

## Fatal Formalin Poisoning: A Case Report

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Received: 12.8.2011

Accept: 20.9.2011

### ABSTRACT

**Background:** Formalin is an aqueous solution of formaldehyde. It is a protoplasmic poison and causes coagulation necrosis and tissue fixation.

**Case:** A 19-year-old girl was brought for autopsy to the mortuary of JSS Medical College, Mysore.

**Conclusion:** Formalin is an unusual poison to be ingested for suicidal purposes due to selective availability and its strong taste and odor.

**Keywords:** Effects on the body, formalin, ingestion, suicide

### INTRODUCTION

Formalin is an aqueous solution of formaldehyde containing 37-40% formaldehyde and 10-15% methanol. It is, however, generally referred to as 100% formalin. The commercial preparation usually contains 3.7% of formalin. Formalin is a protoplasmic poison and causes coagulation necrosis, protein precipitation, and tissue fixation (1). 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 (2). 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. There is not much noteworthy information in forensic toxicology on cases of suicidal formalin poisoning. Hence, a case of suicidal ingestion of formalin by a 19-year-old probationary nurse is reported.

### CASE REPORT

A 19-year-old girl was brought for autopsy to the mortuary of JSS medical college, Mysore. The history provided by the police revealed that the deceased was a probationary nurse, working in a hospital and was told to have consumed unknown chemical from the laboratory of the hospital. She was taken to another hospital for treatment, where she was declared brought dead. Postmortem

examination was conducted on the deceased girl the following day.

In external examination, the body was that of a young female, moderately built and adequately nourished. Bleeding was present from nostrils and mouth. Vomitus and blood stains were present over her clothes. Rigor mortis was present all over the body. Bluish purple postmortem staining was present over the back but not fixed. No appreciable external injuries were present. Body was emitting formalin-like smell. In internal examination, mouth, pharynx, larynx, and trachea showed grayish black discoloration. Oesophagus appeared like a narrow tube with grayish black discoloration of its mucosa. Stomach appeared like tea-pot containing 100ml of indistinguishable material with formalin smell. Small and large intestines were shrunken in size. Mucosa of both stomach and intestine was grayish black in color and mucosal folds were distinctly marked. Inferior surface of the liver showed black discoloration. Other internal organs were intact. Oropharynx, lower one-third of oesophagus, greater curvature of stomach, and small intestine were sent for histopathological examination. Blood and viscera were sent for chemical analysis to Regional Forensic Science Laboratory, Mysore.

The chemical analysis report confirmed the presence of aldehyde compound. The cause of death was opined to be due to chemical peritonitis consequent upon

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consumption of aldehyde containing compound.

## DISCUSSION

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 may show signs and symptoms like severe abdominal pain, vomiting, diarrhea, haematemesis, tachypnoea, and hypotension (1). 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 (2). 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 (3). Formaldehyde is a corrosive material that can produce late sequelae similar to the more common ingestion of acids and alkali (4). In addition, renal failure is a frequent complication in severe poisoning. Skin and mucous membrane may appear whitened (1). At autopsy, the smell of formalin might be noticed upon opening the body. Odor of formalin may be present in the stomach. 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 (5). 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 (1). This test was positive in our case, which was confirmed by the

positive chemical analysis for the aldehyde group of compounds

## CONCLUSION

Formalin is an unusual poison to be ingested in suicidal attempts due to selective availability and its strong taste and odour. Cases of mortality due to formalin ingestion are reported comparatively rare 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.

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