Mushroom Poisoning in a Metropolitan Hospital

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Abstract

Objective: We aimed to investigate suspected cases of mushroom poisoning that were admitted to the emergency department of a metropolitan education and research hospital.

Material and Methods: Suspicious cases of mushroom poisoning and determined mushroom poisoning patients were investigated in the medical records of patients who were older than 18 years old in 1 year. We examined patient's demographic information, admission date, complaints, time of complaint starting, and clinical and laboratory findings. Treatments and results were evaluated.

Results: We analyzed 74 patients who were diagnosed with mushroom poisoning. The most common complaints of the patients were nausea and vomiting. İncreases in the number of admission were observed in November and December. A total of 25 patients were externed from emergency medicine, and 39 patients were hospitalized. 5 patients treatment with hemodialysis and both of them died.

Conclusion: Mushroom poisoning is known to vary according to seasonal distribution, type of mushroom, geographic shape, and climate of the region. Therefore, emergency physicians should investigate the characteristics and ecology of the region and the geographic shape, so that provision services can facility the emergency departments principles working and organizated. The importance of regional characteristics is lost in a metropolitan hospital. *(JAEM 2014; 13: 162-5)*

Key words: Mushroom poisoning, metropolitan hospital, emergency department

Introduction

It is known that there are about 5000 mushroom species in nature, and approximately 50-100 species of these are toxic. Mushrooms that are consumed as food contain protein-rich and essential amino acids. They have a low caloric value, because they do not contain fat and cholesterol. There is a belief suggesting that mushrooms are beneficial for health, since they strengthen the immune system, lower cholesterol, and inhibit coagulation (1). Our country is rich in terms of mushroom flora because of the favorable ecological conditions. It is difficult for people without sufficient knowledge about the subject to distinguish toxic and nontoxic mushrooms (2). There are no characteristics of appearance, taste, and odor in distinguishing toxic and nontoxic mushrooms. The proportion of toxic mushrooms is low, although the risk for intoxication is high in these mushrooms collected from nature because of the difficulty in distinguishing them (3). Reactions, from allergic gastroenteritis to fatal liver necrosis, might be seen, especially following intake of wild mushrooms (2, 4). *Amanita phalloides* accounts for the majority of intoxications. In the case of a suspected mushroom intoxication, the mushroom specie and the toxin must be defined, and accordingly, treatment must be planned. With early diagnosis, a multidisciplinary approach, and aggressive treatment, lives of patients could be saved (2).

The objective of this study was to examine the patients who presented to a metropolitan training and research hospital with suspected mushroom intoxication within 1 year and to review the literature about mushroom intoxications.

Material and Methods

In this study, recordings of patients aged 18 years and older who presented to the emergency department (ED) of a metropolitan hospital with suspected and then diagnosed mushroom intoxication between 01/06/2012 and 01/06/2013 were retrospectively cross-sectionally examined. The mushroom intoxication International Classification of Diseases (ICD-10) diagnosis code (T62.0; toxic effect of mushroom intake) was entered into the hospital recording system. From the obtained patients' files, demographic features (age, gender) of the patients, date of admission, complaints, symptom onset time, and clinical and laboratory findings were investigated. Among the laboratory out-

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Table 1. Patients' treatments and results by month

MONTH/YEAR			JUNE 2012	JULY 2012	AUGUST 2012	SEPTEMBER 2012	OCTOBER 2012	NOVEMBER 2012	DECEMBER 2012	JANUARY 2013	FEBRUARY 2013	MARCH 2013	APRIL 2013	MAY 2013	TOTAL
Outcome from the emergency department			5	1				6	3	3	4	2		1	25
HOSPITALIZED	No special treatment							7	17	3	4		3		34
	HEMODIALYSIS	Discharged with recovery						1	1						2
		Referred for liver transplantation						1							1
		Exitus						2							2
Total patients			5	1				17	21	6	8	2	3	1	64

comes, full blood count, renal function tests [urea, creatinine (Cr)], liver function tests [alanine aminotransferase (ALT), aspartate aminotransferase (AST), bilirubin], and coagulation panel [prothrombin activity (PA), prothrombin time (PT), activated partial thromboplastin time (aPTT) and international normalized ratio (INR)] were studied. In addition, treatment approaches and the results were evaluated. Of the inpatients, persons who did not require additional treatment and undergo hemodialysis were separately examined. Patients with missing data or for whom files could not be reached, those without mushroom intoxication, and patients under 18 years old were excluded from the study.

Statistical Analysis

The data were analyzed by using SPSS 15.0 (Statistical Package for Social Sciences, Chicago, IL, USA). Frequency distribution and percentages were used for the data analysis.

Results

In total, 74 patients were defined to be diagnosed with mushroom intoxication. Of these patients, one was excluded since he/she was under 18 years old, one was excluded because of symptoms related to the use of protein dust, one was excluded since he/she was diagnosed with allergic urticaria, six patients was excluded because their files could not be reached, and one patient was excluded from the study since she/he rejected treatment and follow-up. The mean age of the remaining 64 patients was 39.92±14.22, with 32 (50%) male and 32 (50%) female patients.

When the patients were examined according the symptoms at admission (Figure 1), the most common complaints was found to be nausea, followed by vomiting, whereas the least common symptoms were cold sweats and altered mental status.

Mushroom intoxication was most commonly seen in December (21 patients). In addition, the highest incidence of inpatients was again in December (19 patients). The second highest incidence was seen in November (17 patients), and the highest number of hemodialyses performed was again in this month. Two exitus patients and one patient who was referred for liver transplantation occurred in November. Mushroom intoxication cases were not defined from the end of summer to the beginning of autumn (Table 1).

Twenty-five patients were discharged after monitoring in the ED, while 39 patients were hospitalized and followed up. Thirty-one of the inpatients were discharged with full recovery without any problems or need for additional treatment, while 5 patients received hemodialysis. Two of the patients who had undergone hemodialysis were lost, one was referred to another center for liver transplantation, and two patients were discharged with recovery.

Table 2. Laboratory test results of the hospitalized patients

Laboratory finding	**n**
Normal	9
Decreased PA, Prolonged PT and aPTT	14
Elevated AST and ALT values	8
Decreased thrombocyte count	4
Elevated Urea, AST, and ALT values	2
Elevated total bilirubin values	1
Normal PA, Decreased PZ and aPTT	1

PA: prothrombin activity, PT: prothrombin time, aPTT: activated partial thromboplastin time, AST: aspartate aminotransferase, ALT: alanine aminotransferase.

Mean onset time of the symptoms related to mushroom ingestion was 3.24±2.23 hours in patients who were discharged from the ED and 12.46±9.22 hours in the inpatients.

When the workups of the inpatient patients who did not require additional treatment were examined, the biochemical parameters and hemograms were found to be normal in 9 patients. More than one finding might be observed in our patients. The most common finding was decreased PA and prolonged PZ and aPTT, followed by elevated AST and ALT values. Decreased PA, prolonged PT and aPP, increased urea and cretanine, and decreased thrombocyte count were remarkable, especially in our exitus patients and those who received hemodialysis. In addition, total bilirubin values were high, PA was normal, and PT and aPTT values were decreased in one patient (Table 2). Five inpatients had undergone hemodialysis. Urea, AST, and ALT values were found to be elevated in 3 patients, whereas the laboratory outcomes of 25 patients discharged from the ED were normal.

Discussion

The majority of mushroom intoxications, which are the second most common poisoning, results from ingestion of mushrooms col-

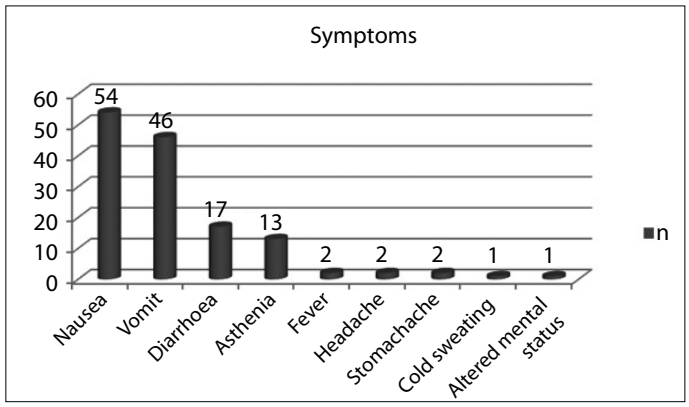

Figure 1. Complaints of patients admitted to the emergency department

lected from nature (5). The diagnosis is difficult to establish because of the broad spectrum of patients' complaints, differing from non-specific symptoms to severe liver failure signs and symptoms. The history to be received from the patients during the diagnosis is crucial (3, 4, 6, 7). In a study by Deniz et al. (3), 30 of 62 (48.4%) patients were females and 32 (51.6%) patients were males, while Erdur et al. (8) found these rates to be 50% female and 50% male; Özdemir Kol et al. (9) reported 73.1% females and 26.9% males in another study. Hocaoğlu et al. (6) found the F/M ratio to be 1.2. In our study, 50% of the patients were females, and 50% was male. The distribution of mushroom intoxication according to gender differs due to local and personal characteristics.

In a study by Deniz et al. (3), mushroom intoxication was most frequently seen between 17 and 44 years old, while Özdemir Kol et al. (9) found the mean age to be 35.65 versus 36.32 in Akdur et al. (2), 39.1 in Hocaoğlu et al. (6), 42.5 in Erdur et al.. Similarly, in our study, we found the mean age to be 39.92±14.22, consistent with other studies in the literature.

When symptoms of mushroom intoxication were examined in a study by Altıntop et al. (7), the most common symptoms were nausea, followed by vomiting and abdominal pain. In addition, they reported that patients presented with symptoms of diarrhea, fatigue, dizziness, desert mouth, hypersalivation, tachycardia, blurred vision, and mental fog. In a study by Deniz et al. (3), the most common symptom was defined as nausea, followed by vomiting, abdominal pain, diarrhea, dizziness, confusion, and sweating. In a study by Özdemir Kol et al. (9), the most common symptoms were reported to be nausea, vomiting, abdominal pain, dizziness, headache, diarrhea, dyspnea, convulsion, and mental fog. In their study, Erdur et al. (8) reported the most commonly seen symptoms to be nausea-vomiting, followed by abdominal pain, fatigue, and diarrhea. They infrequently observed blackout, blurred vision, headache, hematuria, and seizures (8). In a study by Akdur et al. (2), the most common symptoms were nausea, followed by vomiting, abdominal pain, headache, fatigue, dizziness, sweating, diarrhea, blurred vision, and salivation. Consistent with the literature, in our study, the most common symptoms were also nausea, followed by vomiting. Diarrhea, fatigue, headache, abdominal pain, cold sweating, and mental fog were among the other observed symptoms.

The seasonal distribution of mushroom intoxication shows variability depending on the regional climate conditions, geographic characteristics, and features of the mushroom specie. Studies report that mushroom intoxication increases, especially in rainy seasons. Rainy seasons differ among countries and cities (6, 8). In our study, mushroom intoxication cases were most frequent in December and November. In addition, patients who received hemodialysis, those referred for liver transplantation, and lost patients were also seen in these months. This result shows that emergency physicians should know the features, geographic conditions, and ecological conditions of the region where they work well. Thus, ED staff and the local community should be informed about seasonal emergencies. Early diagnosis and treatment of seasonal emergencies would be faster and more accurate. However, we could not see any regional feature, because this study was conducted in a metropolitan hospital; the region lets in immigrants from numerous locations of the country, and different local foods are marketed in this region. Emergency physicians working in metropolitan hospitals should remember that they can encounter various emergencies at any time and should be on the alert for these conditions.

In the literature, mushrooms causing intoxications are classified as mushrooms with early-onset symptoms and late-onset symptoms according to the onset time of the clinical signs and symptoms. Mushrooms causing symptoms within 6 hours after ingestion are classified as mushrooms with early onset, and those causing symptoms after 6 hours are classified as mushrooms with late onset of symptoms. This classification has an important place in the follow-up and treatment approaches. Early-onset mushrooms usually progress with milder clinical symptoms, and wild late-onset mushrooms present with more severe symptoms. Therefore, late-onset mushrooms require more attention (2, 3, 7-10). In our study, the mean symptom onset time was 3.24±2.23 hours in the patients discharged from the ED, while this value was 12.46±9.22 hours in the inpatients.

The most important condition to be kept in mind is that occasionally, patients might consume more than one species of mushrooms. Therefore, severe symptoms might be encountered in patients considered to have mushroom intoxication with early onset. Onset of symptoms within the first 6 hours does not rule out severe mushroom intoxication (2, 3, 7, 8, 10). Besides the onset of symptoms, knowledge of regional mushroom features would provide great benefits in making decisions for the treatment, follow-up, and discharge processes of patients. In addition, learning the mushroom specie ingested by patients, clinical manifestations, and laboratory outcomes are useful in the follow-up and discharge decisions.

Coagulation panel, full blood count, serum glucose, electrolytes, urea, Cr, ALT, and AST values must be evaluated in patients who are considered to have mushroom intoxication. The levels of blood gas and fibrinogen should be studied if needed. Although in our country mushroom intoxication most commonly occurs with the *Amanita phalloides* specie, it should be remembered that other toxic mushroom species might also be seen. If possible, the active ingredient in the gastric content causing intoxication should be analyzed. In our country, analysis of the toxic agent that leads to mushroom intoxication can not be performed in many centers (2, 3, 6-10). In our study, full blood count, renal function tests, liver function tests, and coagulation panel tests were carried out in all patients.

Patients with suspected mushroom intoxication must be controlled again within 36 hours, and their physical examinations and blood workups must be repeated. Liver damage is revealed by rapid elevation in transaminases after 24-36 hours of ingestion (2). Liver and renal failure is a serious toxic condition that might result in death (6). The type and duration of organ failure can differ depend-

ing on mushroom specie (8). In this study, workup outcomes were normal in 9 of the inpatients. The most common symptom was decreased PA and prolonged PT and aPTT, followed by elevated AST and ALT values. Decreased PA, prolonged PT and aPP, increased urea and cretanine, and decreased thrombocyte count were remarkable, especially in our exitus patients and those who received hemodialysis. This was consistent with the literature. In addition, total bilirubin values were high, PA was normal, and PT and aPTT were low in a patient, but these values were normal in the repeated workup. We believe that this was associated with the mechanical fault of the laboratory.

The first step to take in mushroom intoxication is decontamination. Gastric lavage should be performed within the first hour. Administration of repeated doses of activated charcoal is a recommended treatment principle. After this stage, symptomatic treatment gains importance. Hydration has an important place in the treatment. Penicillin G therapy is a frequently used treatment modality. Several studies report that combined use of sibilin and N-acetylcysteine are more effective. Hemodialysis could be useful in severe cases. Liver transplantation is satisfying in patients who develop liver failure (2, 3, 6-10). In our study, 39 patients were hospitalized, while 25 patients were discharged after monitoring and treatment in the ED. Hemodialysis was carried out in 5 inpatients, but full recovery was obtained in only 2 of them. One of the patients who received hemodialysis was referred for liver transplantation due to liver failure. The condition of two lost patients deteriorated rapidly, despite dialysis. We thought that the rapid deterioration in the general condition of these two patients was caused by the father and daughter eating the same mushroom meal for 3 days. The increase in the number of hospitalized patients due to mushroom intoxication in November and later was remarkable. Hemodialysis was applied in 4 patients who presented in November. Two of these patients were lost, and one patient required liver transplantation (Table 1). We believe that physicians tended to follow up patients on an inpatient basis because of the poor prognosis that was revealed during the follow-up.

Study Limitations

International Classification Diseases-10 coding to be made by personnel other than physicians in EDs leads to mistakes. Therefore, we might not define all mushroom intoxication cases. Sufficient information could not be reached, especially in patients discharged from the ED due to lack of information in the files.

Conclusion

The seasonal distribution of mushroom intoxication shows variability, depending on the regional climate conditions, geographic characteristics, and features of the mushroom specie. Many cases of mushroom intoxication could present to EDs on the same day. Therefore, emergency physicians should know the features, geographic conditions, and ecological conditions of the region where they work well to facilitate operation of EDs. However, regional features lose their importance because of the overcrowding of metropolitan areas, migration from various regions, and availability of food from almost every region. Emergency physicians working in metropolitan hospitals should remember that they could encounter various emergencies at any time and should be on the alert for these conditions.

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