

The Evaluation of Fatal Vegetable Oil Poisoning in Forensic Medicine

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ABSTRACT

Fatal poisonings, commonly encountered in forensic medicine, can be of several types: caustic, medicinal, gaseous, but rarely plant-based. This case illustrates a typical picture of poisoning from a vegetable oil called "Harmel"; prescribed and used inappropriately by a young woman. Our objective is to provide a descriptive analysis of the clinical picture of the toxic impregnation of this oil and its after-effects on the body, both ante- and post-mortem, highlighting the value of multidisciplinary work. This case involves a woman of good intellectual level who suffered from joint pain. Unfortunately, instead of consulting a doctor, she was suggested to take a preparation based on a mixture of vegetable oils prepared by a herbal seller. A few days after taking and applying these oils, and unaware of the dangers of wild rue "harmel," the woman fell into a coma and died almost a week later. We will present the typical fatal picture of this poisoning during life and after this woman's death, from a clinical, macroscopic, microscopic, and especially toxicological perspective.

Keywords: Poisoning, Harmel, Clinical, Toxicology, Death

Introduction

Fatal intoxications encountered in forensic medicine are usually due to caustic agents, medications, or gases, but plant-related fatal intoxications remain rare [1].

Vegetable oils have long been consumed for nutritional, cosmetic, and therapeutic purposes. While most are safe, some oils derived from toxic plants may cause severe intoxications when ingested, inhaled, or applied inappropriately. Fatalities from vegetable oils remain rare but carry medico-legal significance, particularly in regions where traditional remedies are frequently used [2,3].

Peganum harmala (harmel) is a plant native to North Africa, the Middle East, and Central Asia, traditionally used for medicinal and ritual purposes. Its oil contains alkaloids such as harmine, harmaline, and tetrahydroharmine, which exert neurotoxic, hallucinogenic, and cardiovascular effects [4-6].



Figure 1: Botanical illustration of *Peganum harmala* (harmel) [7]

The ignorance of toxic doses and unsafe use, often without medical supervision, makes this plant potentially dangerous and sometimes fatal [8]. The forensic investigation of suspected fatal vegetable oil intoxication requires careful integration of clinical history, autopsy, histology, and toxicology to differentiate between natural, accidental, or intentional causes of death.

We report a fatal case of *Peganum harmala* intoxication, highlighting the clinical, biochemical, and medico-legal aspects, and emphasize the importance of prevention and public awareness.

Botanical and Phytochemical Background

Peganum harmala is a perennial plant producing seeds rich in β -carboline alkaloids (harmine, harmaline, harmalol, tetrahydroharmine) and quinazoline alkaloids (vasicine, vasicinone) [9,10]. These compounds have:

- **Neurological effects:** inhibition of monoamine oxidase (MAO), leading to hallucinations, tremors, seizures.
- **Cardiovascular effects:** hypotension, arrhythmias, hemodynamic instability.
- **Respiratory effects:** central depression, asphyxia, pulmonary edema.

These toxicodynamic properties explain the medico-legal findings often reported in fatal harmel oil intoxications: pulmonary hemorrhage, respiratory distress, and cardiac collapse [11-13].

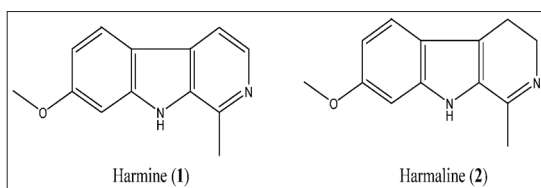


Figure 2: Chemical structures of harmine and harmaline [14]

Methodology And Case Presentation

We report the case of the patient named B.L., aged 49, admitted to the intensive care unit of the Annaba University Hospital for acute poisoning following the ingestion and repeated application of a mixture of essential oils containing "Harmel" for 5 days and this according to a recommendation from a herbalist as a treatment for knee arthralgia.

After his death, a forensic autopsy was ordered by the Annaba public prosecutor and performed. in the forensic medicine department of the Annaba University Hospital.

The case will be presented at three levels:

- Clinical observation
- Biochemical investigations
- Forensic examination (thanatological, toxicological, and histological analyses).

Results

Clinical findings

The patient presented with:

- **Digestive disorders:** severe diarrhea, persistent vomiting.
- **Neurological disorders:** hyperthermia, state of shock progressing to deep coma.
- **Cutaneous lesions:** bullous dermatosis of the neck and back.
- **Unfavorable evolution:** rapid deterioration with cardiorespiratory and renal failure, despite intensive care.

These manifestations are consistent with the known toxicological profile of *P. harmala* alkaloids [3,6].

Biochemical Findings

Laboratory investigations revealed: Polyvisceral failure, combining:

- o Renal insufficiency (elevated creatinine, oliguria).
- o Hepatic cytolysis (elevated AST, ALT).
- o Hydro-electrolytic disorders (hyponatremia, hyperkalemia).
- o Hematological abnormalities (coagulopathy).

Such abnormalities reflect the multi-organ toxicity of β -carboline alkaloids [5,15].

Forensic expertise

- Macroscopic autopsy findings:
 - o Generalized polyvisceral congestion.
 - o Gastric hemorrhage.
 - o Pulmonary edema, hemorrhagic, lesions in bronchi and alveoli.
- Histological findings :
 - o Hepatic cytolysis.
 - o Hemorrhagic alveolitis with neutrophilic infiltration.
 - o Alveoli filled with blood and inflammatory cells.
 - o Renal damage with edema and parenchymal impregnation.
- Toxicological analysis:
 - o Negative for ethanol and judicial poisons.

Indirect confirmation of exposure to *Peganum harmala* alkaloids through the exclusion of other toxins. [2,16].

Discussion

Fatal cases of vegetable oil poisoning are uncommon but clinically relevant in forensic medicine. This case illustrates the formidable toxicity of *Peganum harmala*, despite its reputation as a medicinal plant, it highlights the severe respiratory and cardiovascular consequences of harmel oil exposure, consistent with the known toxicological profile of *P. harmala* alkaloids.

In traditional medicine, the seeds are used as abortifacients, antispasmodics, and analgesics, but the narrow therapeutic index makes overdoses likely [3,4].

Cases reported in the literature describe symptoms such as neurological disorders (tremors, hallucinations, seizures, coma), digestive signs (vomiting, diarrhea, abdominal pain), and multi-organ involvement leading to death [5,15,17]. The main toxic agents, harmine and harmaline, cross the blood-brain barrier and act as reversible MAO (MonoAmine Oxydase) inhibitors, causing excessive accumulation of neurotransmitters, leading to central nervous system hyperstimulation followed by depression [6].

From a medico-legal perspective, the combination of: Absence of trauma, Pulmonary failure with hemorrhage and edema, Negative toxicological screening for common poisons, History of traditional oil ingestion, strongly supports the diagnosis of toxic vegetable oil poisoning.

Similar cases have been documented, linking harmel alkaloids to sudden death due to cardiorespiratory collapse [18,19].

This case highlights the risk associated with unsupervised therapeutic use and the need for public awareness campaigns to prevent such intoxications [16,18].

Conclusion and Recommendations

Peganum harmala remains a plant with recognized therapeutic virtues but also high toxic potential. Used without knowledge or medical supervision, it can cause serious and fatal poisoning.

Vegetable oils are often perceived as harmless, yet oils derived from toxic plants such as Peganum harmala can cause severe, sometimes fatal intoxications.

Medico-legal autopsy, histological and toxicological studies are essential for establishing causality.

- Clinicians should consider Harmel intoxication in patients presenting with unexplained multi-organ failure in endemic regions.
- Forensic experts must ensure systematic toxicological screening in suspected plant intoxications.
- Health authorities should promote education and prevention strategies regarding the risks of traditional remedies.

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