Original Articles

Socio-demographic factors, symptoms, complications and treatment of kerosene oil poisoning in children: A hospital based cross-sectional study

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Abstract

Objective: To assess the contribution of social and demographic factors and to describe the symptoms, complications and treatment of kerosene oil poisoning

Method: This is a cross-sectional study of children with kerosene oil poisoning who were admitted to College of Medicine and JNM Hospital in Kalyani, India during a one year study period. Data was analyzed by descriptive statistics.

Results: There were 64 children with kerosene oil poisoning during study period. There were 72% males, 75% toddlers and 72% families below the poverty line. Incidence was 62.5% in summer and in 43.8% cases kerosene was stored in transparent water containers. Fever was present in 26.6%, respiratory distress in 22% and pneumonitis in 15.6% children. There were no deaths.

Conclusions: In our study 15.6% children developed pneumonitis. In 65.6% instances the kerosene oil was mistaken for water or cool drinks. There were no deaths.

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(Key words: kerosene oil, poisoning in children)

Introduction

Poisoning can be defined as taking or being otherwise exposed to a substance or substances which are injurious to a person's health[1]. All cases of poisoning that result from accidental use of drugs and chemical substances or the use of drugs by children due to curiosity are known as accidental or non–intentional poisoning[2]. Whereas household products like petroleum distillates are the leading causes of poisoning in developing countries, drugs are most commonly implicated in developed nations. In this regard, kerosene was found to be the most frequent cause of poisoning in India[3]. Kerosene is a petroleum distillate hydrocarbon that is a central nervous system depressant in high doses and a gastrointestinal and respiratory tract irritant. In India kerosene is used extensively for heating, cooking, lighting and is thus readily available in most households.

Objective

To assess the contribution of social and demographic factors and to describe the symptoms, complications and treatment of kerosene oil poisoning.

Method

Study design: Cross-sectional study. The study is checked by STROBE Checklist for observational study.

Setting: The study was conducted at the Department of Paediatrics, College of Medicine and JNM Hospital, Kalyani, India.

Study period: 1 year (January 2013 to December 2013).

Participants: Subjects of the study were children under 12 years of age who were admitted due to kerosene oil ingestion during the study period.

Data analysis: The data was entered into register and presented by descriptive statistics. All numeric values are expressed in exact number (n) or percentage (%). Categorical variables were compared using X^2 test. $P < 0.05$ was considered as statistically significant.

Results

Sixty four children under 12 years of age were admitted due to kerosene oil ingestion during the

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study period. Socio-demographic characteristics of the children and their parents are shown in Table 1.

Table 1
Socio–demographic characteristics of children and parents (n=64)

Socio–demographic characteristic	Number (%)
Child gender	
Male	46 (71.9)
Female	18 (28.1)
Child age	
Infant (<1 year)	00 (0)
Toddler (1-3 years)	48 (75.0)
Pre-school (4-6 years)	06 ((09.4)
School-going (>6 years)	10 (15.6)
Residence	
Rural	28 (43.8)
Urban	36 (56.3)
Education level of mother	
Illiterate	21 (32.8)
Can read and write	09 (14.0)
Primary school	16 (25.0)
Secondary school	18 (28.1)
Beyond secondary School	00 (0)
Employment of mother	
Housewife	42 (65.6)
Working mother	22 (34.4)
Social status	
Below poverty level	46 (71.9)
Above poverty level	18 (28.1)
Family type	
Simple	44 (68.8)
Compound	20 (31.2)
Primary fuel	
Kerosene	62 (96.9)
Others	02 (03.1)

The majority of children (75%) were toddlers. None of the mothers studied beyond secondary school. In all cases the mothers were the primary caregivers. In 97% of families the primary fuel was kerosene (Table 1).

The time and place of kerosene poisoning, the type of container used and the site of storage are shown in Table 2.

Table 2
Time and place of kerosene poisoning, type of container used and site of storage

Characteristic	Number (%)
Season	
Summer	40 (62.5)
Rainy	14 (21.9)
Winter	10 (15.6)
Place of poisoning	
Parent's house	54 (84.4)
Others	10 (15.6)
Type of container	
Cold drink jar	14 (21.9)
Kerosene jar	08 (12.5)
Lamp	14 (21.9)
Site of storage	
Bedroom	32 (50.0)
Kitchen	06 (09.4)
Others	26 (40.6)

The incidence of kerosene poisoning was highest in summer (62.5%). Most of the cases (84.4%) occurred in the parent's house. Kerosene oil was stored in cool drink water bottles in 22% cases. The site of storage of the kerosene oil in 50% cases was the bedroom floor within easy reach of children. (Table 2).

The specific amount of kerosene ingested and the type of container from which the kerosene was ingested according to the different age groups is shown in Table 3.

Table 3: ***Amount of kerosene ingested and type of container according to age groups***

	Infant *(n=0)* Number (%)	Toddler *(n=48)* Number (%)	Pre-school *(n=06)* Number (%)	School-going *(n=10)* Number (%)
Amount of kerosene oil ingested				
Few sips	0 (0)	48 (100)	03 (50)	02 (20)
Few gulps	0 (0)	0 (0)	03 (50)	08 (80)
Container				
Transparent water bottle	0 (0)	28 (58.3)	0 (0)	0 (0)
Cool drink bottle	0 (0)	0 (0)	04 (66.7)	10 (100)
Kerosene jar	0 (0)	06 (12.5)	02 (33.3)	0 (0)
Lamp	0 (0)	14 (29.2)	0 (0)	0 (0)

All 48 toddlers had taken only a few sips of kerosene oil in contrast to a few gulps by 80% of school-going children. Toddlers ingested kerosene oil from transparent water bottle (58.3%) or lamp (29.2%) in contrast to school-going children all of whom ingested kerosene oil from colourful cool drink bottles (Table 3)

Of the 48 toddlers, 4 (8.3%) had wheeze associated lower respiratory tract infection, 2 toddlers had the common cold and 1 toddler had measles at the time of the kerosene oil ingestion. All 64 children were admitted to hospital within 1 hour of kerosene ingestion as they are all local children. Among them, 37 children had no symptoms and were discharged home after 24 hours observation. The symptoms of kerosene oil poisoning are shown in Table 4.

Table 4: ***Symptoms and complications of kerosene oil poisoning***

Symptom/Complication	**Toddlers** *n=48* **Number (%)**	**Pre-School** *n=6* **Number (%)**	**School-going** *n=10* **Number (%)**
Asymptomatic	29 (60.4)	01 (16.7)	07 (70)
Vomiting	17 (35.4)	05 (83.3)	03 (33.3)
Fever	15 (31.3)	02 (33.3)	0 (0)
Cough	10 (20.8)	0 (0)	01 (10.0)
Wheezing	11 (22.9)	0 (0)	0 (0)
Respiratory distress	11 (22.9)	02 (33.3)	01 (10.0)
Diarrhoea	0 (0)	02 (33.3)	0 (0)
Abdominal pain	0 (0)	01 (16.7)	01 (10.0)
Convulsions	01 (02.1)	02 (33.3)	0 (0)
Interstitial pneumonitis on chest x-ray	08 (16.7)	02 (33.3)	0 (0)
Lobar pneumonia	0 (0)	0 (0)	01 (10.0)

The most common symptom was vomiting occurring in 25 (39%) children and in most cases this occurred before admission. Vomiting was more common in pre-school children than in toddlers or school going children. Cough and wheezing were almost confined to toddlers. However, 6 children who had pre-existing respiratory tract illness did not have increased symptoms after kerosene oil ingestion. Diarrhoea was confined to preschool children. Among the 3 children with convulsions 2 had a past history of febrile convulsions and all 3 had fever. Chest x-ray was done in all patients who had respiratory distress. No deaths occurred.

The treatment received by the children with kerosene oil poisoning is shown in Table 5.

Five children needed oxygen and intravenous fluid and 4 of them were also given intravenous antibiotics. Oral steroids were given to those children with interstitial pneumonitis in chest X- ray and nebulisation with salbutamol was given to children with wheezing. Antipyretics were used in children with fever and anticonvulsants in those with convulsions.

Table 5
Treatment received by children with kerosene oil poisoning

Treatment	**Number (%)**
No treatment (Kept under observation)	37 (57.8)
Oxygen	05 (07.8)
Intravenous fluids	05 (07.8)
Oral antibiotics	10 (15.6)
Intravenous antibiotics	04 (06.3)
Oral steroids	10 (15.6)
Oral antiemetics	20 (31.3)
Nebulisation	11 (17.2)
Anticonvulsants	03 (04.7)
Antipyretics	17 (26.6)

Discussion

Kerosene oil ingestion is a common cause of childhood poisoning as it is the primary fuel of cooking in most families[4]. It is a serious cause of poisoning in the lower socio-economic group[2,5]. In our study 72% of the families were in the lower socio-economic group. It usually presents with fever and pulmonary symptoms like dyspnoea due to pneumonitis[6]. In our study fever was present in 26.6%, respiratory distress in 22% and pneumonitis in 15.6% children with kerosene oil ingestion. It is found that the incidence is highest in toddlers, because these children are in a developmental stage where they engage in

aggressive exploration of environment and so every object in sight is examined by him/her for texture and taste. In our study 75% were in the toddler age group. Incidence of poisoning is also high in male sex, probably, due to their reckless behaviour as compared to girls[7]. In our study, 72% were males. Incidence of kerosene oil poisoning is lower in children of working mothers[4,8]. In our study there were only 22% working mothers. Incidence is higher in urban environment and in families of below poverty level as such homes lack separate room or place for storage of various household products like kerosene[3]. In our study 56% were from an urban environment and 72% families were below the poverty line. It is higher in simple families due to lack of family members to keep closer observation on child. In our study 69% were from simple families. Incidence is higher in summer as the thirsty child mistakes kerosene oil for water as kerosene oil is commonly stored in transparent water bottles or cool drinks bottles. In our study 62.5% episodes occurred in summer and in 65.6% instances the kerosene oil was stored in transparent water bottles or colourful cool drink bottles. Toddlers usually take kerosene from transparent water bottle, as both kerosene and water are transparent and they cannot differentiate between them whereas school going children take kerosene from colourful cool drinks bottle mistaking them for cool drinks. Toddlers usually take fluid in sips, so the amount ingested by them is small compared to older children who can take fluid in gulps. In our study 100% toddlers had taken only sips of kerosene oil whereas 50% preschool children and 80% school-going children had taken a few gulps of kerosene oil. In our study only 7.8% of children required oxygen and intravenous fluids and none required ventilation. There were no deaths. This is a hospital-based study and does not fully reveal the situation in society which is a limitation

Conclusions

In our study 15.6% children developed pneumonitis. In 65.6% instances the kerosene oil was mistaken for water or cool drinks. There were no deaths.

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