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A REVIEW ARTICLE ON KEROSENE POISONING

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ABSTRACT

Kerosene poisoning is common problem in India. It is generally used for suicidal and homicidal purpose by pouring it on mouth and by burning clothes. Accidentally it is consumed by children mistaking it for water. Kerosene is a flammable liquid which is used in many industries and homes around the world as a fuel for light, heat and power. It is generally non-viscous and clear. Kerosene is also known as paraffin or kero. Kerosene is derived from coal, oil shale and wood, it is primarily derived from refined petroleum. It boils between 302ºF and 527ºF. Kerosene has low surface tension and liquid at room temperature. Kerosene is irritant to the gastrointestinal tract and if absorbed in systemic level depresses the central nervous system and if it is aspired it will be fatal to human beings. On account of its low surface tension and high vapour pressure even a few millilitres of kerosene entering in respiratory passage will spread throughout the lungs resulting in severe pneumonitis. Kerosene is not readily absorbed after ingestion so in treatment demulcents should be given to the patient. In kerosene poisoning gastric lavage is contraindicated because of Aspiration pneumonitis. For this poisoning symptomatic treatment should be done. Thus in this article review the major problems that would occur due to kerosene poisoning will be discussed.

KEY WORDS: Kerosene Poisoning, Suicidal, Homicidal, Gastric Lavage, Pneumonitis etc.

INTRODUCTION

Kerosene is aliphatic hydrocarbon obtain from fractional distillation of petroleum. It has low surface tension, low viscosity[1], liquid at room temperature[2], pale yellow or colourless, odourless, density 0.78-0.81g/cm^3.[3] It is soluble in organic solvent and is most common accidental poisoning in children by mistaking it for water.[4] It is irritant to the gastro-intestinal tract and if absorbed, depresses the central nervous system. Aspiration into the lungs is particular danger to the human beings. On account of its low surface tension and high vapour pressure even a few millilitres of kerosene entering in respiratory passages will spread throughout the lungs resulting in severe pneumonitis. It is not readily absorbed after ingestion, so demulcents should be used to reduce absorption. Its poisoning produce nausea, vomiting, diarrhoea, pulmonary pneumonitis and depression in the central nervous system. It is vital to prevent aspiration into the lungs therefore do not attempt gastric lavage in conscious or subconscious patient. When the patient is unconscious to allow endotracheal intubation following which gastric aspiration and lavage may be performed.[5] There is no specific antibiotic for kerosene poisoning, so symptomatic treatment should be done.

ROUTE FOR KEROSENE POISONING

1) INGESTION

In the absence of aspiration, about 40-60 ml of kerosene can be tolerated without any significant systemic effects.[6] Sign and symptoms usually begin within 30 minutes and may progress during the first 24-48 hours and then subside in next 1-2 weeks.[7]

- Patient feel Kerosene taste, burning sensation in the throat, nausea, vomiting, colicky pain, diarrhoea.
- Breath, vomit and urine have smell of kerosene.
- Fever.
- Lungs – main organ system affected.
- Bronchospasm.
- Chemical pneumonitis.
- Pulmonary oedema.
- Atelectasis.
- Dyspnoea, tachypnoea, gasping, coughing and choking indicate aspiration.
- Cyanosis.
- Intercostal retraction.
- Nasal flaring.
- Heart- Dysarrhythmias, kerosene sensitizes the myocardium to endogenous catecholamines producing dysarrhythmias. Myocardial function may

also be depressed resulting in a poor left ventricular ejection fraction.

- Central nervous system- Neural tissue is rich in myelin (lipid). Myelin is dissolved by kerosene. This causes depression of CNS and ventilation drive.
- Depression of CNS leads to – giddiness, weakness, drowsiness.
- Depression of ventilation drive leads to – cyanosis.[8]
- Pupils are at first contracted, but become dilated when coma supervenes.[9]
- Skin lesions (bullae, blisters and burns) – kerosene (like allo hydrocarbons) is lipophilic in nature. Hence it dissolves the lipids present in the stratum corneum making the skin more vulnerable to drying. This in turns leads to skin lesions varying form.
- Bullae
- Blisters
- Maculopapular rash
- First degree burns
- Chronic eczematoid dermatitis with redness
- Itching and inflammation
- Kidney – renal damage results in type 2 renal tubular acidosis
- Autonomic dysfunction – hypotension.[10]

2) INTRAVENOUS OR SUBCUTANEOUS INJECTION

Vesicles and blisters, necrotizing fasciitis, abscess at the injection site, lethargy, drowsiness, pulmonary oedema, chemical pneumonitis, acute renal failure, hepatocellular damage, intracellular haemolysis, gastric ulcers, cardiac toxicity, tonic-clonic seizures and unconsciousness.[11]

3) ASPIRATION

- Aspiration of even 0.2 ml of kerosene can produce chemical pneumonitis. Depending upon severity, the picture varies from mild tachypnoea, coughing to dyspnoea, cyanosis and pulmonary oedema.
- The inhalation of kerosene may produce dyspnoea, fever, severe hypoxia, bilateral pulmonary infiltrates and a notable decrease in differential leucocytes count. These features usually resolve spontaneously.[12]
- Kerosene is sometime "sniffed" by addicts.[13]
- Inhalation of fumes causes headache, vertigo, nausea, vomiting and lung complication followed by intense excitement, hallucinations and convulsions. In fatal cases, cyanosis, unconsciousness and coma precede death[14] sometime elation may occur.[15]

DIAGNOSIS

X-rays

- Changes may be evident as early as 30 min after exposure, and sometimes may precede clinical symptoms.
- Chest
- Perihilar densities.
- Bronchovascular marking.
- Pneumonic consolidation.
- X-ray of abdomen gives the classical double bubble sign [two liquid densities in the stomach-air:kerosene and kerosene:fluid. Air is lightest, then kerosene and finally fluids].
- Arterial blood gases – hypoxemia.
- Blood- leucocytosis during first 48 hours.[16]

TREATMENT

- In case of cutaneous exposure, decontamination is done by removing the clothing and thoroughly washing the skin with soap and water.
- In case of inhalation, the patient must be removed to the open air and artificial respiration is given. The rest of the treatment is symptomatic.[17] Oxygen and nebulised bronchodilators, chest x-rays to assess pulmonary effects.[18]
- In case of Ingestion, supportive measures are the lifeline of treatment. The patient need to be observed for at least 24h in the hospital for any signs of kerosene toxicity.

  Gastric lavage and emesis are contraindicated, except:
- When the patient presents within one hour of ingestion or large amount has been ingested.
- When the patient is in coma.
- When kerosene mixed with pesticides, heavy metals and other toxic substances.[19]
- When the ingested hydrocarbon contains benzene, toluene, halogenated hydrocarbon or other toxic compounds. (The stomach should be washed carefully with warm normal saline, avoiding aspiration to the lungs by keeping the head low. Oils or fat should not be given, instead liquid paraffin and smashed banana is advised as it delays absorption).[20]
- In no case, should it ever be done without intubation, as there is a risk of aspiration.
- Activated charcoal has a limited role in the management of kerosene ingestion, as it poorly adsorbs most hydrocarbons.[21]
- Milk, starch, egg-white, mineral oil, milk of magnesia, aluminium hydroxide gel etc, act as demulcents they form a protective coating on the gastric mucous membrane and thus do not permit the poisons to cause any damage. Fat and oils should not be used for oil soluble poisons, such as kerosene.[22]
- Bacterial pneumonia is uncommon. Prophylactic antibiotic therapy is not recommended. Antibiotics are indicated in limited situations, like malnutrition or immuno-compromised state. If fever occurs, give specific antibiotic.
- Corticosteroids are not recommended, except when administered concurrently at the time of aspiration.
- Bronchodialators are used for chlorinated or fluorinated solvent intoxication.
- Oxygen therapy is given in hypoxemia.[23]

COMPLICATION

- Aspiration pneumonitis is the most common complication of kerosene ingestion, followed by CNS and CVS complications.
- Respiratory: Aspiration and lungs injury secondary to pneumonitis. Secondary effects of lungs include pneumothorax, pyopneumothorax, pneumatocele or bronchopleural fistula.
- CNS: Seizures, encephalopathy and memory loss.
- CVS: myocarditis and cardiomyopathy.[24]

MEDICOLEGAL ASPECTS

- Most fatalities are accidental.
  In north India, it accounts for 50% of infants and children brought to hospital for accidental poisoning, ho have taken kerosene mistaking it for water. However, ingestion of large quantities is unusual because of its foul taste (rarely consume more than 30 ml).
- Kerosene is occasionally used for self-immolation and suicidal purpose (IV injection has also been reported).
- Homicidal attempts by pouring kerosene on clothes and igniting them are common in case of dowry deaths in India.
- Inhalation of volatile hydrocarbon is common abuse in adolescents and young adults for recreation, similar to drugs and alcohol.
- Aspiration may occur during attempt to siphon of gasoline.[25]

MEDICO-LEGAL SIGNIFICANCE

If a parent has stored kerosene oil negligently resulting in accidental intake by a child, he is liable to be prosecuted u/s 284 of IPC (negligent conduct with respect to poisonous substance; six month and /or 1000 rupees).[26]

POST MORTEM APPEARANCES

- Acute gastroenteritis.
- Stomach: petechial haemorrhages with congested mucosa.
- Lung petechial haemorrhages, congested, oedematous and bronchopneumonia.[27]
- Odour of the material may be observed in the contents of the stomach and lungs.
- Pulmonary oedema and bronchopneumonia are present.
- Hypoplasia of the bone marrow usually occurs after prolonged inhalation of high concentration.
- Asphyxia.
- The lungs and the brain together with other viscera should be preserved for chemical analysis in saturated saline.
- Degenerative changes in the liver and kidney.[28]

FATAL DOSE

30-100 ml. Fatality rate is low. Children younger than four year old are more often effected.[29]

FATAL PERIOD

One day.[30]

CHRONIC POISONING

It can occur in person who is handling petroleum products.

Symptoms are weakness, dizziness, pain in limbs, peripheral numbness, paresthesias, weight loss and anemia.

Cardiomyopathy, cerebellar atrophy, dementia, cognitive deficits and peripheral neuropathy are seen with chronic hydrocarbon inhalant abuse.

Treatment requires isolation of the patient from exposure and symptomatic management.[31]

DISCUSSION

Kerosene is derived from petroleum and it is widely used for commercial and domestic purpose. It is used for lightening, heating purpose in household. Commercially it is used as jet engine fuel, thinner in paint and some time it is used as fire entertainment in circus. Some time peoples use it for homicidal and suicidal purpose and accidentally uses by children. Kerosene cause very harmful effect to the effected person. At that condition patient should be immediately refer to hospital. In burning case firstly decontaminate the body then symptomatic treatment should be done. If patient swallowed, kerosene gastric lavage is contraindicated due to aspiration, demulcents should be given which reduce the absorption of kerosene. If patient aspire kerosene antibiotics, corticosteroid and bronchodialator should be given.

CONCLUSION

Keep kerosene away from children with proper labelling. Worker should be use mask, in petroleum depot. Fire entertainment must be prohibited by government. In burning cases patient should keep in ventilated place and decontaminate the patient. In ingestion cases patient should not be go for gastric lavage, immediately provide proper oxygen and refer to hospital. In inhalation cases patient should provide oxygen, antibiotics, corticosteroid and bronchodialator.

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