ACTA ABP BIOCHIMICA POLONICA

Vol. 63, No 1/2016
181–182
http://dx.doi.org/10.18388/abp.2015_1170

Case Report

Coma in the course of severe poisoning after consumption of red fly agaric (*Amanita muscaria*)

Małgorzata A. Mikaszewska-Sokolewicz[1], Sylwestra Pankowska[1], Marek Janiak[1], Piotr Pruszczyk[2], Tomasz Łazowski[1] and Krzysztof Jankowski[2]✉

[1]1st Clinic of Anaesthesia and Intensive Care, Medical University of Warsaw, Warsaw, Poland; [2]Department of Internal Medicine and Cardiology, Medical University of Warsaw, Warsaw, Poland

Red fly agaric poisoning is rare. It can be consumed for suicidal purposes or its psychedelic effect. The paper describes the case of a young men, who fell into a coma after ingestion of the red toadstools. Quick identification of the poison, early use of gastric lavage and symptomatic treatment resulted in regression of symptoms and lead to the patient's discharge from the hospital on the third day after intoxication. Authors discussing the poisonous alkaloids contained in the red toadtools: ibotenic acid, muscimol, muscasone and muscarine and theirs properties, responsible for the symptoms of intoxication.

Key words: *Amanita muscaria*, hallucinogenic mushroom, coma, ibotenic acid, muscimol, muscasone

Received: 11 August, 2015; revised: 07 October, 2015; accepted: 07 November, 2015; available on-line: 01 February, 2016

INTRODUCTION

Red fly agaric poisoning is rare. The distinctive appearance of this mushroom and widespread belief in its toxic properties make accidental consumption very rare. However, it can be consumed for suicidal purposes or its psychedelic effect.

This paper describes the case of a young men, who fell into a coma after deliberate ingestion of the red toadstools. His appearance may have suggested severe alcohol intoxication. Quick identification of the poison, early use of gastric lavage and symptomatic treatment resulted in regression of symptoms and lead to the patient's discharge from the hospital on the third day after intoxication.

CASE REPORT

In late springtime, a 21 year old male was admitted to hospital emergency department (ED) unconscious. According to his partner, before episode he intentionally ingested hallucinogenic mushrooms — red toadstools (red fly agarics). We were unable to determine the amount of eaten mushrooms and if the loss of consciousness was preceded by any gastrointenstinal symptoms (nausea, intestinal cramps). He was found not responding to voice and physical stimuli. The patient was diagnosed and chronically treated for endogenous depression. He was treated for several years with fluoxetine, but he interrupted this treatment a few weeks before the hospitalization and began taking hallucinogenic substances, including red toadstools and marijuana. Prior to hospitalization, he ate several times smaller portions of red toadstools, although never lost consciousness or experienced any neurologic or gastrointestinal symptoms, but only a pleasant psychedelic effect.

At the time of admission to ED, the patient was in a deep coma (Glasgow Coma Scale 4 points), did not respond to voice or pain stimuli, had narrow, equal pupils, his blood pressure was 130/70 mmHg, his respiration was effort but started having generalized seizures. He had red, dry and very warm skin. Body temperature was 37.7°C, heart rate was 127/min. Immediate head CT scan was performed but no pathology was found.

After endotracheal intubation, gastric lavage was performed (fragments of not ingested mushrooms) and then the patient was transferred to the ICU. On admission to ICU patient's condition remained serious; persistent unconsciousness (GCS 4 points), seizures, severe redness and dryness of the skin, hyperemic conjunctiva, dilated pupils, intensive salivary secretion and increased secretion in the airways were observed. Blood pressure was 130/80 mmHg, pulse 80 beats per minute, body temperature 37°C, oxygen saturation 97%. ECG monitoring recorded a number of ventricular and supraventricular extrasystoles. Serum creatinine, urea, and liver enzymes levels were normal. Toxicological studies ruled out poisoning by psychotropic drugs or alcohol. The local laboratory was not competent to determine the red toadstool alkaloids. The examination of gastric lavage was impossible.

We observed a transient increase in body temperature to 38°C and an increase in blood pressure to 160/70 mmHg. The patient received fluids intravenously and electrolyte disturbances were corrected. The patient's condition improved rapidly. He gradually went out of the coma, we observed the appearance of response to external stimuli, decreased secretion of saliva, and receding of arrhythmia. After 11 hours of treatment in the ICU, the patient regained consciousness. After a subsequent hour the patient was extubated. Control serum levels of creatinine and bilirubin, liver function tests and INR were within normal ranges. On the second day of hospitalization the patient was transferred to the General Ward and the following day he was discharged from the hospital.

DISCUSSION

In nature, there are over 200 plants with hallucinogenic properties. They contain psychoactive alkaloids. Alka-

✉e-mail: krzysztofjankowski@hotmail.com

Abbreviations: CT, Computed Tomography; ED, Emergency Department; GABA, γ-Aminobutyric Acid; GCS, Glasgow Coma Scale; ICU, Intensive Care Unit; NMDA, N-methyl-D-aspartate

loids may exert various effects on the functioning of central nervous system: anesthetic, sedative or hallucinogenic. Alkaloids are toxic and consumed in large doses cause fatal poisoning and death.

Red fly agaric (*Amanita muscaria*) is considered to be highly poisonous mushroom. Due to its distinctive appearance poisoning with this mushroom occurs extremely rarely; most often accidentally in children, in suicidal attempts or as a result of overdosage for hallucinogenic effect. Hallucinogenic properties and substances contained in the mushroom are also generally known and discussed in internet, where participants provide numerous recipes for processing of the mushrooms to get the best psychedelic effect.

Poisonous alkaloids contained in the red toadstools are as follows: ibotenic acid (neurotoxic), muscimol (panterine) and muscasone showing parasympatholytic action (atropine-like) and small amount of muscarine, which has parasympathomimetic properties. Fresh mushrooms are the most poisonous because of the high ibotenic acid concentration.

Ibotenic acid is a potent neurotoxin, whose structure resembles the glutamic acid and activates NMDA receptors. Muscimol has a strong psychoactivating action. It works primarily by blocking the GABA B receptor. Both substances act as false neurotransmitters.

Ibotenic acid is unstable and subsequently undergoes decarboxylation to muscimol. This is why the fresh mushrooms are much more toxic than dried. After ingestion, ibotenic acid is partially metabolized to less toxic muscasone and muscimol. The dose required to induce hallucinations is 30–60 mg of ibotenic acid and 10–15 mg of muscimol – this is less than fresh weight content of a single *A. muscaria*.

Red fly agaric poisoning is fatal in 2–5% of cases. Mortality depends on the amount of poison absorbed. A fatal dose has been calculated as 15 cap, but the amount of chemical compounds per mushroom varies widely from season to season. Spring and summer mushrooms have been reported to contain up to 10 times more ibotenic acid and muscimol than autumn fruitings (Benjamin, 1992). In case of described patient we were unable to determine, how much mushrooms he ate, but the episode of intoxication happened in the springtime, what could potentially affect the higher concentration of toxins in the ingested mushrooms.

Due to the opposing effects of toxic components contained in red fly agaric mushroom, symptoms of poisoning are less expressed than if each of these substances acts alone. These are: general weakness and confusion, dizziness, tinnitus, visual and auditory perceptual changes, spasm of the bladder sphincter, hallucinations — visual and auditory (Davis & Williams, 1999). Hallucinations usually appear 0.5–1.5 hours after intake, but the first symptoms in the form of gastro-intestinal disorders (vomiting, diarrhea, abdominal pain) can occur just after 15 minutes. In more severe cases, symptoms include: psychomotor agitation rising up to madness (the so called panterin madness), elevated muscle tone, seizures, flushing, increased body temperature up to 40°C. The usual duration of clinical manifestation after Amanita muscaria intoxication is 8–24 hours although it may sometimes continue for 5 days (Vendramin & Brvar, 2014). In extremely severe poisoning coma, circulatory and respiratory failure leading to death can occur (Santora *et al*., 2005).

Since mushrooms grow freely in wild, they take part in cycling of heavy metals in our lithosphere and this potential intoxication should be kept in mind in case of prolonged clinical manifestation (Łukasik-Głębocka, *et al*., 2011; Drewnowska *et al*., 2012; Vendramin & Brvar, 2014). In our patient it was not an accidental poisoning. He have eaten red toadstools in the presence of a witness, and the remains of the mushroms were present in the gastric wash out fluid, so mycological identification was not necessary to diagnose the problem.

Mycological studies, represent a simple and inexpensive tool, but they are not always available. The diagnosis of a red fly agaric poisoning may also be established based on the presence of ibotenic acid and muscimol in the urine within the first hour after intoxication.

It should be noted that if a patient is unconscious, the lack of data from the anamnesis could significantly delay the execution of the basic medical treatment (which is gastric lavage) and prolong the time of absorption and increase the amount of absorbed poison.

Our patient had gastric lavage performed immediately after admission to hospital. Probably this fact decided on a good prognosis and rapid recovery.

In the literature, in a red fly agaric intoxication, in addition to unconsciousness, focal neurological symptoms are sometimes described, but generally there are only a few case reports published about this potentially fatal intoxication. Our patient had seizures on admission but was consulted by a neurologist before leaving the ICU, and final outcome of neurological examination was normal.

Treatment of patients poisoned with red fly agaric should be performed in the hospital. Gastric lavage and the symptomatic treatment should be employed as soon as possible. In the case of coma, and lack of protective reflexes gastric lavage may be performed only after endotracheal intubation. There is no specific antidote to the active substances contained in red fly agaric. Atropine should be avoided.

According to statistics over the last years, there was more than a fivefold increase in the number of adolescents who have tried illicit substances. The prevalence of so-called magic mushrooms is much smaller than marijuana and hashish but fungi are the most commonly used hallucinogen in the 12 Member States of the "old" European Union. In Poland, they are responsible for about 20% of intoxications (Hillebrand *et al*., 2006).

Conclusion: Red fly agaric belongs to so called legal hallucinogens and its popularity and consumption has grown in recent years. It is presumed that in the future patients poisoned by hallucinogenic mushrooms will be admitted to hospitals more often. Clinical manifestation of intoxication is variable but mortality depends on the amount of absorbed poison and time to gastric lavage.

REFERENCES

Benjamin DR (1992) Mushroom poisoning in infants and children: the Amanita pantherina/muscaria group. *J Toxicol Clin Toxicol* **30**: 13–22. doi: 10.3109/15563659208994442.

Brvar M, Mozina M, Bunc M (2006) Prolonged psychosis after *Amanita muscaria* ingestion. Wien Klin Wochenschr **118**: 294–297.

Davis DP, Williams SR (1999) *Amanita muscaria*. *J Emerg Med* **17**: 739.

Drewnowska M, Jarzyńska G, Kojta AK, Falandysz J (2012) Merkury in European Blushers, *Amanita rubenscens* mashrooms and topsoils: bioconcentration potential and intake assessment. *J Environ Sci Healthy B* **47**: 466–474. doi: 10.1080/03601234.2012.663609.

Hillebrand, J, Olszewski D, Sedefov R (2006) Hallucinogenic mushrooms: an emerging trend case study. *European Monitoring Centre for Drugs and Drug Addiction* (EMCDDA), Lisbon. doi: 09.06.2012.

Santora L, Pach D, Futryn B, Hydzik P, Balicka-Ślusarczyk B (2005) Fly agaric (*Amanita muscaria*) poisoning, case report and review. *Toxicon* **45**: 941–943.

Łukasik-Głębocka M, Drużdż A, Naskret M (2011) Clinical symptoms and circumstances of acute poisoning with fly agaric (*Amanita muscaria*) and panther cap (*Amanita pantherina*). *Przegl Lek* **68**: 449–452.

Vendramin A, Brvar M (2014) *Amanita muscaria* and *Amanita pantherina* poisoning: two syndromes. *Toxicon* **90**: 269–272. doi: 10.1016/j.toxicon.2014.08.067.