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## Clinical Finding and Outcome in Suicidal Attempt Due to Intravenous Injection of Kerosene

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**Abstract:** The aim of this study was to describe the clinical findings and outcome in suicidal attempted due to intravenous injection of kerosene. This case series study was conducted in the Department of Internal Medicine, Shohada Ashayer Hospital, Khorramabad, Iran during 8 years. Ten IV drug addicts who intravenously injected themselves with Kerosene were collected. All patients admitted in ICU, completely monitored for cardiopulmonary status and consulted with pulmonologist, cardiologist, neurologist, anesthesiologist and dermatologist. Therapeutic decision including intubation, antibiotics therapy, and oxygen, correction of water and electrolyte disturbances was applied according patients condition. The data were analyzed with fisher-exact test. Nine (90%) patients were male, 1(10%) was female. All cases were attempted suicides and IV drug abusers. Mean age was 20.3±2 years. The patients' mean arrival time to the hospital after poisoning was 1.1 h. Death of 5(50%) patients was related to the higher doses (>5 mL) of intravenous injection of kerosene, the most clinical findings were related to pulmonary involvement with pulmonary edema and subsequent cardiac and neurological complications and phlebitis due to IV injection. Intravenous kerosene injection causes major injury to the lungs, the organ bearing the first capillary bed encountered. Other complications including cardiac and neurological seems to be related to severe hypoxia and other metabolic disturbances due to lung injury. The amounts of kerosene were major determinants of lethality. Early and aggressive supportive care might be conducive to a favorable outcome with minimal residual pulmonary squeal at least in patients with injection of less than 5 mL of kerosene.

**Key words:** Kerosene poisoning, suicide, intoxication, intravenous injection

### INTRODUCTION

Hydrocarbons exposures are among substances most frequently involved in human and poisoning of children under the age of 6 years are frequent and unintended hydrocarbon ingestion is a common reason for pediatric hospitalization in the developing world (Siddiqui *et al.*, 2008; WHO EMRO, 2007; Litovitz and Manoguerra, 1992). Two groups of hydrocarbons may be described as first hydrocarbons which are easily aspirated following ingestion and second hydrocarbons that may produce systemic toxicity in addition to their aspiration potential. Kerosene belongs to the first group Hydrocarbon poisoning (Siddiqui *et al.*, 2008; Weaver, 1988) and kerosene intoxication usually occurs by inhalation, ingestion or occupational percutaneous absorption (Reese and Kimbrough, 1993; Wolfe *et al.*, 1979). Adults

usually ingest kerosene for the purpose of self-harm and children may ingest accidentally (Shotar, 2005; Domej *et al.*, 2007; Arena, 1987). Intravenous injection of hydrocarbons like kerosene is very unusual kind of suicide. The patient who injects kerosene has a high risk of significant pulmonary toxicity (Rao *et al.*, 1977). Initial symptoms may include chest pain and dyspnea. Over subsequent hours, pulmonary infiltrates may occur on the chest roentgenogram. Hypoxemia and pulmonary edema are common and requiring ventilatory support. Despite the appearance of fever and leukocytosis, Sputum and blood cultures may be negative. The mechanism of pulmonary injury may be due to endothelial injury by the petroleum molecule. Hydrocarbon intoxication may be associated with major toxic CNS effects, such as seizures and respiratory collapse (Patel *et al.*, 2004; Lifshitz *et al.*, 2003). Milder

neurological complications, including euphoria, depression, lethargy, and drowsiness may occurs in some patients (Seymour and Henry, 2001). Secondary effects include hypoxemia, infection and chronic lung dysfunction (Campbell, 1970; Rao *et al.*, 1977). Present aims at this study were introducing of this unusual kind of suicidal attempts and major clinical findings of intravenous injection of kerosene and the outcome of patients.

### MATERIALS AND METHODS

In this study, we investigated the clinical findings and outcome of petroleum poisoning due to an unusual kind of suicidal attempt and intoxication with intravenous injection of kerosene. This kind of poisoning and suicidal attempt is very unusual and we recorded 10 cases during 8 years. This is a case series study of 10 patients with intravenous injection of kerosene presenting in Shohada Ashayer Hospital of Khorramabad, Lorestan, Iran from 2000-2007. Cases were admitted through emergency department and diagnosed on the basis of history of IV abusing of the petroleum for suicidal attempt. Kerosene poisoning is diagnosed based on a description of the events and the quantity of substances according to used syringe. The cases separated in two groups. First cases with using of less than 5 mL (one syringe) and another with injection of more than 5 mL kerosene. All patients injected kerosene in cubital vein at forearm. Pneumonia and chemical pneumonitis were diagnosed with a chest x-ray and blood oxygen saturation measured in all cases. While diagnosing these cases, clinical signs suggested of pulmonary and other systemic involvements like dyspnea, tachypnea, sweating, tachycardia, chest pain, cyanosis, rales, hemoptysis, seizure, phlebitis, vomiting, agitation, fever, pleuritis, cough, delirium, petechia, arrhythmia, and typical odor of the compound in breath were also taken into account. Data collected includes age, gender, address, arrival time, quantity of injected kerosene according history and syringe size, frequency of different clinical features and outcome. Heparin, antibiotic, oxygen and antiarrhythmic drugs were administered in patients according to clinical findings and consultations with pulmonologist and cardiologist. All patients admitted in ICU and had to be put on circulatory and respiratory support according to clinical findings and their condition.

### RESULTS

The youngest patient was 16 years of age and the oldest was 26. Nine patients were male and one was

Table 1: Comparison of Presenting symptoms and complications in 10 patients between two groups (cases that inject less than 5 mL and cases that inject more than 5 mL)

Variables	Amount of injected Kerosene		p-value
	<5 mL	>5 mL	
Death	0(0)	4(80)	0.024
Hemoptysis	1(20)	5(100)	0.024
Delirium	0(0)	1(20)	NS
Cough	4(80)	5(100)	NS
Chest pain	3(60)	3(60)	NS
Odor	0(00)	3(60)	0.024
Arrhythmia	2(40)	4(80)	NS
Pleuritis	2(40)	3(60)	NS
Phlebitis	3(60)	4(80)	NS
Vomiting	3(60)	4(80)	NS
Sweating	1(20)	4(80)	NS
Rales	4(80)	5(100)	NS
Agitation	5(100)	5(100)	NS
Petechia	0(0)	1(20)	NS
Tachypnea	5(100)	5(100)	NS
Tachycardia	5(100)	5(100)	NS
Cyanosis	1(20)	4(80)	0.024

NS: Not significant

female. The mean arrival time was 1.1 h. The mean age of patients was 20.3 years.

According to Table. 1, the most common symptoms were hemoptysis, cough, pulmonary coarse rales, cyanosis, fever, agitation, and tachycardia and tachypnea. In statistical study, only hemoptysis, cyanosis and kerosene odor had significant differences between two groups with p-value of 0.024. At the other hand, the difference between death rate was significant between cases that used injection of kerosene less than 5 mL and those that used more than 5 mL with p-value of 0.024. Two of patients died during first day and another ones (3 cases) died after third days of admission. Phlebitis occurred in seven patients but had not significant differences between two groups. In alived cases (5 cases) Phlebitis completely cured after two weeks. Fever continued at least for one week in all cases that in three of them was due to infection. Loss of consciousness occurred in eight patients that five of them died. Lived cases followed at least for 3 month. Cough continued in four patients but other symptoms completely cured.

### DISCUSSION

Accidental hydrocarbon poisoning and kerosene intoxication usually occur by ingestion (Reese and Kimbrough 1993). Intravenous injection of petroleum for suicide is very unusual. Pneumonia due to aspiration of hydrocarbons into the lungs is usually the most serious consequence of ingestion of these materials. One kind of hydrocarbons is kerosene that use for multiple purposes. Many constituents of kerosene are toxic to humans

(Weaver, 1988; Wolfe *et al.*, 1979). Kerosene is a complex mixture of hydrocarbons and additives with about 15% paraffin, less than 25% aromatics, 0.15% sulfur and 6-9% alkenes (Page and Mehlman, 1989). Kerosene most commonly uses for solvent fuel for stoves and lamps. Adults usually ingest kerosene for the purpose of self-harm and children may ingest accidentally (Shotar, 2005; Arena, 1987; Belonwu and Adeleke, 2008). Intravenous self-injections of gasoline or kerosene occurs frequently in psychotic patients (Wason and Greiner, 1986). In the present cases, kerosene injected intravenously caused major injury to the lungs. Lung damage was associated with fever, leukocytosis, and hemorrhage. The associated fever may be observed in pneumonitis subsequent to intravenous kerosene application and do not necessarily indicate superimposed infection (Domej *et al.*, 2007). Chest pain at these patients was due to chemical pneumonitis and pleurisy. Treatment of kerosene poisoning is symptomatic because no specific antidote is available. Tissue injury mainly depends on the quantity of injected material. Clinical management should include early admission of patients to ICU and good supportive cares. In this study, most of the victims of poisoning were in the age group of 20 years. Overall male to female ratio was 9/1 in this study. Four cases were having previous history of suicide in the past and all of patients were having previous history of psychiatric disorders. In this study, quantity of kerosene injected was directly linked to the death. Five patients injected more than 5 mL of the kerosene and four of them died. This route of suicide and Petroleum hydrocarbon toxicity involve the respiratory system and cause severe lung injury. This kind of poisoning often occurred in young ages that inject kerosene intravenously for suicidal attempt and of course only in patients with psychiatric problems. The most common manifestations of this kind of toxicity are respiratory problems due to pulmonary edema and pneumonitis. Cardiac and neurological complications such as shock, arrhythmia and convulsion occur in some patients. the most common symptoms and signs includes, tachypnea, sweating, tachycardia, chest pain, cyanosis, rales, hemoptysis, seizure, phlebitis, vomiting, agitation, fever, pleuritis, cough, delirium, petechia, arrhythmia and typical odor of the compound in breath. At this study we found that doses more than 5 mL of kerosene injection had high mortality rates because of severe lung injury. There is nothing antidote for this kind of poisoning and supportive care of patients and putting them in cardiopulmonary support is mandatory but treatment for cases that using more than 5 mL of kerosene is not very effective. Repeated follow-ups

aimed especially at pulmonary functions, cardiac functions and neurological function is strongly recommended.

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