Journal of Clinical Toxicology
ISSN: 2161-0495

Yadav and Mirdha, J Clinic Toxicol 2012, 2:9
DOI: 10.4172/2161-0495.1000149

Case Report Open Access

Acute Cryptosporidiosis Following Exposure to Hydrocarbon Containing Compounds

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Abstract

Hydrocarbon poisoning may result from ingestion or inhalation and can provoke direct or indirect damage which may influence infectious diseases by altering natural resistance. Poisoning is a general term and is defined as the potential of a chemical substance in causing adverse effects on the body. Gastrointestinal manifestations, aspirated pneumonitis, symptoms of Central Nervous System (CNS) impairment, and hypoxia are frequent findings. Further, exposure to chemical substances has the potential in weakening the individual's immunity to infections produced by bacteria, fungi, parasites and viruses. Present case report highlights cryptosporidial diarrhea in a patient with hydrocarbon poisoning.

Keywords: Hydrocarbon; Poisoning; Cryptosporidial, Diarrhea

Context

Hydrocarbon poisoning is most common amongst children below 5 years of age. Hydrocarbon liquids with low viscosity (SSU<60) can spread rapidly over large surface areas and cause aspiration pneumonitis compared to hydrocarbons with SSU>60. Hydrocarbons, especially the halogenated derivatives, if ingested in large amounts, may be absorbed systemically and cause Central Nervous System (CNS) related complications or hepatic toxicity.

Case Report

A 3 year old boy weighing 11.2 kg of body weight was admitted to pediatric Intensive Care Unit (ICU) after accidental poisoning with hydrocarbon compounds "thinner," name of a commercial product made up of phenolic compound which is used for cleaning mobile phones. The child soon after consuming the "thinner" was irritable, although oriented and froth was coming out of the mouth. After sometime, the child became lethargic and developed tonic contraction of all four limbs associated with neck retraction which lasted for about 10-15 minutes. He also had an episode of Generalized Tonic Clonic Seizures (GTCS) that lasted for approximately one minute. He had two episodes of vomiting that contained approximately 100 ml of blood each time. He subsequently became unconscious, had tachypnoea (RR-72/ minute), poor pulse (PR-184/ minute, BP-120/70 mm Hg) with cool peripheries. The child developed hypotension and was administered 30ml/kg of normal saline. The chest X-ray (CXR) showed worsening with white-out right lung fields. Re-intubation with Endotracheal (ET) tube (4.5mm), fixed at 14 cm length was done and ventilation with high Positive End Expiratory Pressure (PEEP) was provided. The child in between had passed black colored urine, suggesting renal injury with metabolic acidosis and hypokalemia. His urine sample along with other clinical specimens such as vomitus and stool were also sent for microbiological investigations. None of the samples provided any significant findings. His serum potassium was 2.8 mmol/L. A diagnosis of aspirated pneumonitis was made.

On 25th day of the hospital stay in ICU, the child complained of watery diarrhea. The child was febrile with no chills and rigor and had occasional episodes of vomiting, but showed no signs of any abdominal discomfort. Brochoalveolar Lavage Fluid (BALF) was examined that grew only *Candida tropicalis* on culture. The urine culture was sterile. Direct stool examination was negative, however, the Modified Acid Fast (MAF) smears of the stool specimens were positive for oocysts of *Cryptosporidium* species. Speciation of *Cryptosporidium* species was performed by Polymerase Chain Reaction (PCR) assay using Small Sub-Unit ribosomal (SSU rRNA) and Dihydrofolate Reductase (DHFR) as the target genes. It was identified as *Cryptosporidium parvum*. The child was treated with nitazoxanide (200 mg/ BD) for 7 days and the diarrheal episodes resolved successfully. The child was HIV seronegative and had no evidence of any immunodeficiencies. This episode of diarrhea was not a hospital-acquired one.

Discussion

More than two million human poisoning exposures have been reported annually by the toxic exposure surveillance system of the American Association of Poison Control Centers. Of these, more than 50% cases occur in children of 5 years of age or younger [1]. All cases of accidental or non intentional poisoning that result from use of drugs and/or chemical substances by children less than 5 years of age is often due to curiosity [2]. The cause and types of poisoning vary in different parts of the world depending upon the demography, socioeconomic status, cultural factors, belief and customs [3]. A seasonal distribution of hydrocarbon poisoning has also been postulated. There is a higher risk of hydrocarbon poisoning during summers [4,5] as children consume hydrocarbon compounds inadvertently considering the liquid for water. In the present case also, the child felt thirsty after eating some snacks and consumed the hydrocarbon compound kept stored in a bottle on the floor, within the reach of the child.

There are a number of evidences that demonstrate the rapid onset of clinical symptoms after hydrocarbon vapor inhalation or liquid ingestion and/or aspiration [6,7]. Physical properties of such

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Received November 22, 2012; **Accepted** December 26, 2012; **Published** December 28, 2012

Citation: Yadav P, Mirdha BR (2012) Acute Cryptosporidiosis Following Exposure to Hydrocarbon Containing Compounds. J Clinic Toxicol 2:149. doi:10.4172/2161-0495.1000149

compounds such as high volatility, low viscosity, and low surface tension, allow hydrocarbons to penetrate into distal airways and spread over a large area of lung tissues [8] that causes respiratory distress and throat congestion. Hydrocarbon ingestion can result in aspiration pneumonitis. Gastrointestinal manifestations like nausea, vomiting, abdominal pain and diarrhea have been attributed to mucosal irritation [4]. The etiology of CNS symptoms (headache, dizziness, restlessness, seizures, and coma) are however, not clear, but hypoxia has been suggested as one of the probable cause [9].

Exposure of such chemical substances is also capable of inducing immune abnormalities including immune suppression in humans and animals, potentially compromising the organism's resistance or immunity to infections produced by biological agents such as bacteria, fungi, parasites and viruses [5,10-12]. However, phenolic hydrocarbon compounds cause only immunotoxicity in the host and do not cause significant immunosuppression [13]. Parasitic infections posing as a serious threat to the hosts under certain circumstances have not been clearly delineated. Little information is available to prove the simultaneous effects of parasites and pollutants on the physiological homeostasis of the organisms. Laboratory studies on "eels" experimentally infected with the swimbladder nematode *Anguillicola crassus* revealed that toxic chemicals such as polychlorinated biphenyls produce immunosuppressive effects which might facilitate parasitic infection. Furthermore, pathogenic parasites are able to elicit physiological changes that are attributed to chemicals with endocrine disrupting activity. The most thoroughly documented examples of endocrine disruption in wild fish are in roach, and that the disruption is caused not only due to chemical activity but also due to parasites such as *L. intestinalis* or species of the phylum Microspora [14].

In the present case, the child may be asymptomatic for cryptosporidiosis when he was admitted in the ICU after accidental hydrocarbon poisoning. The incidence of asymptomatic cryptosporidiosis in children as reported from India is as high as 0-9.8% [15-20]. Accidental exposure of the child to the hydrocarbons weakened his immunity for cryptosporidosis as he developed infection during his stay in the ICU. The other possibility could be that the infection due to *Cryptosporidium* was a hospital-acquired one. The precise source of infection however, could not be ascertained. Water supply of the hospital tested negative for *Cryptosporidium*. Poor diaper-changing and hand washing practices by nursing-staff could be the plausible source of nosocomial cryptosporidiosis. There is evidence in the literature suggesting nosocomial patient-to-patient transmission [21-25].

The most common source of accidental poisoning in children is kerosene [26], organophosphates (insecticides) and other hydrocarbon compounds. One of the study carried out by Singh et al [6] showed that 25.3% of all childhood poisonings were due to hydrocarbons [6]. Hydrocarbons were the agents of poisoning in only 0.9% case in a study reported from Columbia [2]. To the best of our knowledge, this is the first case of hydrocarbon poisoning associated with acute cryptosporidial diarrhea.

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