# Kerosene poisoning in children in Kirkuk city


## Yarub Abdulkhafor mutlak*,Hussein Ibrahim Mahdi**, Jameel Ibrahim Azeez**

## *Pediatrics hospital ,Kirkuk, Iraq.

## **Department of pediatrics, Azadi teaching hospital, Kirkuk, Iraq.



## Abstract:

***Background:*** Kerosene poisoning is one of the most common accidental poisoning in children in developing countries due common use of kerosene in house-hold and unsafe storage practices. Aspiration pneumonitis is the most common manifestation of kerosene ingestion due to its low viscosity, high volatility, and low surface tension.

***Aim Of The Study:*** The aim of this study was to identify the demographics, incidence, signs and symptoms, radiological findings and treatment of kerosene poisoning in children in Kirkuk city.

***Patients And Methods:*** Seventy two cases admitted to the emergency department in Kirkuk pediatric hospitals, After Kerosene ingestion during the period from the 1st of june 2020 to the 1st of june 2021. Fifty four cases (75%) were boys and 18 cases (25%) were girls, and the age ranges between 10 months to 10 years. Information regarding the history was taken from their parents , by special questionnaire paper (appendix) including (name, age, sex, residence, date of admission, mother occupation, season, time of ingestion, amount of ingestion, Kerosene storage, place of storage, presentation, vomiting ,time of vomiting, (induced or spontaneous vomiting).

***Conclusions:***

1. It appears clearly that kerosene pneumonia in Iraq is most often of mild to moderate degree of severity with no mortality.

2. we should not depend on clinical finding only for exclusion of kerosene pneumonitis ;radiological examination is necessary .

3. Vomiting is a risk factor for the development of pneumonitis ; therefore, health workers should stress this point to people .

4. Boys more common than girls with maximum age is 3 years old .

5. Kerosene poisoning is more common in Summer than Winter .

6. The most common presenting feature is cough in the 1st 6 hours .

***Keywords:*** kerosene poisoning, children, Kirkuk.

## Introduction :

Kerosene is a straight-chain ,or aliphatic hydrocarbon commonly used in households ,and industries, especially in rural areas in developing countries like ours. It is used in households for cooking, lighting, heating, and in paints and pesticides. Exposure occurs accidently ,in children when they consume the kerosene stored in juice bottles, beverages bottles, and colorful packing within their reach.[1,2]

Kerosene oil poisoning in children, is a preventable cause of significant mortality ,and morbidity by safe storage of kerosene, in house out of reach of children, community education, provision of electricity in rural areas, and safe cooking practices by using cooking gas instead of kerosene stoves.[1,2]

Kerosene poisoning is one of the commonest accidental poisonings in children accounting for 14–60% of admissions due to accidental poisoning in children.[5]

Kerosene once aspirated spread rapidly, across the surfaces of airway and alveoli leading to inactivation of type II pneumocytes, and resulting surfactant deficiency, intra-alveolar hemorrhage, inflammation, and necrosis.[1,6]

Most of the poisoning with kerosene is unintentional. Males are more commonly involved, and the majority of the cases are <5 years of age.[1,3]

Chest radiographs can remain abnormal long ,after clinical improvement. Pneumatoceles can develop 2–3 weeks after exposure.[6,7]

There is no clear role of corticosteroids or prophylactic antibiotics.[6,8]

Kerosene poisoning, in children is a preventable cause of significant mortality, and morbidity. Safe storage of kerosene in household ,out of reach of children, avoiding storing kerosene in cold drink, and beverage bottles, community education, and provision of electricity in rural areas, and safe cooking practices, by using cooking gas instead of kerosene stoves. The word poison should be written prominently ,on kerosene containing containers.[1,2,4,8]

## Aim Of The Study:

The aim of this study was to investigate the demographics, incidence, signs and symptoms, radiological findings and treatment options of kerosene poisoning in children in our locality.

## Patients And Methods:

Seventy two cases admitted immediately to the emergency department in Kirkuk pediatric hospitals, After Kerosene ingestion during the period from the 1st of june 2020 to the 1st of june 2021.

Fifty four cases (75%) were boys and 18 cases (25%) were girls, and age between 10 months to 10 years.

Information regarding the history was taken from their parents , by special questionnaire paper (appendix) including (name, age, sex, residence, date of admission, mother occupation, season, time of ingestion, amount of ingestion, Kerosene storage, place of storage, presentation, vomiting ,time of vomiting, (induced or spontaneous vomiting).

The amount of kerosene ingesting could not be measured accurately but more complicated cases had history of large amount ingestion.

Physical examination was performed for every patient and this included level of consciousness, awareness, pulse rate, respiratory rate, $O_2$ saturation, temperature, (skin, mouth, pharynx inspection), chest examination, abdominal examination and all the cases were admitted to the emergency department until at least 6-hours after ingestion for observation .

Chest radiography were taken to all the cases, after 6-hours of ingestion and complete blood count (CBC) were taken for all patients and 51 cases needed admission to the ward due to abnormality in radiological finding, or abnormality in the clinical examination.

Those who were admitted given $O_2$, antibiotics and other supportive measures and all of them were discharged within 3-7 days.

## Results:

### 1. Demographic Aspect :-

Ages of the patients were between 10 months to 10 years with the majority of the cases 60 cases ( 83.3 % ) were between (1-4 years), and 12 case (16.6%) were above 4 years as shown in table (I).

**Table (I)** : The age distribution of children with kerosene poisoning.

| Age (year) | No. of case | % |
|---|---|---|
| 1-4 | 60 case | 83.3% |
| > 4-10 | 12 case | 16.6% |
| **Total** | 72 case | 100% |

Male were more common than female, male 54 cases (75%) and female 18 cases (25%),male to female ratio was 3:1.

Most cases were from urban area 50 cases (69.4%) but the patients from rural area were 22 cases (24.6%), patients from poor family were 55 cases (76.3%) and 17 cases ( 23.7 % ) from good socioeconomic state family , 50 cases ( 69.4 % ) from large family ( more than 6 ) and 22 cases ( 30.5 % ) were from small family ( less than 6 ).

The mothers of 56 cases ( 90.2 % ) were housewives and 7 cases ( 9.8 % ) were workers.

The most families stored the kerosene in small unsuitable containers in 53 cases ( 73.6 % ) as shown in table (II).

**Table (II):** Demographic characters of the study group

| Character of Patients | | No | % |
|---|---|---|---|
| **Sex** | Male | 54 | 75 |
| | Female | 18 | 25 |
| **Residence** | Urban | 50 | 69.4 |
| | Rural | 22 | 29.6 |
| **Family size** | < 6 | 22 | 30.5 |
| | ≥ 6 | 50 | 69.4 |
| **Socio Economic** | Poor | 55 | 76.3 |
| | Good | 17 | 23.7 |
| **Mother Occupation** | Housewife | 65 | 90.2 |
| | Worker | 7 | 9.8 |
| **Kerosene Storage** | Small container | 53 | 73.6 |
| | Barrels | 19 | 26.4 |

## 2. Clinical Features

**I.** The most common presentation within the 1st 6-hours were cough in 52 cases (72.2%), tachypnea in 44 cases (61.1%), vomiting in 43 (59.7%), drowsiness in 14 cases (19.4%) and grunting in 8 cases (11.1%) as shown in table (III).

**Table (III):** Signs and symptoms that appeared in the first 6 hours after ingestion.

| Signs and symptoms | No. of patients | % |
|---|---|---|
| **Cough** | 52 | 72.2 |
| **Tachypnea** | 44 | 61.1 |
| **Vomiting** | 43 | 59.7 |
| **Lung ronchi** | 24 | 33.3 |
| **Drowsiness** | 14 | 19.4 |
| **Intercostal retractions** | 13 | 18 |
| **Cyanosis** | 10 | 13.8 |
| **Decreased breath sounds** | 9 | 12.5 |
| **Grunting** | 8 | 11.1 |
| **Crepitations** | 6 | 8.3 |
| **Restlessness** | 4 | 5.5 |
| **Stupor** | 1 | 1.3 |
| **Convulsion** | 1 | 1.3 |

**II.** Clinical presentation after 6-hours of ingestion were fever in 35 cases (48.6%), constipation in 20 cases (27.7%) , abdominal pain in 12 cases (16.6%) but chest pain in only 2 cases (2.7%) as shown in table (IV).

**Table (IV):** Signs and symptoms that appeared after 6 hours

| Signs and symptoms | No. of affected patients | % |
|---|---|---|
| **Fever** | 35 | 48.6 |
| **Constipation** | 20 | 27.7 |
| **Abdominal pain** | 12 | 16.6 |
| **Chest pain** | 2 | 2.7 |

**III.** Thirty five case (81.3%) patient develop pneumonits after vomiting, and 16 cases develop pneumonits without vomiting as shown in table (V).

**Table(V):** Relation of vomiting to radiological pneumonitis

| Case | Pneumonitis | No pneumonitis | Total |
|---|---|---|---|
| **Vomiting** | 35 ( 81.3 % ) | 8 ( 18.7 %) | 43 (100 % ) |
| **No Vomiting** | 16 ( 55 .1 %) | 13 (44.9%) | 29 (100%) |
| **Total** | 51( 70.8%) | 21(29.1%) | 72(100%) |

**IV.** Radiological abnormality

Radiological findings after 6-hours of ingestion showed right side infiltration in 18 cases (25%), left side infiltration in 9 cases (12.5%) and bilateral infiltration in 24 cases (33.6%) as shown in table (VI).

**Table(VI):** Chest radiographic findings among the studied group

| Diagnosis | NO. of patients | % |
|---|---|---|
| **Normal** | 18 | 25 |
| **Bilateral interstitial pneumonitis** | 24 | 33.6 |
| **Right lung interstitial pneumonitis** | 18 | 25 |
| **Left lung interstitial pneumonitis** | 9 | 12.5 |
| **Pleural effusion** | 1 | 1.3 |
| **Empyema** | 1 | 1.3 |
| **Atelectasis** | 1 | 1.3 |

**V.** laboratory findings:-

WBC count was done for all the patients after excluding other causes of leukocytosis (e.g. otitis media ).

Fifty one cases (70.8%) with pneumonitis develop leukocytosis while 21 cases (29.2%) of patients without pneumonitis develop leukocytosis. As shown in table (VII).

**Table(VII):** Patients with leukocytosis after 6 hours of ingestion

(thousands of leukocytes per $mm^3$ of blood )

| Patients | <15 | > 15 | % from total pneumonitis | total | % from total Patients |
|---|---|---|---|---|---|
| With | 17 | 34 | 66.6 | 51 | 70.8 |

| | | | | | |
|---|---|---|---|---|---|
| pneumonitis | | | | | |
| Without pnuemonitis | 11 | 10 | 47.6 | 21 | 29.2 |

**VI.** Study group and season :

Thirty seven cases (51.3%) came during Summer, 17 cases (23.6%) during autumn , 12 cases(16.6%) during spring and 6 cases (8.3%) during winter. As shown in table (VIII).

**Table(VIII):** Shows the distribution of patients according to the season .

| Season | No. | % |
|---|---|---|
| **Summer** | **37** | **51.3** |
| **Autumn** | **17** | **23.6** |
| **Spring** | **12** | **16.6** |
| **Winter** | **6** | **8.3** |

**VII.** Treatment :

All cases admitted to the emergency department received $O_2$ and 43 cases (59.7%) received also IV Fluid, and 51 cases (70.8%) also received antibiotics(ampiclox). As shown in table (IX).

**Table(IX):** Treatment of patients

| $O_2$ | IV. Fluid | Antibiotics |
|---|---|---|
| **72 case** | 43 case | 51 case |
| **100%** | 59.7% | 70.8% |

## Discussion:

Accidental kerosene ingestion remains a serious contributor to childhood poisoning in low socioeconomic people, with high incidence of morbidity and occasional mortality.

In this study 35 cases (48.6%) were 3 years old and boys predominant where they form 54 cases (75%) , And these results agree with **Arronld** [12], **Fagbule** [11], **Mchado B** [13], and **Dewet B** [14].

Most of the cases 50 (69.4%) were from Urban area, and from poor family and that does not agree with **Abdul Aziz** [15], and **Hameed** thesis [16].

This could be due to the fact that people from rural area don't present to our hospital due to difficulty in transport and security purposes.

In this study most of the accidental ingestion occurred in summer then in autumn due to the child likely to be thirsty and mistakes kerosene for water or another drink, and most of the cases stored the kerosene in small soft unsuitable container and all these were in agreement with **South African** study[17]

Kerosene was kept in a small unsuitable container for storage in 53 cases (73.6%) which agree with **South African** study[1], **Nouri** [10], **Fagbule** [11], **Abdul Aziz** [15] and **Hameed** thesis [16].

Kerosene poisoning affect mainly the respiratory and the CNS. Which agree with **Naji** [9], **Singh S** [11], and **Nouri** [10] studies.

The most common presenting symptoms in this study were cough found in 52 cases (72.2%), Tachypnea found in 44 cases (61.1%), vomting found in 43 cases which agree with , **Arnold** [12], **Abdul Aziz** [15], and **Humeed** thesis [16].

In this study we found high presence of symptoms relating to respiratory system similar to other studies **Naji**[9], **Abdul Aziz** [15], and **Hameed** [16]. Pneumonitis in most of the cases were bilateral seen in 24 cases (33.6%) and right interstitial in 18 cases (25%) and left interstitial in 9 cases (12.5%).

It may be due to anatomic variation between the two lungs, and this agree with **Naji** [9] and **Hameed** thesis [16]. Symptoms of CNS impairment were found in 14 cases (19.4%) it was widely accepted that hypoxia due to pneumonitis is probably the cause of CNS symptoms and this is proved by **Majeed** HA [18], who reported a close relationship between the severity of pulmonary involvement and the development of neurological complications.

One of the cases (1.3%) developed convulsion due to sever hypoxia due to large amount of kerosene ingested, which agree with **Naji** [9]. Fever occurred in 35 cases (48.6%) which agree with **Naji** [9]. Vomiting occurred in 52 cases (81.1%) and in the most of them it was induced shortly after ingestion ,and was correlated with pneumonitis. This result agrees with **Naji** [9], **Arnold** [12]. Constipation was found in 20 cases (27.7%), abdominal pain in 12 cases (16.6%) appear later this agree with **Al- Naji** [9]. Leukocytosis is an indictation of pneumontis and this

study showed higher incidence of leukocytosis in cases with pneumontis this agree with **Al- Naji**[9].

All admitted patients received $O_2$, and 43 cases (59.7%) received IV Fluid due to vomiting and 51 cases (70.8%) received antibiotics due to pneumonitis.

**Conclusions:**

1. It appears clearly that kerosene pneumonia in Iraq is most often of mild to moderate degree of severity with no mortality.

2. we should not depend on clinical finding only for exclusion of kerosene pneumonitis ;radiological examination is necessary .

3. Vomiting is a risk factor for the development of pneumonitis ; therefore, health workers should stress this point to people .

4. Boys more common than girls with maximum age is 3 years old .

5. Kerosene poisoning is more common in Summer than Winter .

6. The most common presenting feature is cough in the 1st 6 hours .

**Recommendations:**

1. Public health education through T.V., radio, newspapers ,and other broadcasting network should alarm the people from the dangers of storing kerosene in small unsuitable containers particularly those which might be used for storage of water or soft drinks .

2. Families should be educated not to try to vomit their children after they accidentally ingest kerosene to minimize the risk of aspiration .

3. Antibiotic should not be used unless a secondary bacterial infection is suspected and should be stressed on .

4. No patients should be discharged before 6 hours after ingestion of Kerosene because development of pneumonitis might be delayed several hours .

## References:


1. Dayasiri M, Jayamanne SF, Jayasinghe CY. Kerosene oil poisoning among children in rural Sri Lanka. *Int J Pediatr.* 2017;2017:8798610. doi: 10.1155/2017/8798610. DOI: [PMC free article] [PubMed] [CrossRef] [Google Scholar]

2. Parekh U, Gupta S. Kerosene-a toddler's sin: A five years study at tertiary care hospital in western India. *J Forensic Leg Med.* 2017;47:24–28. doi: 10.1016/j.jflm.2017.02.004. DOI: [PubMed] [CrossRef] [Google Scholar]

3. Roy MP, Gupta R, Bhatt M, Aggarwal KC. Profile of children hospitalized with acute poisoning in New Delhi. *Indian Pediatr.* 2017;54(3):246–247. doi: 10.1007/s13312-017-1039-9. DOI: [PubMed] [CrossRef] [Google Scholar]

4. Dayasiri M, Jayamanne SF, Jayasinghe CY. Patterns and outcome of acute poisoning among children in rural Sri Lanka. *BMC Pediatr.* 2018;18(1):274. doi: 10.1186/s12887-018-1246-0. DOI: [PMC free article] [PubMed] [CrossRef] [Google Scholar]

5. Peshin SS, Gupta YK. Poisoning due to household products: A ten years retrospective analysis of telephone calls to the National Poisons Information Centre, All India Institute of Medical Sciences, New Delhi, India. *J Forensic Leg Med.* 2018;58:205–211. doi: 10.1016/j.jflm.2018.07.005. DOI: [PubMed] [CrossRef] [Google Scholar]

6. Makrygianni EA, Palamidou F, Kaditis AG. Respiratory complications following hydrocarbon aspiration in children. *Pediatr Pulmonol.* 2016;51(6):560–569. doi: 10.1002/ppul.23392. DOI: [PubMed] [CrossRef] [Google Scholar]

7. Das S, Behera SK, Xavier AS, Selvarajan S. Prophylactic Use of Steroids and Antibiotics in Acute Hydrocarbon Poisoning in Children. *J Pharm Pract.* 2018:897190018771520. doi: 10.1177/0897190018771520. DOI: [PubMed] [CrossRef] [Google Scholar]

8. Balme KH, Zar H, Swift DK, Mann MD. The efficacy of prophylactic antibiotics in the management of children with kerosene-associated pneumonitis: a double-blind randomised controlled trial. *Clin Toxicol.* 2015;53(8):789–796. doi: 10.3109/15563650.2015.1059943. DOI: [PubMed] [CrossRef] [Google Scholar]

9.Nagi NA, Abdullah ZA. Kerosene poisoning in children in Iraq. Postgrad Med J. 1995; 71:419–422.].

10.Nouri L, Al Rahim K. Kerosene poisoning in children. Postgrad- Med-J. 1970; 46: 71-75.

11.Fagbule-DO; Joiner-Kt. Kerosene poisoning in childhood: a 6 year prospective study at the university of llorin teaching hospital .West-Afr-J-Med.1992 Apr-Jun; 11(2):116-121.

12.Arnold H.Einhorn.petroluin hydrocarbon poisoning; Abraham M.Rudolph pediatrics'. 18th ed, Appleton &Lang pediaeric care, Noralk, 1987; 717-719.

13.Machado B, Cross K, Snodgrass W. Accidental hydrocarbon ingestion cases telephoned to a regional poison center. Ann Emerg Med. 1988; 17:804–807.

14.De Wet- B. Van Schalkwyk D, Van der Spuy J, du Plessis J, du Toit N, Burns D. Paraffin (kerosene) poisoning in childhood-is prevention affordable in South Africa.S- Afr-Med-J.1994 Nov;84(11):735-8

15.Abdul Aziz Mansour. Kerosene poisoning in children A Thesis submitted to the Committee of Iraqi Board Specialization in partial fulfillment for the requirement of the degree of Fellowship of The Iraqi Commission for Medical Specialization in pediatric1999.

16.HAMEED A. MUSTAFA. Kerosene poisoning in children A Thesis submitted to the Committee of Iraqi Board Specialization in partial fulfillment for the requirement of the degree of Fellowship of. The Iraqi Commission for Medical Specialization in pediatric2008.

17. Ellis JB, Krug A, Roberston J, Hay IT, MacIntyre U:Paraffin ingestion—the problem. S Afr Med J. 1994; 84:727–730.

18. Majeed HA, Bassyouni H, Kalaawy M, Farwana S. Kerosene poisoning in children: a clinico-radiological study of 205 cases. Ann Trop Paediatr. 1981; 1:123–130.