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DELIBERATE SELF-HARM, FORMIC ACID POISONING: A CASE REPORT

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ABSTRACT

Formic Acid is a colourless, pungent organic acid found in various industrial applications like preservatives, rubber sheet liquid etc. The case presented a 23 year old male patient was admitted in a tertiary care hospital with complaints of intake of rubber sheet acid with burns in tongue and oral cavity, hematemesis. On laboratory investigation, WBC, CRP, urine pus cells, urea, ALT, AST was elevated. On Endoscopy, showed that bilateral pyriform forsa opening positive, slough covering on pyriform forsa mucosa, presence of deep ulcers with necrosis, serosa grade III b corrosive injuries. This showed Deliberate self-harm by Formic acid Poisoning, a metabolite of Methanol which leads to metabolic acidosis, tissue damage and organ failure, particularly affecting the kidneys and liver. Plan of care was primarily NPO- TPN and cold saline gargle with other supportive medications. The patient was discharged when symptomatically better and vitally stable with advice of gradual intake of solid food and other precautions.

This case highlights the deliberate self- harm by formic acid poisoning. The mortality rate is 35.4%. Metabolism of formic acid produces formate that lead to an increased anion gap metabolic acidosis. Due to irritant property of formic acid, causes mucous membrane damage in gastrointestinal lining, characterised by ulceration and bleeding. The foremost action could be symptomatic management and supportive care. In case of self- harm or

accidental ingestion, the patient should be educated and counselled on safe handing of formic acid. Curtailing of easy availability of formic acid by proper measures could prevent these hazardous condition.

KEYWORDS: Self- harm, Formic Acid Poisoning, Hematemesis, Pyriform forsa, Ulcer.

INTRODUCTION

Deliberate self-harm (DSH) through poisoning remains a major public health challenge worldwide, especially in low- and middle-income countries, where access to toxic substances is often unregulated (Gunnell et al., 2007). Among the various agents used, formic acid poses a significant health risk due to its widespread industrial use and high toxicity. Formic acid, an organic acid commonly utilized in leather, textile, and agricultural industries, is both highly corrosive and easily accessible in many regions, making it a frequent choice in DSH cases (Bhalla et al., 2010; Shivanagouda et al., 2014).

Ingestion of formic acid leads to severe toxicity, with consequences that can range from mild mucosal injury to fatal organ damage. Due to its corrosive properties, formic acid rapidly damages the upper gastrointestinal tract, causing immediate symptoms like oral and gastric burns, intense pain, and vomiting, followed by severe metabolic acidosis, hypotension, and multi-organ failure in acute cases (Mahesh et al., 2011). Moreover, formic acid metabolizes into highly toxic intermediates such as formaldehyde and formate, which can further exacerbate cellular toxicity and acidosis (Goldfrank et al., 2010). The case fatality rate for formic acid ingestion remains high, particularly when medical intervention is delayed, underscoring the critical need for improved regulation, prompt treatment protocols, and mental health support for individuals at risk (Gupta & Palimar, 2009).

Despite the serious health impacts, limited data exists on the prevalence and outcomes of formic acid poisoning in self-harm cases. This gap highlights the need for further research and awareness on prevention strategies, as well as the provision of mental health resources aimed at reducing the incidence of DSH through formic acid ingestion (Jain et al., 2012).

CASE REPORT

A 23 yearl old male patient was admitted at Nephrology Department with history of intake of rubber sheet liquid (formic acid content), was having burns in tongue and oral cavity along with hematemesis. On physical examination breathing difficulty and cough was present Endoscopy showed bilateral pyriform forsa opening positive, slough covering on pyriform forsa mucosa, presence of deep ulcers with necrosis, serosa grade III b corrosive injuries. Elevated parameters: WBC, CRP, urine pus cells, urea, AST, ALT.

Primary management was NPO- TPN followed by cold saline gargle. For the gastric relief INJ. PANTOPRAZOLE 40mg IV BD was given. To prevent vomiting INJ. ONDANSETRON 4mg IV BD was given. For breathing difficulty, NEB BUDECORT P/N Q8H was given. For preventing infection, INJ.

CEFOPERAZONE + SULBACTUM 1.5g IV BD as well as INJ. METRONIDAZOLE 400mg IV TDS was taken. To manage inflammation, INJ. DEXAMETHASONE 8mg IV Q8H was given. For pain relief, INJ. PACTIV 1g IV BD was given. After 11 days the patient was stable, started semisolid food intake and better and discharged with T. DEXAMETHASONE 8mg P/O 1-0-1 for 1 week and then 1-0-0 for the next 1 week., T. PANTOPRAZOLE 40mg P/O 1-0-1, T. ONDANSETRON 4mg P/O 1-0-1 and cold saline gargle.

DISCUSSION

Deliberate self-harm (DSH) involving formic acid poisoning presents unique challenges in both clinical management and public health. Unlike other toxic substances, formic acid is exceptionally corrosive, causing immediate and extensive damage to tissues upon ingestion. This leads to complications such as esophageal and gastric burns, perforations, and systemic toxicity (Bhalla et al., 2010). Rapid progression to severe metabolic acidosis and multi-organ failure is common, resulting in a high case-fatality rate, particularly in low-resource settings where timely medical interventions are limited (Mahesh & Iyer, 2011; Sharma et al., 2019).

One primary concern in DSH cases involving formic acid is the severity and irreversibility of tissue damage, which can necessitate surgical interventions like gastrectomy or esophagectomy. This places a significant burden on healthcare resources and personnel, especially in hospitals lacking specialized toxicology units (Gupta & Palimar, 2009). Clinical management typically includes aggressive rehydration, correction of acidosis, and supportive care; however, even with optimal treatment, patients are at risk for complications such as strictures, chronic pain, and mental health sequelae due to the traumatic nature of their injuries (Jain et al., 2012).

Mental health issues, including depression and impulsivity, have been identified as risk factors for DSH with toxic substances. Access to hazardous chemicals like formic acid, which are widely available for industrial use, exacerbates this risk, especially in settings where regulatory controls are lax (Gunnell et al., 2007). In regions with limited mental health support and where formic acid is easily accessible, prevention strategies should include better regulation of hazardous substances and increased public health awareness about the risks associated with chemical ingestion.

Further research is needed to better understand the factors that contribute to the high incidence of DSH involving formic acid, as well as the long-term outcomes for survivors. Effective interventions may include restricting access to formic acid, implementing targeted public health campaigns, and improving mental health services to address underlying psychological factors (Shivanagouda et al., 2014). Additionally, enhancing training for healthcare providers in the management of corrosive poisoning could improve survival rates and reduce long-term morbidity associated with formic acid ingestion (Goldfrank et al., 2010).

CONCLUSION

Deliberate self-harm with formic acid poisoning is a serious public health issue due to the substance's corrosive properties and the high risk of fatal complications, including metabolic acidosis, multi-organ failure, and severe gastrointestinal damage. Management of such cases poses significant challenges, particularly in settings with limited healthcare resources. Effective prevention requires a multi-pronged approach, including stricter regulation of hazardous substances, public awareness campaigns, and accessible mental health services to address the root causes of self-harm. Improved training for healthcare providers in managing corrosive poisoning and focused research on long-term outcomes for survivors may also enhance patient care and reduce morbidity and mortality rates associated with formic acid poisoning.

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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