Case Report

FATAL SELF POISONING WITH FORMALIN- A CASE REPORT
Dr. RK Gadhari, Dr. AG Pathak, Dr. KM Chaudhari, Dr. NA Devraj

Authors
Dr. Ramesh Kashinath Gadhari, Assistant Professor, Department of Forensic Medicine & Toxicology, Shri Bhausaheb Hire Government Medical College, Dhule, Maharashtra, India (424001).

Dr. Ajit Gajanan Pathak, Associate Professor and Head, Department of Forensic Medicine & Toxicology, Shri Bhausaheb Hire Government Medical College, Dhule, Maharashtra, India (424001).

Dr. Kapileshwar Maganlal Chaudhari, Assistant Professor, Department of Forensic Medicine & Toxicology, Shri Bhausaheb Hire Government Medical College, Dhule, Maharashtra, India (424001).

Dr. Nilesh Ashok Devraj, Assistant Professor, Department of Forensic Medicine & Toxicology, Shri Bhausaheb Hire Government Medical College, Dhule, Maharashtra, India (424001).

Number of Pages: Four
Number of Tables: Nil
Number of Graph: Nil
Number of Photographs: Two

Corresponding Author: Dr. Ramesh Kashinath Gadhari
6, Shriraj Apartment, Vaibhav Nagar, Dhule, Maharashtra (424001).
9011610322
drrams13@gmail.com.
Case Report

FATAL SELF POISONING WITH FORMALIN- A CASE REPORT
Dr. RK Gadhari, Dr. AG Pathak, Dr. KM Chaudhari, Dr. NA Devraj

Abstract:
Formalin is a protoplasmic poison and causes coagulation necrosis, protein precipitation, and tissue fixation. Suicidal ingestion of formalin is uncommon as the general population does not have an easy access to it, and it is more often seen in people working in the health industry. Formaldehyde ingestion has only rarely been described in the literature. Hence, a case of suicidal ingestion of formalin by a 42-year-old health care worker is reported.

Keywords: suicide, formalin, corrosive

Introduction:
Commercially available formalin is a 37 to 50% aqueous solution of formaldehyde that contains up to 15% methanol. It is, however, generally referred to as 100% formalin. Formalin is a protoplasmic poison and causes coagulation necrosis, protein precipitation, and tissue fixation\(^1\). Formaldehyde has wide commercial and medical applications. It is used as disinfectant, tissue preservative\(^2\). Formaldehyde is also used as an ingredient in fertilizers, biocides, antimicrobial hair shampoos and conditioners, industrial and soil sterilants etc. Formaldehyde reacts rapidly with DNA, RNA, and proteins in biologic systems. When cells are exposed to high concentrations, cellular functions cease and necrosis is rapid. Formaldehyde may affect neural functions by condensing nonenzymatically with neuroamines, catecholamines and indolamines to form tetrahydroisoquinolines and tetrahydrobetacarbolines respectively\(^3\). It targets CNS, GI, liver, and all other organs (systemic toxicity). The ingestion of formalin causes disorders in the oral cavity, the gastrointestinal tract, liver, kidney, lung, heart, and central nervous system in the early phase of reaction\(^4\). Accidental exposure to formalin is common as an occupational hazard. Suicidal cases are uncommon as the general population does not have an easy access to it, and it is more often seen in people working in the health industry. Very few cases of suicidal formalin poisoning are reported in the literature. Hence, a case of suicidal ingestion of formalin by a 42-year-old laboratory attendant is reported.

Case report:
A 42-year-old man was brought for autopsy to the mortuary of medical college hospital. As per history provided by the police, the deceased was a laboratory attendant working at Civil Hospital and was told to have consumed unknown substance at his home. He was brought to the hospital in dead condition. Postmortem examination was conducted on the deceased the following day.

On external examination, the deceased was moderately built and averagely nourished. No appreciable external injuries were present. Body was emitting formalin-like smell. There was no oozing from nostrils, mouth and ears. Rigor mortis was present all over the body. Bluish purple postmortem staining was present over the back, buttocks and was fixed.

On internal examination mouth, pharynx, larynx and trachea showed brownish black discoloration (figure 1). Mucosa of oesophagus showed grayish black discoloration with oedematous appearance. Stomach appeared like tea-pot containing 50ml of grayish fluid with formalin smell and brownish black appearance of mucosa (figure 2). Small and large
Intestines were shrunken in size. Mucosa of intestines was grayish black in color and mucosal folds were distinctly marked. Inferior surface of the liver showed black discoloration. Lungs were heavy and oedematous. Rest of internal organs were intact. Blood and viscera were sent for chemical analysis to Regional Forensic Science Laboratory. The chemical analysis report confirmed the presence of aldehyde compound. The chemical analysis report confirmed the presence of aldehyde compound. The cause of death was opined to be due to pulmonary oedema consequent upon consumption of aldehyde containing compound.

**Discussion:**

Formaldehyde is a highly reactive substance; it may be irritating to the eyes, skin, and mucous membranes. Ingestion may cause corrosive injury to the gastrointestinal mucosa and the mucous membranes of the respiratory tract. Clinical effects of acute poisoning include hypotension and cardiovascular collapse; upper respiratory tract irritation, coughing, bronchitis, pulmonary oedema, or pneumonia, ARDS (adult respiratory distress syndrome); lethargy and coma; nausea, vomiting, and severe abdominal pain; corrosive gastritis, oedema, ulceration, and even perforation of the oesophagus may occur.

Formaldehyde is a protoplasmic poison and the cases of acute exposure to it might be through the route of inhalation and ingestion. Inhalation may cause coughing, lacrimation, dyspnoea, chest pain and wheezing. Ingestion of as little as 30 ml of 37% (approximately 2 tablespoons) formaldehyde solution (formalin) has been reported to cause death in an adult. The ingestion of formalin has caused several deaths, preceded by severe corrosive damage to the stomach and small intestine, circulatory collapse and kidney damage. Ingestion may show signs and symptoms like severe abdominal pain, vomiting, diarrhoea, haematemesis, tachypnoea, and hypotension. The stomach suffers the most severe damage in such cases because formalin is in contact with the gastric mucosa longer than other parts of the gastrointestinal tract. Gastric ulcers and mild hemorrhages are frequently seen. The phenomenon of perimortal fixation is a useful indication for the forensic pathologist and should direct the suspicion to oral poisoning. The detection of fixation facilitates toxicology screening by indicating that the relevant substance must have the capability to precipitate proteins. The “fixing” of the stomach by formaldehyde may produce delayed absorption following formalin ingestion. Formaldehyde is a corrosive material that can produce late sequelae similar to the more common ingestion of acids and alkali. In addition, renal failure is a frequent complication in severe poisoning. Skin and mucous membrane may appear whitened. At autopsy, the smell of formalin might be noticed upon opening the body. Odour...
The mucous membrane of the stomach may be red, inflamed and eroded with the extravasation of blood, or may be leathery, fixed, and hard to touch as seen in our case. The duodenum may present the same appearance as that of the stomach and histological details may be well preserved. Kidneys may reveal microscopic evidence of tubular necrosis. To confirm the presence of formaldehyde in the gastric content, a small quantity of the latter is dissolved in resorcinol in a test tube and sulphuric acid is gently poured along the sides of the tube. A red to violet colored ring will develop at the junction of the two solutions.

**Conclusion:**
Suicidal poisoning with formalin is rare due to its selective availability, strong taste and odour. Very few cases of death due to formalin ingestion are reported in literature. This case shows that the forensic expert should be alert in such cases and the proper autopsy protocol should be followed. Meticulous dissection and the proper preservation of the viscera for histopathology are indicated in such cases, which help in identifying the cause of death.

**References**