

## Neonatal phenol poisoning – A case report

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### ABSTRACT

Phenol is an alcohol-based inflammable liquid. It is mainly used in dyeing industries, hospital disinfectants, and antiseptic preparations. Phenol was initially used (in low concentrations) as a disinfectant in household cleaners. In rural India, it is used to prevent snake infestation. Although sociocultural differences in India between males and females are decreasing day by day due to the efforts of the central and state governments, female infanticide still exists. Here, we are presenting a homicidal case of phenol poisoning in the fourth female child.

**Key words:** *Carbolic acid, Esophageal stricture, Girl child, Neonate, Phenol*

Phenol (carbolic acid) is an inflammable, highly corrosive chemical which is well absorbed by all routes of exposure, including inhalation, cutaneous, and oral. Phenol denatures and precipitates cellular proteins and results in tissue injury [1]. Compared to adults, children are more vulnerable to toxicants absorbed through the skin because of their relatively large surface area to body ratio. Particularly, the preterm neonatal skin is more permeable to chemicals as an application of povidone-iodine causes hypothyroidism in preterm neonates. Pharmacokinetics and pharmacodynamics of chemicals and drugs are different in neonates from children and adults. Some chemicals may be less harmful in neonates due to the immaturity of cytochrome oxidase; however, most of them may cause more harm due to less glucuronidation and limited renal excretion of metabolites. Phenol causes more harm in neonates due to the limited excretion of its metabolite. Due to the high level of fetal hemoglobin, neonates are more prone to methemoglobinemia. There are very few case reports of phenol intoxication in neonates. Here, we are presenting a case of carbolic acid ingestion in a neonate.

### CASE REPORT

A 22-day-old term female baby born out of non-consanguineous marriage by spontaneous vaginal delivery to fourth gravida mother reported to the pediatrics department of the tertiary hospital in south India. The baby was admitted in view of moderate respiratory distress, dull activity, and reduced acceptance of feed. On examination, hemorrhagic papules over the face and hemorrhagic crusts over lips and angles of mouth were noted. The tongue was buffy white (yellowish-white) in colour. On auscultation, bilateral

conducting sounds were present. Mild subcostal retractions were noted. Mother's antenatal, natal, and postnatal history was not significant. Blood sugar at admission was normal.

The baby was started on antibiotic coverage after sending blood culture. The complete blood picture showed raised white blood cell count and C-reactive protein was positive. Renal and liver function tests were normal. The radiographic examination did not reveal any abnormality. As the baby was not able to accepting feeds, orogastric (OG) tube was inserted. It passed through the esophagus with some difficulty. Although baby's sucking and swallowing reflexes were normal, excessive salivation was noted. Hence, upper gastrointestinal (GI) endoscopy was planned. The endoscopy was done by the gastroenterologist in our institute, which showed circumferential ulcer with stricture in the upper third of esophagus.

The baby was put on antibiotic coverage and antacid syrup (ranitidine) and mucosal protective agents (sucralfate) were started. On follow-up, endoscopy showed a healed ulcer, and we removed the OG tube. The baby was kept nil per oral for 10 days and adequate bowel rest was given. Meanwhile, the baby was on total parenteral nutrition. The baby started accepting small amounts of milk after 10 days. Full oral feeds were established in another 3 days. The baby was discharged and follow-up was advised. We looked for other injuries by infantogram, ultrasound cranium, and abdomen. We registered the baby under medico-legal case after father confession. Written consent was taken from parents for publication.

### DISCUSSION

Phenol is an inflammable highly corrosive chemical with a sweet acrid odor. It is well absorbed by all the routes of exposure which



**Figure 1: Corroded area of the tongue and oral cavity**

may cause systemic toxicity. Phenol is a protoplasmic poison, i.e., it kills the cell by denaturing and precipitating proteins. Therefore, it causes necrosis and sloughing of tissues. The lethal dose is between 3 and 30 g, but may be as little as 1 g in the pediatric age group. If it is ingested in large amounts, the fatal period is about 3–4 h.

The diluted phenol looks white and due to its sweet acrid odor, there is the possibility of accidental ingestion. The usual mode of intoxication is ingestion [2]. Therefore, it leads to corrosion of lips, mouth, and tongue. The corroded areas have dead white to yellow (buffy-white) appearance (Fig. 1). Phenol-induced buffy white tongue should be differentiated from candida and pseudomonas infections. Cheeks and chin may be burnt due to the dribbling of phenol. GI tract involvement leads to ulcers, perforation, and strictures. Cold skin, feeble pulse, pinpoint pupil, and labored breathing are the clinical signs of acute poisoning. The initial respiratory alkalosis is followed by metabolic acidosis which results from renal excretion of the base during the alkalosis stage. In our case, we did not find any blood gas abnormalities due to late presentation, as reported by Seak *et al.* and Foxall *et al.* [3,4].

Mild exposure may cause upper respiratory tract irritation. With more serious exposure, swelling of the throat, inflammation of the trachea, tracheal ulceration, and an accumulation of fluid in the lungs can occur. Ingestion may lead to death from respiratory failure. Rogers *et al.* noticed phenol absorption in seborrheic eczema treated infants with magenta paint [5]. Doan *et al.* noted two outbreaks of neonatal jaundice due to excessive concentration of phenol in disinfectants [6]. Hinkel and Kintzel reported two newborns having cutaneous contact with phenol-containing disinfectants. A 1-day-old newborn died 11 h after application of an umbilical bandage that was accidentally soaked with 2% phenol instead of saline. Another 6-day-old infant was treated for skin ulcer with phenol containing disinfectant and developed severe methemoglobinemia, but baby survived following blood-exchange transfusion [7].

Giri *et al.* reported a case series of phenol poisoning in the pediatric age group, where acute phenol poisoning with multiorgan failure was observed and one case required hemodialysis [8].

Ünlü *et al.* reported a case in which the boy aged 11 years with xeroderma pigmentosum developed phenol toxicity due to the chemical peeling of the skin and developed cardiac arrhythmia as a complication [2]. Cardiac arrhythmia, central nervous system depression, and hemolysis are the major noticed complications in adults [9-12]. The management is mainly symptomatic and supportive care. No specific antidote is available for phenol poisoning. Decontamination should begin as early as possible to decrease phenol absorption. In cases of ingestion, emesis should not be induced as there is a chance of aspiration. Hemodialysis may be necessary to manage the complications of phenol toxicity but it will not remove the phenol from blood.

## CONCLUSION

If there is a suspected case of phenol poisoning, it is better to avoid insertion of OG tube to prevent the formation of a fistula. Kangaroo mother care, father care, and showing the baby to mother soon after delivery (her sensitive period) would strengthen the bond between parents and child until adulthood.

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