Poisonings resulting from the ingestion of magic mushrooms in Kraków

Zatrucia grzybami halucynogennymi w Krakowie

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 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 protruded tongue and face, a body temperature 38.3 degrees Celsius. During medical examination, after about 30 minutes, he exhibited an elevated mood and merriment with comitant 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 injection of atropine. An electrocardiogram showed regular sinus rhythm, 98 bpm, PQ interval 220 ms, flat T waves and features of right bundle branch block. Shortly after 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 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
discharged from the hospital after 3 days at his own re-
quest.

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 communi-
cate 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. The laboratory tests revealed a regular cardiac rhythm, 75 bpm, without any recent ischaemic changes. The laboratory monitoring revealed a regular cardiac rhythm, 75 bpm, without any recent ischaemic changes. The laboratory tests were normal. After a 3-hour-long obser-

Case 4
16-year-old boy was sent to the Department of Clinical Toxicology from the regional hospital following earli-
er 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 labo-

Discussion
Several dozen species of mushrooms, especially in the genera: Psilocybe, Stropharia, Conocybe and Panaeolus con-
tains indole alkaloids – psilocybin (4-phosphoryloxy-N,N-dimethyltryptamine) and psilocin (4-hydroxy-N,N-dimethyltrypta-
mine). Psilocybin is the main psycho-active alkaloid which has been known from the 1960s [17,18]. Psilocin phospo-ester de-
composes 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 spe-
cies such as the liberty cap, P. semilanceata and petticoat mottlegill, Panaeolus papilionaceus, which are often used for recre-
tional purposes to create a confused sensation. The psilocybin and psilocin con-
tent in mushrooms depends on many fac-
tors. They may be connected with the natu-
ral 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 con-
tent in mushrooms found in Germany as 0.003-1.15% for psilocybin and 0.01-0.9% for psilocin. The greatest amount of psilo-
cybin and psilocin occurred in the mottlegill species, P. cyanescens [10]. The clinical effect of psilocybin and psilocin on the hu-
man body consists of aural, visual and tac-
tile hallucinations together with disorienta-
tion 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 serotnergic recep-
tors 5-HT, followed by the increase of glucose consumption in the frontal cortex resembles metabolic disturbances which are usually found during acute psychotic epi-
sodes in patients suffering from schizophre-
nia [19]. In more serious poisoning patients may experience a sense of dissociation or a sensation of personal bodily dysmorph. 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 usu-
ally develop within 30 minutes after eating the mushrooms [11,12]. They include imagi-
nations of abstract figures, loss of the sense of time and place, mood changes, euphoria and absent-mindedness. The typical vegeta-
tive 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, re-
ferred to as a flashback effect [1,17], espe-
sially when associated with earlier alcohol use [2]. Taking into consideration that the usually ingested dose of magic mushroom is 0.6-2.8 g and average psilocin concen-
tration in mushrooms 0.14%, the approxi-
mate doses of psilocin introduced to the or-
ganism 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 intoxy-
cation were observed in the above-de-
scribed 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 mush-
rooms are eaten fresh or dried, smoked with marihuana and more and more often added to the jelly or pizza like in Scandi-
vonian countries [6]. In German magic mush-
rooms are often eaten fresh, because the method is thought to produce the strongest hallucinatory effects. They can also be con-
sumed dried, frozen to be eaten later, mixed and drunk with milk or tea and added to

Figure 1
Visual hallucinations drawn by the patient after ingestion of P. semilanceata.
Graficzne przedstawienie w³asnych halucynacji wzrokowych przez pacjenta po spo¿yciu P. semilanceata.
soups or omelettes. Water, in which the
mushrooms have been boiled, is used for
culinary purposes when boiling and prepar-
ing meals [10]. As in Germany and the Neth-
erlands, psilocybin and psilocin, as the hal-
locinogenic substances, are legally con-
trolled in Poland [17]. Such substances are
subject to the Act dated 24 April 1997 de-
signed to counteract drug abuse (Dziennik
Ustaw Nr 75, poz. 468).

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