1
Visual hallucinations drawn by the patient after ingestion of *P. semilanceata*.
 Graficzne przedstawienie własnych halucynacji wzrokowych przez pacjenta po spożyciu *P. semilanceata*.

discharged from the hospital after 3 days at his own request.

Case 2

20-year-old man ingested approximately 60 magic mushrooms *Psilocybe sp.* that had been boiled 2 hours before the admission. During the admission procedure the patient remained conscious and able to communicate verbally, with a respiratory rate of 16 per minute, BP was elevated to 200/100 mmHg and the pulse rate was 100 bpm. In the physical examination there were good tendon reflex responses and dilated light-responsive pupils were observed. The patient complained of blurred vision. He was treated with activated charcoal, laxatives (magnesium sulphate) and fluids given orally. BP decreased after administration of hypotensive medicine. The ECG recording showed a regular cardiac rhythm, 100 bpm, without any ischaemic changes. In spite of the slightly increased creatine phosphokinase level (CPK) laboratory tests were normal. After a 3-hour-long observation the man was discharged in a conscious state, apparently coordinated and oriented, without any balance or visual impairments. BP was 120/80 mmHg and the pulse rate 74 bpm.

Case 3

21-year-old man was brought to the admission room by ambulance 4 hours after ingesting about 40 magic mushrooms *Psilocybe sp.* He called the ambulance because he feared a collapse. It was his 6th ingestion of hallucinogenic mushrooms. During the admission procedure he remained conscious and was able to communicate verbally, with a breathing rate of 16 per minute; BP of 140/100 mmHg and a pulse rate of 72 bpm. Very positive tendon reflexes and dilated pupils, reacting only slowly to light were found in the physical examination. Despite general fatigue he did not complain of any other symptoms. The patient was given activated charcoal and laxative salt (MgSO₄) and fluids were provided. ECG monitoring revealed a regular cardiac rhythm, 75 bpm, without any recent ischaemic changes. The laboratory tests were normal. The man was discharged from the

Emergency Department at his own request after 2.5 hours of observation.

Case 4

16-year-old boy was sent to the Department of Clinical Toxicology from the regional hospital following earlier toxicological information. During the examination, he stated that he had ingested about 60 fruiting bodies of the red-staining mushroom *Inocybe patouillardii*. The symptoms appeared 30 minutes after the mushrooms were eaten and included blurred vision, auditory hallucinations, disorientation and anxiety. The results of laboratory tests showed no pathological changes. In the mycological examination spores of *I. patouillardii* were confirmed. The patient was treated symptomatically. All symptoms disappeared completely after 6 hours.

Discussion

Several dozen species of mushrooms, especially in the genera: *Psilocybe*, *Stropharia*, *Conocybe* and *Panaeolus* contains indole alkaloids – psilocybin (4-phosphoryloxy-N,N-dimethyltryptamine) and psilocin (4-hydroxy-N,N-dimethyltryptamine). Psilocybin is the main psycho-active alkaloid which has been known from the 1960s [17,18]. Psilocin phospho-ester decomposes spontaneously into psilocin [11]. Indole alkaloid content of mushrooms varies according to the particular species. The highest concentrations are found in subtropical species and significantly lower amounts in species occurring in a temperate climate. In Poland there are popular species such as the liberty cap, *P. semilanceata* and petticoat mottlegill, *Panaeolus papilionaceus*, which are often used for recreational purposes to create a confused sensation. The psilocybin and psilocin content in mushrooms depends on many fac-

tors. They may be connected with the natural content of mushrooms such as glucose and ammonium succinate and may also be influenced by environmental factors like the acidity of the soil and the stage of maturity [4]. The psilocin concentration in mushrooms found in Poland is relatively low and fluctuates between 0.005 and 0.44%, however particular specimens vary significantly in terms of their alkaloid content. The highest concentration of hallucinogenic components is found in the mushroom cap [17]. German authors have determined the alkaloid content in mushrooms found in Germany as 0.003-1.15% for psilocybin and 0.01-0.9% for psilocin. The greatest amount of psilocybin and psilocin occurred in the mottlegill species, *P. cyanescens* [10]. The clinical effect of psilocybin and psilocin on the human body consists of aural, visual and tactile hallucinations together with disorientation with regard to time and place [16]. Mood changes, aggressive reactions and sometimes psychotic symptoms similar to those of schizophrenia are also present [8,19]. Presumably, the activation of serotonergic receptors 5-HT₂ followed by the increase of glucose consumption in the frontal cortex resembles metabolic disturbances which are usually found during acute psychotic episodes in patients suffering from schizophrenia [19]. In more serious poisoning patients may experience a sense of dissociation or a sensation of personal bodily dysmorphism. Neuropsychiatric symptoms may appear after the ingestion of as little as 10-30 g of fresh mushrooms which corresponds to 5-15 mg of psilocybin [17]. Toxic effects usually develop within 30 minutes after eating the mushrooms [11,12]. They include imaginations of abstract figures, loss of the sense of time and place, mood changes, euphoria and absent-mindedness. The typical vegetative symptoms which occurs concomitantly with hallucinations include tachycardia, raise of BP, paresthesias and mydriasis. Several days to one week after the ingestion of magic mushrooms hallucinations may recur, referred to as a flashback effect [1,17], especially when associated with earlier alcohol use [3]. Taking into consideration that the usually ingested dose of magic mushrooms is 0.6-2.8 g and average psilocin concentration in mushrooms 0.14%, the approximate doses of psilocin introduced to the organism can be assessed as 0.8-3.9 mg [17]. The dose of 12 mg of psilocin can cause hallucinatory effects for 3-5 hours [17]. No organ damage after magic mushroom intoxication were observed in the above-described cases, which corresponds to the data from the literature. However, reports of possible organ damage resulting from hallucinogenic mushroom ingestion exist, including myocardial infarction or renal failure [2,13]. In Poland, hallucinogenic mushrooms are eaten fresh or dried, smoked with marijuana and more and more commonly added to the jelly or pizza like in Scandinavian countries [6]. In German magic mushrooms are often eaten fresh, because the method is thought to produce the strongest hallucinatory effects. They can also be consumed dried, frozen to be eaten later, mixed and drunk with milk or tea and added to

soups or omelettes. Water, in which the mushrooms have been boiled, is used for culinary purposes when boiling and preparing meals [10]. As in Germany and the Netherlands, psilocybin and psilocin, as the hallucinogenic substances, are legally controlled in Poland [17]. Such substances are subject to the Act dated 24 April 1997 designed to counteract drug abuse (Dziennik Ustaw Nr 75, poz. 468).

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