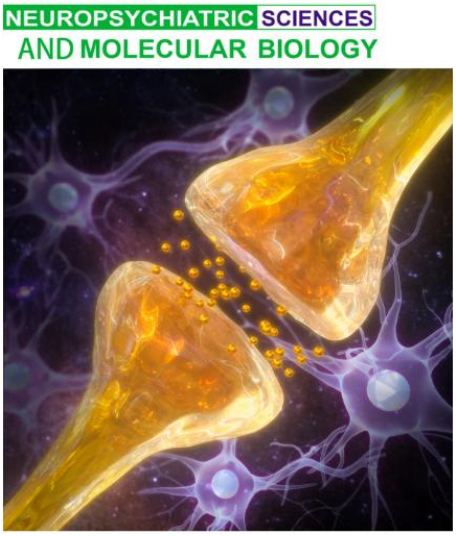
Clinical First Aid Research on Poisoning from Wild Mushrooms



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Abstract

Poisoning from wild mushrooms is a serious public health problem. Especially in Yunnan Province, China, poisoning incidents caused by accidental ingestion of poisonous mushrooms occur frequently. There are numerous types of wild fungi. The toxic ones are similar in form to the edible ones. Moreover, some toxins are concealed and delayed, making poisoning incidents difficult to prevent and diagnose and treat in a timely manner. In response to this problem, clinical first aid for wild mushroom poisoning is particularly important. This article will integrate the existing literature to explore the causes of wild mushroom poisoning, epidemiological characteristics, clinical manifestations and diagnosis of poisoning, clinical first aid measures, psychological support after poisoning and related research progress.

Keywords: Poisoning of wild mushrooms; Mental symptoms; Psychological support therapy; Clinical first aid

Research Background

Wild mushrooms refer to fungal organisms that grow freely in nature without artificial cultivation. They are diverse in species and various in form. Wild mushrooms are widely distributed in environments such as forests, grasslands and fields. According to investigations, there are currently about 250 species of wild mushrooms in China [1]. Wild mushrooms mostly grow in mountainous areas at an altitude of 2,000 to 4,000 meters, especially in Yunnan Province [2]. Yunnan Province has many mountainous areas with an average altitude of about 2,000 meters. The pine needle forest has formed a three-dimensional mountainous climate and produced a variety of wild mushrooms. Wild mushrooms, also known as wild fungi or mushrooms, are affected by factors such as altitude, light, temperature and precipitation, and their amino acid and trace element contents vary [3]. Because wild mushrooms have a delicious taste and rich nutritional value, they are delicacies on people's dining tables and are commonly known as "mountain delicacies". However, there are also many poisonous wild mushrooms among them. Once ingested by mistake, it may cause symptoms of wild mushroom poisoning, and in severe cases, it may even endanger life.

The clinical manifestations of wild mushroom poisoning are diverse. Common symptoms include nausea, vomiting, abdominal pain, diarrhea, mental abnormalities, toxic encephalopathy, etc. In severe cases, it can lead to liver and kidney failure, and even death [4]. Studies have shown that certain mushrooms, such as Amanita muscari, contain strong toxins. Accidental ingestion can rapidly affect liver and kidney functions, causing severe poisoning reactions [5,6]. Clinically, timely identification of the type and severity of poisoning is the key to first aid. For poisoning from wild mushrooms, doctors need to determine the nature and severity of the poisoning by inquiring about a detailed medical history and conducting comprehensive laboratory tests. The timeliness and effectiveness of clinical first aid measures for wild mushroom poisoning directly affect the prognosis of patients. For patients with mild poisoning, symptomatic treatment measures are usually adopted, including inducing vomiting, gastric lavage, symptomatic treatment, fluid replacement and maintaining electrolyte balance, etc. [7] Studies have pointed out that early detoxification measures

(such as the use of activated carbon) can significantly reduce the absorption of toxins in the body, thereby improving the prognosis of patients with wild mushroom poisoning [8]. For patients with severe poisoning, more complex treatments may be required, such as blood purification, liver and kidney transplantation, etc. [9].

Causes and Epidemiology of Wild Mushroom Poisoning

The main cause of poisoning from wild mushrooms is the accidental ingestion of toxic fungi. About 90% of poisoning incidents result from misjudgment of the toxic fungi, such as misting the highly toxic Amanita for edible chicken mushroom [10]. Some edible fungi need to be thoroughly heated (such as the deer flower fungus), and insufficient cooking may lead to the residue of toxins. Some groups of people have a strong reaction to the toxins of specific fungi and may be poisoned even if they consume a small amount.

The epidemiological characteristics of wild mushroom poisoning mainly include [11] : (1) Territoriality: Yunnan Province in China is a high-incidence area. Every year, more than 200 incidents of wild mushroom poisoning are reported in Yunnan Province, and over 80% of the deaths are caused by amanita. (2) Seasonality: It is more common during the rainy season (June to September) and is related to the growth cycle and peak feeding period of wild fungi. (3) Population distribution: Rural families, field workers and feeders lacking identification experience are at the highest risk.

Pre-hospital first aid for poisoning from wild mushrooms

At present, when wild mushroom poisoning occurs, the consumption of any suspected wild mushrooms should be immediately stopped and samples should be preserved as much as possible, because accurate identification is crucial for subsequent treatment. If possible, take photos to record the appearance characteristics of these wild mushrooms for identification by medical personnel or poison control centers [12]. Meanwhile, call the emergency number immediately or go to the nearest hospital emergency room. While waiting for the ambulance to arrive, try to keep the poisoned person calm and avoid any physical activities to reduce the spread of toxins in the body.

Studies have shown that quantitative management nursing can effectively improve the rescue effect of acute poisoning incidents and maintain the vital signs of patients [13]. In the pre-hospital emergency treatment of wild mushroom poisoning, if quantitative assessment and nursing management can be introduced, the pre-hospital mortality rate will be effectively reduced. In addition, immediate postural emesis has a significant effect in patients with oral poisoning, which is beneficial to prognosis and rehabilitation [14]. However, immediate postural induction of vomiting also requires the operator to have certain medical first aid knowledge and skills to prevent serious consequences such as asphyxia and endanger life.

Diagnosis of poisoning from wild mushrooms

The toxins that cause poisoning from wild fungi are mainly classified into the following categories, and the symptoms of poisoning are closely related to the type of toxin [15] : (1) Gastroenteritis type mainly includes toxic red mushrooms and yellow mucilage boletus, with symptoms such as severe vomiting, diarrhea and dehydration. (2) The neuropsychiatric type mainly includes Umbrella flies and Pleurotus eryngii, with symptoms such as hallucinations, delirium, excessive sweating, and constricted pupils. (3) Hemolytic type mainly includes Stagella, with the main symptoms being hemoglobinuria, jaundice and renal failure. (4) Liver and kidney damage type mainly includes fatal amanita and Parasol. The main symptoms are liver necrosis and multiple organ failure after the false recovery period. (5) Rhabdomyolysis type mainly includes subdilute pleurotus eryngii, with the main symptoms being severe muscle pain, myoglobinuria and acute kidney injury.

The key points for diagnosing wild mushroom poisoning mainly include collecting the medical history: clarifying the type of edible fungi, the intake amount and the time. Secondly, it includes laboratory testing: detecting toxins in blood or urine through high-performance liquid chromatography (HPLC) or mass spectrometry. For the differential diagnosis of wild mushroom poisoning, other food poisoning or acute gastroenteritis should be excluded.

First aid for wild mushroom poisoning in the hospital

When conducting in-hospital emergency treatment for wild mushroom poisoning, if the poisoned person is conscious and has no vomiting reflex disorder, the contents of the stomach should be cleared. Emetic agents or emetic operations can be considered. However, please be sure to note that inducing vomiting carries certain risks. Try to avoid possible asphyxia or esophageal injury [16]. At the same time, gastric lavage should be actively prepared to remove the residual toxins in the stomach. Gastric lavage is a method of flushing the stomach with a large amount of liquid to dilute and remove toxins in the stomach [17]. When performing gastric lavage, it is important to keep the patient still and avoid strenuous exercise to prevent accelerating the circulation of toxins in the body. If the patient is conscious and able to swallow, a small amount of water or milk can be given, but do not force the patient to vomit, as vomiting may cause asphyxia or re-ingestion of toxins [18].

After completing the above steps of inducing vomiting and gastric lavage, symptomatic treatment measures should be actively taken. Give corresponding drug treatment according to the symptoms of poisoning. If an allergic reaction occurs, antihistamine drugs can be used to relieve the symptoms. For moderate to severe allergic reactions, emergency treatment with epinephrine is required [19]; If severe symptoms such as breathing difficulties or low blood pressure occur, further supportive treatment is required. If an inflammatory response occurs,

For example, if there is obvious pain, over-the-counter drugs such as Nonsteroidal anti-inflammatory drugs (NSAIDs) can be used to relieve the pain and discomfort caused by inflammation. In some cases, physical therapy such as cold or hot compresses can also relieve symptoms [20].

In addition, clinical supportive treatment is also indispensable, including maintaining electrolyte balance, stabilizing blood pressure, respiratory support, etc. [21] First of all, ensure that the patient's breathing is unobstructed. If necessary, perform artificial respiration or use a ventilator. Monitor and maintain vital signs such as blood pressure and heart rate within the normal range. Secondly, provide reasonable nutritional support for patients with wild mushroom poisoning to prevent and treat complications. For some poisoning cases, corresponding rehabilitation treatment needs to be provided. While providing clinical support treatment, the patient's condition changes should be recorded in detail, the treatment plan should be adjusted in a timely manner, and communication with the patient's family should be maintained to ensure the continuity and effectiveness of the treatment. These treatment measures are designed to provide patients with the necessary life support until the toxins are cleared or their effects are weakened.

Mental symptoms of wild mushroom poisoning

Of course, the symptoms of wild mushroom poisoning often include mental abnormalities and hallucinations [22], mainly manifested as: hallucinations (visual hallucinations, auditory hallucinations), disorientation of time and space, and emotional fluctuations (excitement, anxiety or depression). In addition, there may also be manifestations similar to schizophrenia (such as delusions, behavioral disorders). Poisoning from wild mushrooms can lead to autonomic nerve dysfunction [23], such as muscarinic symptoms: excessive sweating, salivation, tearing, constricted pupils, blurred vision, slowed heart rate, decreased blood pressure, gastrointestinal cramps, etc. Poisoning from wild mushrooms can also cause motor and coordination disorders, such as ataxia, numbness in hands and feet, tingling sensation, muscle twitching, spasms or tonic contractions, etc.

A major category of clinical manifestations of severe complications after poisoning of wild mushrooms is Toxic encephalopathy, which is a type of brain disease caused by excessive amounts of various toxins or drugs. The pathological changes of the brain may include diffuse congestion, edema, punctate hemorrhage, degeneration and necrosis of nerve cells, demyelination of nerve fibers, etc. [24]. The occurrence of toxic encephalopathy may present with consciousness disorders and brain damage, manifested as drowsiness, and in severe cases, even coma may occur [25] (in cases of severe poisoning or combined with multiple organ failure). When cerebral edema occurs in toxic encephalopathy, symptoms such as headache, nausea, vomiting and convulsions may appear (certain toxins cause an increase in intracranial pressure). Patients who have partially recovered from toxic encephalopathy may also develop delayed encephalopathy, presenting with memory loss, cognitive impairment, consciousness disorders, and abnormal behaviors.

The cause of mental symptoms in wild mushroom poisoning is the neural mechanism of action of different toxins [26]. Some mushrooms contain mycorine, which can activate cholinergic M receptors and has both central and peripheral effects. The specific manifestations are confusion, delirium, restlessness, drowsiness, and occasionally visual or auditory hallucinations. Some mushrooms contain psilocybin, which can activate the 5-HT2A receptor in the body, interfere with the serotonin system, and cause hallucinations and perceptual abnormalities. It can cause people to have a sense of euphoria, visual or auditory hallucinations, a sense of temporal and spatial distortion, personality dissociation, etc., and usually lasts for 4 to 6 hours. Some mushrooms contain muscarinic acid, which can mimic acetylcholine and overstimulate the parasympathetic nerve, leading to cholinergic crisis. Some mushrooms contain Gyromitrin, which is metabolized as a hydrazine compound. It inhibits the metabolism of vitamin B6, affects the synthesis of GABA, and causes convulsions.

First aid measures for mental symptoms of wild mushroom poisoning

To treat the mental symptoms of wild mushroom poisoning, it is usually necessary to immediately identify and eliminate the source of the toxin. The first step is to actively treat by removing the poison, including: gastric lavage, activated carbon adsorption (early stage), blood purification (hemoperfusion/dialysis), and other treatments.

First aid for mental symptoms is also crucial. For patients with hallucinations (visual hallucinations, auditory hallucinations) and delirium, we first select benzodiazepines (diazepam) to control the symptoms. Benzodiazepines can relieve symptoms by enhancing GABA to inhibit neuronal activity. They are highly safe and can prevent the occurrence of convulsions at the same

time [27]. Haloperidol or olanzapine can also be used to control symptoms for severe delusions, aggressive behavior, or when benzodiazepines are ineffective. However, when using "haloperidol", it should be noted that it may aggravate extrapyramidal reactions, and the QT interval needs to be monitored.

For patients presenting with muscarinic symptoms (hypercholinergism), that is to say, if patients have symptoms such as excessive sweating, salivation, and constricted pupils caused by poisoning, atropine can be used to control the symptoms, but it should be used with caution in patients who also have central anticholinergic symptoms [28].

For patients with convulsions, we can use "phenytoin sodium" or "sodium valproate" to control the convulsions. When there is cerebral edema, mannitol or hypertonic saline is used to reduce intracranial pressure. At the same time, the electrolytes in the blood should be monitored and the electrolyte imbalance corrected. Studies have shown that penicillin G drugs may treat liver-brain syndrome caused by poisoning by competitionarily inhibiting toxin absorption [29]. Some studies have also shown that silymarin has a protective effect on the liver and indirectly prevents mental symptoms related to hepatic encephalopathy.

Intensive care for wild mushroom poisoning

For some patients, after the above treatments, the symptoms of wild mushroom poisoning have not been relieved or have continued to worsen. In such cases, intensive care is indispensable. For critically ill patients, close observation and treatment in the intensive care unit may be necessary. The intensive care unit is equipped with advanced medical facilities and professional medical staff, capable of providing patients with the most comprehensive treatment and care. The intensive care unit for poisoning patients should closely monitor their vital signs, such as heart rate, blood pressure, respiratory rate and body temperature, and take active measures such as mechanical ventilation and blood purification when necessary [30]. The goal of intensive care is to stabilize the patient's vital signs, prevent the occurrence of complications, and restore the patient's physiological functions as much as possible. For patients with severe poisoning, timely and effective treatment and monitoring are the keys to saving lives and reducing long-term health impacts. The early and reasonable application of atropine, mechanical ventilation and other symptomatic supportive treatment methods is an effective measure for rescuing poisoned patients [31]. Some studies suggest that using bedside ultrasound to measure the residual toxins in the stomach of poisoned patients and comparing the enteral nutrition tolerance, nutritional indicators and clinical test indicators of poisoned patients is of certain significance for the treatment of poisoned patients [32]. In the intensive care of wild mushroom poisoning, it is essential to clearly identify the type and route of poisoning for the patient, which is related to the determination of clinical diagnosis and treatment methods and the prognosis of the patient. When poisoning from wild mushrooms, be vigilant about organ damage mainly to the liver, kidneys and brain. Provide support for respiratory and circulatory functions to improve the treatment effect and success rate [33].

Prognosis monitoring of wild mushroom poisoning

In recent years, relevant studies have also emphasized the importance of post-poisoning monitoring. Poisoned patients need to undergo continuous physiological monitoring after first aid in order to detect and handle possible complications, such as liver and kidney failure, in a timely manner [34]. Studies have shown that regular monitoring of blood biochemical indicators can effectively prevent the occurrence of complications and improve the survival rate of patients [35]. If severe liver and kidney failure occurs, liver and kidney transplantation is the last resort of treatment [36].

Poisoning by wild mushrooms can cause changes in physiological and biochemical functions such as protein hydrolysis, protein modification, immune response, complement activation, lipoprotein metabolism process, signal transduction, and coagulation response. Some studies suggest that detecting serum coagulation indicators and trypsin can reflect the recovery of prognosis in poisoned patients [37,38]; Continuous electroencephalogram (CEEG) can also reflect the brain function of the prognosis of patients [39].

Psychological support treatment for wild mushroom poisoning

Patients with wild mushroom poisoning may suffer a double blow both physically and psychologically after experiencing poisoning incidents. Psychological support is crucial to their recovery process [40].

The following are some suggestions aimed at providing psychological support for patients with wild mushroom poisoning [41] : 1. During the acute poisoning period (24 to 72 hours after poisoning), the primary task of psychological support is to cooperate with medical treatment, clearly explain to the patient the cause of poisoning, symptoms, treatment process and possible prognosis, help them better understand their condition, and reduce their panic caused by the unknown. If the patient experiences hallucinations or confusion, keep the environment quiet and soothe them with gentle words. Meanwhile, the company of family members and the sense of security they convey to the patient are equally important. 2. Psychological intervention during the recovery period

(one week to one month after poisoning) : Provide a safe environment for the patient, encourage them to express their feelings during the poisoning period, enable them to express their feelings and concerns, listen to their experiences, offer understanding and support, and ensure that listening is done without judgment. Encourage patients to express their emotions, whether it is fear, anger or sadness, and provide appropriate emotional support and comfort. To carry out cognitive reconstruction and correct the patient's self-blaming thoughts, for instance, tell him: It's not your fault. Many people mistakenly pick wild mushrooms. By conducting popular science knowledge to reduce bad thinking and timely treatment, the risk has been greatly reduced. Next, gradual desensitization treatment will be carried out. If you develop a fear of food, you can start with a small amount of familiar food and gradually rebuild your sense of security. Encourage relatives and friends to accompany, and join the support group for poisoning survivors when necessary. 3. For long-term psychological rehabilitation, if symptoms persist for more than one month, it is recommended that patients seek the help of mental health experts, such as psychological counselors or psychiatrists. Methods such as cognitive behavioral therapy (CBT) and minds-based Stress Reduction (MBSR) can be adopted. These methods can enable patients to adjust their negative perception of poisoning events and alleviate the physical reactions caused by anxiety. At the same time, by participating in food safety science popularization activities, negative experiences can be transformed into preventive experiences, and a clear "wild fungus avoidance plan" can be formulated to help patients regain a sense of security and reduce future risks.

Through these methods, comprehensive psychological support can be provided for patients with wild mushroom poisoning, helping them better cope with the challenges brought by the disease and promoting their overall physical and mental recovery.

Education on prevention of poisoning from wild mushrooms

Finally, public education and preventive measures should not be ignored either. The most important point is preventive education, educating patients and the public about the risks of wild mushroom poisoning and enhancing their ability to identify and avoid toxic wild mushrooms [42]. By enhancing the public's ability to identify wild mushrooms, the occurrence of accidental ingestion incidents can be effectively reduced. Do not pick unfamiliar types of fungi. Choose regular markets or suppliers to avoid purchasing mixed and unknown varieties of "miscellaneous fungi", which can effectively prevent the accidental ingestion of toxic fungi. Also, participate in the mushroom-picking activities organized by local nature education institutions to learn identification skills. In addition, we should cook and consume scientifically. We should fully process it. Even if it is confirmed to be non-toxic, it should be thoroughly cooked and avoid eating it raw in cold dishes. Cook different types of fungi separately to prevent cross-reaction of toxins. Relevant institutions should strengthen the research on wild mushrooms, establish databases, and provide accurate information and guidance to help the public safely identify and avoid poisonous mushrooms [43]. If symptoms such as nausea, vomiting and hallucinations occur after consuming wild mushrooms, vomiting should be induced immediately and the patient should be sent to the hospital without delay. Also, keep samples of the leftover mushrooms or vomit to facilitate the identification of the type of toxin.

Research Progress and Challenges

Firstly, the molecular pathway by which amanitin inhibits RNA polymerase II to cause apoptosis has been clarified [44]. The development of monoclonal antibody antidotes against α -amanitin has entered the clinical trial stage. However, most toxins have no targeted antidotes, and the diversity of toxins makes the development of broad-spectrum antidotes difficult, relying on symptomatic support [45]. Meanwhile, the effect of blood purification has aroused great controversy. Blood purification is effective for Amatoxin poisoning, but has limited effect on toxins with large molecular weights (such as psilocytin). Secondly, there are also many risks in the choice of psychotropic drugs. For instance, antipsychotic drugs may mask other toxic symptoms (such as the progression of coma).

At present, the diagnostic techniques and new therapies for wild mushroom poisoning are all under exploration. Among them, the rapid detection method based on mass spectrometry in toxin detection technology can improve the diagnostic efficiency [46]. Exploration of the Application of Stem Cell Transplantation and Artificial Liver Support in Severe Cases.

Conclusion

In conclusion, the clinical first aid research on wild mushroom poisoning involves multiple aspects, including the identification, diagnosis, first aid measures, monitoring and public education of poisoning. Clinical first aid for wild mushroom poisoning requires a comprehensive consideration of the patient's condition, the type of poisonous mushroom and its toxic mechanism, timely and effective first aid measures should be taken, and subsequent monitoring and treatment should be carried out. By strengthening public education and scientific research, the incidence of wild mushroom poisoning can be effectively reduced, and the survival rate and quality of life of patients can be improved. Psychological support for

patients after poisoning from wild mushrooms is equally important. By conducting popular science on "Psychological Coping after accidental ingestion Poisoning", organizing expert lectures, and providing dual training on "identification of wild mushrooms + psychological first aid", the sense of shame and fear can be reduced in advance. Future research should continue to focus on the field of clinical first aid for wild mushroom poisoning, including rapid diagnosis and symptomatic treatment of wild mushroom poisoning, as well as improving the effect of first aid, reducing the incidence of severe cases of poisoning in patients and alleviating its harm.

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