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REVIEW

Herbal poisoning cases in Turkey: a narrative review

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Abstract

For centuries, humans have harnessed the diverse benefits of plants for a variety of purposes, including food, spices, medicinal remedies and home decoration. While there are thousands of plant species on Earth, some are toxic and instances of poisoning from the consumption of these toxic plants are documented in the literature. Toxic effects are often attributed to compounds such as alkaloids, anthraquinones, saponins, oxalic acid and cardioactive and cyanogenic compounds. In this research, some cases of herbal poisoning in Turkey were examined. It was observed that plants such as *Rhododendron ponticum*, *Rhododendron luteum*, *Atropa belladonna*, *Conium maculatum*, *Ecballium elaterium*, *Nicotiana rustica*, *Dieffenbachia* species *Amanita phalloides*, and herbal products such as Apple oil and Apricot seeds, are contributors to poisoning in Turkey. These cases of poisoning were observed in all age groups. Ornamental plants at home can pose a poisoning risk to children. While some poisonings result in mild symptoms, others can be life-threatening, and treatment typically focuses on alleviating symptoms and administering antidotes. Such poisonings may occur accidentally, carelessly or consciously. It is, therefore, necessary to exercise caution with poisonous plants and herbal products, and raise public awareness about their risk. Emergency medical personnel should have basic knowledge about plant poisonings, as recognizing the poisonous agent and providing prompt treatment can be life-saving in these situations.

Keywords

Herbal poisoning; Turkey; Treatment methods

1. Introduction

The most prevalent acute poisoning in Turkey are, in order: drugs, pesticides and insecticides, domestic chemicals, poisonous gases, other chemicals, plants and foods (*e.g.*, mushrooms, indoor plants, fish, wild honey and apricot seeds) and poisonous animal bites. Treatment with herbal medicines has been widely used in recent years, though it can sometimes result in fatal poisoning. Compounds contained in plants such as cardiac glycosides, alkaloids, cyanogen glycosides, saponins, anthraquinones and calcium oxalate cause poisoning [1]. Based on data from the Turkish National Poison Consultancy Center (UZEM), in 2020, 0.85% of poisonings in Turkey were attributed to poisonous plants [2]. Petersen reported that according to data from the American Association of Poison Control Centers (AAPCC) and the Cincinnati-based Drug and Poison Information Center (DPIC), approximately 3.4% of calls to the AAPCC involved plants, and a higher percentage (4.5%) involved pediatric exposures. Furthermore, approximately 70% of reported plant exposure cases occurred in children under the age of six [3]. There are thousands of plant species in the world, some of which are poisonous. Poisoning may occur due to several reasons such as chewing seeds, using them for suicide purposes, abusing them for entertainment purposes and accidentally consuming the plant. If the type of plant or herbal product is known, the application of specific treatment is the most appropriate approach, while in cases where the poisoning agent is unknown, general decontamination methods and supportive treatment are employed [4]. Dose, contact time, contact route and contact frequency are extremely significant in the determination of toxicity. Prompt and effective treatment is essential for all cases of acute poisoning. The first goal of treatment is to maintain vital functions, followed by steps to prevent further absorption of the toxin and to facilitate its elimination from the body. Subsequently, antidote treatment, if available, is the most significant approach to minimize the toxic effect [5]. In cases of poisoning, it is essential to first stabilize the airway, breathing and circulation, and to prevent further absorption of the toxin, various interventions may be employed based on the patient's condition, including gastric lavage, vomiting, intestinal lavage and activated charcoal applications. Hemodialysis, hemofiltration and hemoperfusion are applied in necessary cases to excrete absorbed poison [6, 7]. Antidotes are substances that reduce or eliminate the effects of a poison or toxin, and the timely and appropriate use of antidotes is critical for effective treatment of poisoning [8].

Herbal poisoning presents a significant challenge that impacts the global community today. It is essential for both

emergency medical personnel and the public to have greater awareness regarding herbal poisonings. Timely and accurate treatment for such poisonings can be life-saving. In this context, some herbal poisoning cases and treatment methods observed in Turkey were investigated in this study.

2. Material and methods

A comprehensive literature search was performed in the Web of Science, PubMed and Google scholar. The terms "Turkey", "Poisoning", "Plant", "Case" were used as keywords. Additionally, various books were examined as sources. Some cases of herbal poisoning in Turkey were reviewed.

3. Results

3.1 Rhododendron ponticum (mad honey) poisoning

Rhododendron ponticum and *Rhododendron luteum* (Ericaceae) are two species indigenous to the Black Sea region of Turkey. These species contain a toxic compound called grayanotoxin (andromedatoxin). Honey made from the nectar of these plants is poisonous as well. Although, this honey is traditionally used to treat various diseases such as hypertension, it may cause cardiac and cholinergic poisoning, and effective treatments for such poisoning include intravenous fluids, atropine sulfate and vasopressors [9, 10]. In a study, a family consumed mad honey for breakfast and later sought medical attention due to symptoms such as nausea, vomiting, abdominal pain and dizziness. They were treated with 0.9% Sodium chloride (NaCl) infusion, and atropine was administered to the parents due to bradycardia. The parents and their children were subsequently discharged after recovery [11]. In another case report, a 21-year-old male patient presented to the hospital's emergency department with symptoms of nausea, blackout, dizziness, cold sweats, weakness, drowsiness, bradycardia and tremors after eating two spoons of honey. He received treatment with 1 mg of atropine along with intravenous administration of 0.9% NaCl and 5% dextrose. The patient fully recovered and was discharged from the hospital [12]. In a separate report by Aksoy *et al*. [13], a 72-year-old male patient was admitted to the emergency department with complaints of dizziness, weakness, nausea, vomiting, cold sweats and fainting after eating two spoons of mad honey. As treatment, 2 mg of atropine, intravenous dopamine and saline infusion were administered and the patient was discharged after his complaints improved.

3.2 Atropa belladonna poisoning

Atropa belladonna (*A. belladonna*, Solanaceae) is a perennial herbaceous plant known for its striking purple flowers, alternately leaves, purple and semi-spherical fruits. This plant contains important alkaloids such as atropine, scopolamine and hyoscyamine [14]. *A. belladonna* causes poisoning in both adults and children, where in cases of poisoning, symptoms such as meaningless speech, mydriasis, tachycardia and flushing are observed [15]. Gastric lavage and the antidote physostigmine are commonly used to treat such poisoning [16]. A study investigated nine patients who experienced poisoning from *A. belladonna* with the majority consuming the fruit of the plant, mistaking it for another fruit. One of them deliberately swallowed the fruit. The most commonly reported symptoms were dry mouth and slurred speech, followed by other symptoms such as paresthesia of the lips, nausea, bilateral lower extremity weakness, agitation and temporary loss of consciousness. Eight of the cases were admitted to the intensive care unit and one was discharged as an outpatient [17]. In another case report, three geriatric cases were admitted to the emergency department in five days with *A. belladonna* poisoning. These patients exhibited confusion, hallucinations and meaningless speech. The first two cases involved individuals who accidentally ingested the fruit because they thought it would cure their diabetes, while the third patient mistook it for a different fruit. Due to the unavailability of therapeutic physostigmine, conservative treatment was implemented. They were all discharged from the hospital a few days later [18]. In a different case, a 64-year-old male patient was admitted to the emergency department due to poisoning from *A. belladonna*. He presented with symptoms of nausea, vomiting, headache, incoherent speech, palpitations, flushing of the body and face, and inability to urinate. He was discharged on the 4th day after gastric lavage, application of activated charcoal, urinary catheterization, and benzodiazepine treatment [19]. Additionally, a 49-year-old female patient was admitted to the emergency department with complaints of restlessness and aggression after consuming *A. belladonna* fruit. A nasogastric tube was inserted, gastric irrigation was performed, and 1 mg/kg dose of activated charcoal was administered. After the urinary catheter was inserted, 1000 cc of urine was drained, and ventilatory support treatment was applied. After 24 hours, the symptoms completely disappeared [20].

3.3 Conium maculatum (hemlock) poisoning

Conium maculatum (*C. maculatum*, Apiaceae) is a very poisonous species that contains piperidine alkaloids. All parts of the plant including fruits, flowers, leaves, seeds and roots are toxic [21]. General symptoms of hemlock poisoning, which contains alkaloids such as coniine, include tremors, vomiting, movement problems, pulse changes, rapid breathing, urination, salivation, nausea, convulsions, nervous system paralysis, coma and death [22]. In one case, a 42-year-old woman consumed *C. maculatum* which she collected from the garden, mistaking it for another plant. She was hospitalized with complaints of dry mouth, weakness and feeling ill. Despite receiving treatment, including gastric lavage, ventilatory support, activated charcoal and anticonvulsants, the patient died. The autopsy revealed damage to the brain and other organs [23]. Accidental ingestion of hemlock can lead to central nervous system depression, respiratory failure, acute rhabdomyolysis, acute renal failure and even death. Treatment for this type of poisoning is primarily supportive.

In another incident, a 3-year-old girl accidentally consumed this plant and began vomiting two hours later, eventually losing consciousness. She was discharged after 10 days following therapeutic plasma exchange, golytely-based stool passage

and antibiotic treatment [24]. Additionally, a 6-year-old girl accidentally ate *C. maculatum* and presented at the emergency department with symptoms of burning in the mouth, increased salivation, trembling hands and gait instability. Gastric lavage was performed and activated charcoal, intravenous crystalloid infusion and fresh frozen plasma were administered. The patient recovered 3 days later [25].

3.4 Apple oil poisoning

Salvia is a genus belonging to the Lamiaceae family. *Salvia triloba* (*Salvia fruticosa*, sage) is a species that grows in Turkey, and the essential oil obtained by steam distillation from the leaves of this plant is called Apple oil, which is rich in 1,8-cineole and camphor. Gall nuts are formed on the branches of this shrub and their resemblance to apples is the reason behind the name "apple oil" [26]. Apple oil is traditionally used to treat of infantile colic, characterized by restlessness, agitation and crying crisis which can be seen in the first 4–5 months of babies. The apple oil is recommended to be used by massaging 1–2 drops externally onto the soles of the feet and the abdominal area. However, incorrect application such as oral use or overdose can sometimes lead to poisoning. Apple oil poisoning may affect the central nervous system, resulting in sedation, confusion, vertigo, delirium, hallucination, tremor and seizure, or respiratory system symptoms such as pneumonia and respiratory failure.

In a study, four cases related to the misuse of bitter apple oil were admitted to the hospital and treated. It has been stated that poisonings were caused by parents' insomnia and fatigue, lack of knowledge, mixing with other oral drops, and insufficient information given by doctors [27].

3.5 Apricot seed poisoning

Certain plant species contain cyanogenic compounds that can break down into hydrogen cyanide (HCN), an extremely toxic substance. For instance, the seeds of *Prunus armeniaca* (apricot) contain cyanogenic substances [28]. Hydroxycobalamin, amyl nitrite and sodium nitrite are antidotes used in the treatment of cyanide poisoning [29]. Several pediatric patients have been admitted to hospitals with symptoms such as vomiting, loss of consciousness and convulsions following ingestion of apricot seeds. Patients were treated with methods such as oxygen support, activated charcoal and antidote application [30, 31]. Four children poisoned with apricot seeds were admitted to the hospital with complaints such as nausea, vomiting, abdominal pain, and weakness, *etc*. A 3-year-old boy and a 2.5-year-old girl were treated with nasal Continious Positive Airway Pressure (CPAP), intravenous fluid therapy and hydroxocobalamin (70 mg/kg). A 2-year-old girl with respiratory distress and loss of consciousness was intubated and given intravenous fluid therapy, dopamine (5 mcg/kg/min) and hydroxocobalamin (70 mg/kg). A 3.5-year-old girl recovered without requiring antidote treatment. All patients were discharged [32].

One other notable case involved a 3-year-old male patient who sought emergency care due to seizures after consuming apricot seeds. He was treated with Midazolam (0.1 mg/kg) and hydroxycobalamin (70 mg/kg) administered intravenously, and was discharged after 24 hours of monitoring [33].

3.6 Ecballium elaterium poisoning

Ecballium elaterium (*E. elaterium*, Cucurbitaceae) is a herbaceous plant native to the Mediterranean area. It primarily contains cucurbitacins, and has been used traditionally to treat ailments such as sinusitis, jaundice and rheumatism. Despite previous studies showing its diverse biological activities, the fruits of *E. elaterium* are known to be poisonous. [34]. The juice of *E. elaterium* can cause mucosal irritation [35].

In one case, a 46-year-old male patient presented to the emergency department with complaints of sore throat and difficulty swallowing after administering 3–4 drops of *E. elaterium* extract into each nostrils to treat sinusitis. Despite being treated with nasal oxygen and intravenous methylprednisolone and diphenhydramine, the patient developed chest pain and shortness of breath 1 day later. His treatment included ipratropium bromide, salbutamol, budesonide, pheniramine maleate and methylprednisolone [36]. In another case, a 38-year-old male patient who used *E. elaterium* juice intranasally was admitted with shortness of breath, burning and stinging sensation in the eyes, and swelling of the eyelids. He received oxygen therapy, epinephrine (0.3 mg), intravenous methylprednisolone (80 mg), and diphenhydramine (50 mg) before being discharged [37].

In another case, a 6-year-old boy accidentally ingested *E. elaterium* and was admitted to the hospital complaining of vomiting. Maintenance fluid infusion and ranitidine + sucralfate (1 mg/kg) treatment were applied. The patient was monitored and later discharged [38].

3.7 Nicotiana rustica poisoning

Tobacco plants natively belong to America but are cultivated worldwide. These plants contain a variety of secondary metabolites [39]. Although tobacco is extremely harmful to human health, it is widely used today. Nicotine is an addictive alkaloid and is found in tobacco. Certain compounds in tobacco smoke are carcinogenic, making tobacco use a severe public health concern [40]. Lung cancer, heart disease, and chronic lung disease are common in smokers. It is also known to be associated with laryngeal cancer, oral cavity, pharynx, esophagus, gastrointestinal cancer, bladder cancer, pancreatic cancer, uterine cancer and breast cancer [41]. A study conducted with primary school students in Kazakhstan, revealed that using *Nicotiana rustica* led to symptoms such as hyperemia, swelling and white plaque formation in the oral mucosa layer [42].

3.8 Dieffenbachia poisoning

Dieffenbachia species belongs to the Araceae family and is commonly referred to as the "weeping flower". This ornamental plant is widely favored for home cultivation due to its ease of growth, rapid development, and preference for shaded environments. It contains several potentially harmful compounds such as sapanosides, alkaloids, cyanogenetic heterosides, proteolytic enzymes, calcium oxalate crystals and oxalic acid. It is believed that the calcium oxalate crystals,

oxalic acid, and protease may be responsible for its poisoning effects. These compounds cause an inflammatory reaction and cause localized irritation symptoms, particularly when the plant is ingested orally or comes in contact with the eyes.

Dieffenbachia poisoning in humans or animals may cause systemic or local effects. Symptoms may arise from chewing the stem or the leaves, leading to oropharyngeal edema, pain, hypertrophy and ulceration in the oral mucosa or tongue, increased secretions and difficulty in speaking. There is no specific treatment for this type of poisoning; however, in mild cases, supportive treatment such as cold application and topical analgesics may be sufficient. In more severe cases, treatment may involve steroids, antihistamines and nebulized epinephrine. In cases of airway obstruction, intubation and tracheostomy may be required. Cases of poisoning of children who accidentally consumed the leaves of this plant are recorded in the literature [43–45].

An 8-year-old girl who had contact with *Diffenbachia* was admitted to the hospital with complaints of numbness of the tongue, swelling and redness of the lower lip, slurred speech and difficulty breathing. Methyl prednisolone (1 mg/kg) and pheniramine (1 mg/kg) were administered. The patient's symptoms improved and she was discharged after 24 hours [46].

3.9 Mushroom poisoning

Mushrooms are abundant worldwide, but certain species can be highly toxic, leading to severe poisoning. The symptoms of poisoning vary depending on the specific type of mushroom consumed. Toxic ingredients responsible for these effects include cyclopeptide, gyromitrine, muscarine, coprine, ibotenic acid, muscimol, orelline, orellanine and psilocybin. In particular, mushrooms containing amatoxin are very toxic and have a lethal risk. Consequently, consuming wild mushrooms collected from nature is an important problem. Treatment approaches can include symptomatic management, poison removal and antidote depending on the type of toxic mushroom involved [47].

The liver and kidneys are mainly damaged in *Amanita* mushroom poisoning, which contains amatoxin. Treatments for affected patients may involve hemoperfusion, hemodialysis, high doses of penicillin, activated charcoal, liver transplantation and forced diuresis. Two siblings were admitted to the hospital due to gastrointestinal complaints approximately ten hours after eating *Amanita phalloides*. Hemoperfusion treatment was applied to both cases and improvement was observed [48]. Two male patients, aged 55 and 42, who collected and consumed mushrooms in the forest area, were admitted to the hospital with complaints of nausea, vomiting, diarrhea and fatigue. The patients were successfully treated using silibinin [49].

A 44-year-old female patient was admitted to the hospital with complaints of nausea and vomiting two days after eating mushrooms. In biochemical tests; blood urea nitrogen and creatinine levels were very high. Hemodialysis and plasmapheresis were applied several times. Diuretic and oxygen therapy were also administered, and the patient recovered after 15 days [50]. A 51-year-old female, a 55-year-old male, and a 59-year-old male who consumed *Amanita proxima* mushrooms were also hospitalized with complaints of nausea and vomiting. All three patients with acute kidney injury received hemodialysis treatment and their kidney damage completely healed [51].

4. Discussion

The popularity of herbal medicine has surged in recent years. Health centers often admit patients due to complications from ingesting poisonous plants. While some cases involve low doses and are relatively minor, others can be quite severe. Poisonings may occur for several reasons, including the accidental consumption of a toxic plant mistaken for a medicinal or edible variety, or the intentional use of toxic plants for illegal activities [52]. A significant number of herbal poisoning cases are reported to emergency services globally, including Turkey. However, only a limited number of these cases are published in the literature as case reports. This study evaluates several poisoning incidents and their respective treatment methods within Turkey. The plants and plant products implicated in these poisoning cases include *Rhododendron ponticum*, *Rhododendron luteum*, *Atropa belladonna*, *Conium maculatum*, Apple oil, Apricot seed, *Ecballium elaterium*, *Nicotiana rustica*, *Dieffenbachia* species, and *Amanita* species. The symptoms, age, gender and treatment methods observed in these plant poisoning cases are summarized in Table 1 (Ref. [11–13, 17–20, 23–25, 27, 30–33, 36–38, 42–46, 48–51]).

A 42-year-old female tragically died after accidentally ingesting the highly poisonous plant *Conium maculatum*. Other patients were successfully treated and discharged. Timely and appropriate treatment is, thus, essential in cases of poisoning. Incidents of poisoning from apple oil, Apricot seed and *Dieffenbachia* sp. poisoning have been particularly noted children. Similarly, numerous cases of poisonings related to the misuse of plants and herbal products have been reported globally [53, 54]. Wendt *et al*. [55] conducted an evaluation of herbal poisoning cases received by the poison control center in Erfurt (Germany) between 2011 and 2020 years. They emphasized that healthcare professionals should exercise caution with plants notorious for their toxicity, including wolfsbane (*Aconitum*), belladonna, angel's trumpet, cowbane (*Cicuta virosa*), autumn crocus, hemlock, jimson weed, henbane, castor bean (*Ricinus*), false hellebore, foxglove (*Digitalis*) and European yew. Riet-Correa *et al*. [56] compiled a list of 219 toxic plants responsible for livestock poisoning in South America. Fatur and Kreft analyzed plant poisonings involving tropane alkaloids belonging to the Solanaceae family between 1966 and 2018. They reported that plants such as *Datura stramonium*, *Atropa belladonna* and *Hyoscyamus niger* caused anticholinergic poisoning [57]. Furthermore, Hani *et al*. [58] assessed the poisonous medicinal plants in the Shouf Biosphere Reserve (Lebanon), identifying 31 toxic plants, including *Ecballium elaterium*, *Sambucus ebulus*, *Ricinus communis* and *Arum palaestinum*. Thousands of plants thrive on Earth, some of which are toxic. The literature includes numerous cases of plant poisoning, which can generally be classified into cardiotoxic, neurotoxic, cytotoxic and gastrointestinal-hepatotoxic categories. Toxicity is often attributed to

TABLE 1. Some herbal poisoning cases in Turkey.

Plant	Consumed part	Symptoms of Poisoning	Gender/Age	Treatment/Outcome	References
Rhododendron ponticum	Honey made by bees from flowers (Mad honey)	Nausea, blackout, dizziness, cold sweats, weakness, drowsiness, bradycardia, tremors.	Male/38 years old (Father) Female/35 years old (Mother) Sisters (10 and 5 years old) Male/21 years old Male/72 years old	0.9% Sodium chloride (NaCl) Atropine (1 mg), discharged healthy. 0.9% NaCl Atropine (1 mg), discharged healthily. 0.9% NaCl, discharged healthily. 0.9% NaCl 5% Dextrose Atropine (1 mg), discharged healthily. Atropine (2 mg) Dopamine, discharged healthily.	[11–13]
Atropa belladonna	Fruits	Dry mouth, meaningless speech, mydriasis, tachycardia, flushing.	3 cases female/Between 48–68 years old 6 cases male/Between 52–86 years old Male/70 years old Female/75 years old Male/60 years old Male/64 years old Female/49 years old	Symptomatic supportive treatment was administered. The antidote physostigmine was not administered. Eight of the cases were admitted to the intensive care unit, and one was discharged as an outpatient. Fluid support, activated charcoal (1 mg/kg), low-dose midazolam for agitation, discharged healthily. Gastric lavage, activated charcoal, urinary catheterization, benzodiazepine, discharged healthily. Gastric lavage, 1 mg/kg activated charcoal, urinary catheterization, ventilatory support, discharged healthily.	[17–20]
Conium maculatum	All parts	Tremors, vomiting, movement problems, pulse changes, rapid breathing, urination, salivation, nausea, convulsions, nervous system paralysis.	Female/42 years old Girl child/3 years old Girl child/6 years old	Gastric lavage, activated charcoal, anticonvulsant/Died. 125 mL Golytely nasogastric tube (every 15 min, enteral), therapeutic plasma exchange, discharged healthily. Gastric lavage, activated charcoal, intravenous crystalloid infusion, fresh frozen plasma, discharged healthily.	[23–25]
Salvia triloba (Apple oil)	Essential oil (Leaves)	Central nervous system effects.	31 days old baby boy 25 days old baby girl 31 days old baby boy 2-month-old baby	They were monitored in the emergency service. No complications developed. They were discharged.	[27]

TABLE 1. Continued.

Plant	Consumed part	Symptoms of Poisoning	Gender/Age	Treatment/Outcome	References
Prunus armeniaca (Apricot seed)	Seeds	Vomiting, loss of consciousness, convulsions.	27-month-old baby boy 3.5 years old boy 3 years old boy 2 years old girl 3 years old boy 2.5 years old girl 3.5 years old girl 3 years old boy	Hydroxycobalamin (70 mg/kg), sodium bicarbonate, activated charcoal, fluid and oxygen support, discharged healthily. Gastric lavage, activated charcoal, oxygen and fluid support, discharged healthily. Dopamine (5 mcg/kg/min), hydroxocobalamin (70 mg/kg). Nasal Continious Positive Airway Pressure (CPAP), intravenous fluid therapy, and hydroxocobalamin (70 mg/kg). Without antidote treatment/They were discharged. Midazolam (0.1 mg/kg) and hydroxycobalamin (70 mg/kg), discharged healthily.	[30–33]
Ecballium elaterium	Fruits	Irritation in the nose, mouth and respiratory tract, edema, sore throat, increased secretion, difficulty swallowing and breathing.	Male/46 years old Male/38 years old 6 years old boy	4 L/min nasal oxygen, 80 mg methylprednisolone, 50 mg diphenhydramine, Combivent nebul (Ipratropium bromide 0.5 mg/2.5 mL, Salbutamol 2.5 mL), Pulmicort nebul (Budesonide 0.25 mg/mL), Pheniramine maleate 45.5 mg/2 mL ampoule, 80 mg methylprednisolone, discharged healthily. Oxygen therapy, epinephrine (0.3 mg), methylprednisolone (80 mg), diphenhydramine (50 mg), discharged healthily. Maintenance fluid infusion, ranitidine + sucralfate (1 mg/kg), discharged healthily.	[36–38]
Nicotiana rustica	Tobacco prepared from leaves	Hyperemia, swelling, and white plaque formation in the oral mucosa layer.	Primary school students	Unspecified.	[42]
Dieffenbachia species	Leaves	Oropharyngeal edema, pain, hypertrophy and ulceration in the oral mucosa or tongue.	7 years old boy 3 years old boy 1-year, 11-month-old child 8 years old girl	Pheniramine (1 mg/kg)/Discharged healthy. Deksametazon 0.6 mg/kg, feniramin 1 mg/kg, epinefrin 0.01 mg/kg, discharged healthily. Fluid and oxygen support, discharged healthily. Methyl prednisolone (1 mg/kg), pheniramine (1 mg/kg), discharged healthily.	[43–46]
Amanita phalloides *Amanita proxima*	Mushroom	Diarrhea, vomiting, abdominal pain, drowsiness, liver and kidney failure.	3.5 years old boy 6 years old boy Male/55 years old Male/42 years old Female/44 years old Female/51 years old Male/55 years old Male/59 years old	Gastric lavage, activated charcoal, high-dose penicillin, forced diuresis, hemoperfusion, discharged healthily. N-acetyl cysteine, benzathine penicillin G, vitamin B, silibinin, discharged healthily. Silibinin, 8% amino acid preparation, 1 unit of fresh frozen plasma, discharged healthily. Hemodialysis, plasmapheresis diuretic and oxygen therapy, discharged healthily. Hemodialysis treatment.	[48–51]

compounds such as alkaloids, terpenes, glucosides and resins. Incorrect identification of plants may lead to accidental use. To aid early diagnosis and treatment, it may be beneficial to establish a straightforward toxidromic classification scheme for plant poisonings, designed for use by emergency medical professionals [59]. The responsible health institutions of all countries/territories should identify the common poisonous plants in the vegetation of their regions and inform the medical personnel. Medical personnel should have a basic knowledge of plant poisonings, and in the event of poisoning, a poison information centre should be contacted for plant identification, risk assessment and treatment recommendations. Antidotes are available for a small number of poisonous plants. Therefore, relevant authorities should address the challenges associated with providing antidotes that can mitigate or eliminate the effects of poisoning.

5. Conclusion

In recent years, there has been a growing interest in herbal treatments. While many valuable plants in nature are used as food, spices and medicine, some have poisonous effects. It is, therefore, important to be careful about such plants and to inform the public and medical personnel. Knowing the poisonous agent and early treatment is life-saving in cases of poisoning. Moreover, health authorities should be more proactive in developing antidotes and specific protocols.

AVAILABILITY OF DATA AND MATERIALS

The data presented in this study are available on reasonable request from the corresponding author.

AUTHOR CONTRIBUTIONS

ESK—designed the research study; performed the research; analyzed the data; wrote the manuscript. The author read and approved the final manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Not applicable.

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CONFLICT OF INTEREST

The author declares no conflict of interest.

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