

ACCIDENTAL KEROSENE OIL POISONING IN CHILDREN – A STUDY

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ABSTRACT: CONTEXT: Accidental kerosene oil poisoning continues to be common childhood menace. In third world countries the substances ingested reflect the toxic substances available in the home for instance in India, kerosene is the principal toxin of all poisoning. Highest incidence of kerosene oil poisoning is observed in low socio economic status. The major toxicity of kerosene is its potential to cause pneumonitis when aspirated. Radiological changes may be observed as early as 45 minutes after ingestion, the commonest being basal infiltrates. **AIMS:** The objective of our study was to know the pattern, clinical profile and radiological changes in kerosene oil poisoning in children. **SETTINGS & DESIGN:** Prospective Observational study conducted at Pediatric ward at KIMS Hospital Hubli.

KEYWORDS: Kerosene Oil, Poisoning, Foley's criteria, Children.

MESHTERMS: kerosene oil, poisoning, children.

INTRODUCTION: Accidental kerosene oil poisoning continues to be common childhood menace in India.¹ In developed countries, medicines are the leading cause of childhood poisoning² because in those countries the average home contains several containers of medicines. In third world countries, however the substances ingested reflect the toxic substances available in the home³ for instance in India, kerosene is the principal toxin of all poisoning. Highest incidence of kerosene oil poisoning is observed in low socio economic status as kerosene oil is cheapest and readily available for cooking and lighting purposes. Moreover it is stored in containers meant for drinking water, medicinal bottle and left carelessly. These containers remain within easy reach of curious and active children.

The major toxicity of kerosene is its potential to cause pneumonitis when aspirated, kerosene inhibits surfactant resulting in alveolar collapse, ventilation perfusion mismatch and subsequent hypoxemia. Patient who aspirate generally have cough and choking followed by the tachypnoea, grunting respiration, nasal flaring, chest retraction and may have cyanosis. Kerosene inhibits surfactant resulting in alveolar collapse, ventilation perfusion mismatch and subsequent Hypoxemia.

Bronchospasm and direct capillary damage lead to chemical pneumonitis, hemorrhagic bronchiolitis and alveolitis. Haemoptysis and pulmonary odema may be observed in severe cases. Other complications like pneumatocele, pleural effusion, pneumothorax, pneumo-mediastinum and subcutaneous emphysema may develop. Radiological changes may be observed as early as 45 minutes after ingestion. The commonest being basal infiltrates, other changes like extensive bronchopneumonia, pleural effusion, pneumatocele and pneumothorax may be seen.³

Though many studies are available we undertook the present study to see whether our results are on par with other studies undertaken in India. The objective of our study was to know the pattern, clinical profile and radiological changes in kerosene oil poisoning in children.

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MATERIALS AND METHODS: Twenty three patients with history of consumption of kerosene oil who were admitted to pediatric medical wards KIMS Hospital, Hubli, from April 2000 to September 2001 were included in the study. Findings related to age, sex, socio- economic status, literacy of parents, amount of kerosene ingested, time lapse (duration from consumption to hospital admission) were noted.

Chest radiograph were taken. Chest radiograph if found abnormal or with signs of clinical deterioration, chest radiographs were repeated to know progression or resolution. Chest radiographs were repeated by single competent radiologist to minimize inter-observer bias. The extent of lung involvement was classified as per Foley's criteria (Grade I – Normal radiograph, Grade II – Less than 10% of lung involvement, Grade III – 10-30% of lung involvement, Grade IV – More than 30% of lung involvement)

All patients were observed for a minimum of 24 hours. Gastric lavage was not done. Symptomatic and supportive treatment was given, antibiotics antipyretics, bronchodilators were given when needed. Children with mixed poisoning, homicidal poisoning and children who had already lower respiratory infection prior to consumption of kerosene oil were excluded from the study.

Statistical analysis: Proportions (%) were calculated for various data collected. Standard error of proportions was used to determine significance whenever applicable.

RESULTS: Kerosene is the most common accidental poisoning followed by insecticide and weed killer (Table No 1). The peak incidence of 65.22% (15 cases) occurred in the age group of 13-18 months, no cases were found in <1year and >3 years.

Incidence of poisoning in children from lower and lower middle socio-economic status groups was more. Incidence of poisoning according to socio-economic Status using modified Kuppuswamy's classification-Lower-lower: 2(8.70%), Upper-lower: 12(52.17%), Lower-middle: 8(34.78%), Upper-middle: 1(4.35%), Upper: 0(0%). Kerosene poisoning was more common in the urban population. Incidence of poisoning in Rural: 7(30.43), Urban slums: 7(30.43) and Urban: 9 (39.13).

Kerosene poisoning was more common where both the parents were illiterate. Both illiterate: 12(52%), Mother illiterate: 6(26.09%), Father illiterate: 0(0%) Both literate: 5(21.74%). A time lapse of 1 to 4 hours was seen in majority of the poisoning cases. (Table No 2). Fever, cough, vomiting and drowsiness were seen in majority of the cases (Table No 3). Basal infiltrates was seen in 78.26% of radiological findings in kerosene oil poisoning (Table No 4)

DISCUSSION: In India, while the most pressing and commonest problems remain those related to infections and malnutrition, accidental poisoning is one of the important emergencies encountered in children. Hospital statistics reported periodically from different parts of the country indicate the incidence of kerosene poisoning from 0.25%⁴ to 7.64%⁵ of admissions.

In the present study the incidence of kerosene poisoning is 41.07% and is the most common poisoning, this correlates with other studies in which kerosene was the single most common culprit. On the contrary studies from U.S.A though showed high incidence in earlier

years of 1950's there was sudden drop in overall incidence by late 1950's. Since then poisoning by petroleum products is a rare cause in U.S.A.^{2, 6}

The present study correlates with other studies in which majority of the patients are between 1-3 yrs. In our study all were 1-3 years.⁷ The occurrence of poisoning related to the development stages of the child. As the infant starts crawling and walking around one year of age, his activity and curiosity increases and lead him to explore unfamiliar objects by putting them into his mouth. By about 2 1/2 to 3 years of age the child's motility and ingenuity allow him access to cupboards or shelf despite apparent hurdles and the impulsiveness characteristic of that age may lead to disaster.

These entire factors explain highest incidence between 1 to 3 years. Children above five years kerosene poisoning does not occur unless they are mentally subnormal. The lowest incidence of cases below 1 year of age can be related to greater supervision by caretakers, infant's inability to reach for things.

In the current study, the children from lower and lower middle socio economic groups were the major sufferers with 95.55% of total cases. This is in conformity with earlier studies.^{8, 9} The factors responsible were parental illiteracy, conducive environmental factors and ignorance about safety keeping and dangers of kerosene oil consumption.

86.95% of patients reported to the hospital within 4 hrs of consumption. Two cases (8.7%) reported after one day when they developed symptoms like fever. Increase breathing, chest retraction. Those who reported late had complication like pneumonia and had prolonged stay in hospital. This is in accordance with other studies.^{2, 6} In malnourished children the body response to toxic insult like kerosene poisoning may be impaired so they show slow recovery. This is in accordance with other studies⁹

The extent of radiological involvement as per Foley's criteria in our study is: Grade I - 8.70%, Grade II- 60.87%, Grade III- 13.04% & Grade IV- 17.39%. The extent of radiological involvement as per Foley's criteria has prognostic value, as the grade is more the patient had prolonged stay in the hospital. There is positive correlation between extent of radiological involvement and duration of stay in hospital ($r=0.67$).

CONCLUSIONS: Multi-factorial causation of kerosene oil poisoning and interaction of host, agent and environment factors is very much evident. Kerosene oil still remains the single most common substance causing accidental poisoning in childhood. Kerosene poisoning usually happens when it is kept haphazardly in container which are easily within the reach of children who are curious, impulsive and exploratory during their 1-3 years life period. Children tend to mistake kerosene for water, so all these containers like bottle lamps, water bottle containing kerosene should be kept away from the reach of children.

Incidence of kerosene poisoning is very much high among lower socio-economic groups. Literacy of parents play vital role in preventing kerosene oil in children. The use of prognostic score and Foley's criteria can be utilized to predict the morbidity and mortality of kerosene oil poisoning. This may require large multicentric studies before it is recommended. As asymptomatic pneumonitis is common, it is essential to subject the patient to X-ray of chest.

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Kerosene poisoning should be prevented rather than treated. Education Programmes aimed at parents and other family members must disseminate knowledge of hazards of kerosene oil, safety keeping and when consumed never to induce vomiting.

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Nature / type of poisoning	Cases	
	No. of cases	Percentage (%)
Kerosene poisoning	23	41.07
Insecticide and weed killers (O.P)	15	26.78
Croton seeds	12	21.42
Turpentine	2	3.57
Mushroom	1	1.79
Food poisoning	1	1.79
Copper Sulphate	1	1.79
Alcohol intoxication	1	1.79
Total	56	100

Table No 1: Nature and types of poisoning during the study period

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Time pass	No of cases	Percentage (%)
< 1 hours	8	34.78
1-4 hours	12	52.17
5-8 hours	0	0
9-12 hours	0	0
13-16 hours	0	0
17-20 hours	0	0
21-24 hours	1	4.35
>24 hours	2	8.70

Table No 2: Time lapse between ingestion and reporting

	Clinical features	No. of cases, Percentage (%)
General	smell	20 86.96
	Fever	17 73.91
	Tachycardia	4 17.39
	Cough	22 95.65
respiratory system	Increases breathing	16 69.57
	Chest retraction	8 34.78
	Adventitious sounds	10 43.48
	Bronchial breathing	5 21.74
	Crepts and rhonchi	5 21.74
Central system	Cyanisis	0 0
	Drowsiness	21 91.30
	Irritability	0 0
	Unconsciousness	0 0
	Convulsion	0 0
Gastro intestinal system	Vomiting	14 60.87
	Abdominal distension	1 4.34
	Abdominal pain	1 4.34

Table No 3: Clinical features

Findings		Right	Left	Bilateral	Total	%
Major findings	Normal				2	8.70
	Extensive Bronchopneumonia				1	4.35
	Basal infiltrates	6	3	9	18	78.26
	Parahilar infiltrates			2	2	8.70
Additional findings	Emphysema	2	1	5	8	34.78
	Pneumatocele		2	1	3	13.04

Table No 4: Radiological findings in kerosene oil poisoning

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	Grade I Normal	Grade II < 10%	Grade III 10- 30%	Grade IV >30
Cases	2	4	3	4
Percentage (%)	8.70	60.87	13.04	17.39

Table No 5: Extent of radiological involvement as per Foley's criteria

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