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# Severe camphor poisoning, a seven-year observational study

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ABSTRACT

In a retrospective case series from 2007 to 2014, we searched for any accidental/intentional, and recreational cases of pure camphor poisoning through hospital records. Epidemiological data, as well as factors correlated with seizure, were evaluated.

Thirty cases including 29 males were recruited with a median age of 18 years (range; 0.2–87). Patient's reported ingestion rate of camphor was 1.5–15 grams. Almost all of the patients (96.7%) were conscious on arrival time and the ingestion to the presentation time ratio was 7 ± 5 h. It was observed that in a majority of the cases (53.4%), decreasing libido was the main intent of Camphor ingestion. Nausea and vomiting occurred in 22 (73.3%) cases and tonic-clonic seizure was seen in 12 (40%) patients. Mean presentation time was significantly longer in patients who experienced seizure (9.1 ± 6.1 h vs. 5.2 ± 2.8 h, p = 0.05). No correlation was found between the amount of ingested camphor (grams or mg/kg) and vital signs along with the bio-chemistry results. Not only did all of our cases survive but also they exclusively received supportive care.



## 1. Introduction

In the Middle East's traditional medicine, the volatile natural oil of camphor has commonly been using for a long time (Chen et al., 2013). This name was derived from the old Malay "Kapur" and Arabic 'Kafur' meaning chalk of Barus, an ancient port in west of Sumatra, which is a cyclic ketone of the terpene group (1,7,7-Trimethylbicyclo[2.2.1] heptan-2-one) and has originally distilled from the bark of the camphor tree, *Cinnamomum camphora*. An early international trade throughout Arabian Island to Sumatra made camphor widely known in pre-Islamic era (Sahana and Rajiv, 2012). Camphor is mentioned in the holy Quran as a flavoring material for drinks of those times as well (THE NOBLE QUR'AN 2016).

Avicenna (980–1037 AD), a famous Iranian physician and philosopher described camphor as an inhibitor of libido and an effective element on the reproductive system in his medical encyclopedia- *The Canon of Medicine*. Camphor was used to increase breathing capacity, opening the senses, mind clearing and relieving hysteria (Avicenna 1998).

It was one of the therapeutic agents of the 19th century used as a painkiller, expectorant, counterirritant, and stimulant agent that might cause abortion (Sue and Pinkert 2007). It has long been used as an antiseptic material for bathing Muslims' dead bodies (The Method of Bathing a Dead Body 2016; Cheraghi et al., 2005). Further evidence provides deliveries of camphor substance to the soldiers and students' food without their knowledge in order to reduce their sexual desire (Friedl 2002).

Nowadays, camphor is synthesized from *pinene*, a hydrocarbon derivative of turpentine oil. The occurrence of 10,000 annual camphor ingestions in the United States convinced the American Association of Poison Control Centers to provide an evidence-based guideline for out-of-hospital management (Manoguerra et al., 2006). Yet, in spite of extensive exposures particularly in children, there are a few individualized hospital-based cohort studies (Camphor, 2016).

Intoxication with elevated doses leads to injure the liver and central nervous system. fatality frequently takes place with respiratory arrest (Eldridge et al., 2007). Camphor's potentially fatal dose in a 10 kg toddler is 5 mL of 20% oil (Koren, 1993) and recovery after ingestion of 42 g in an adult has been stated (Emery and Corban, 1999).

Since studies on camphor toxicity are scarce in adults, inter-individual variability in age, weight or underlying diseases may

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**Fig. 1.** Illustration of one-gram camphor powder.

have affected camphor toxicokinetics and toxicodynamics (Aronow and Spigiel 1976; Camphor, 2016). Here upon current study was done to evaluate the prevalence, demographic data, clinical manifestations, treatment, and outcome of "camphor-poisoning" in patients referring to the Loghman-Hakim Poison Centre of Tehran, Iran.

## 2. Materials and methods

### 2.1. Setting

Loghman-Hakim Poison Centre is the main hospital dedicated to poisoned-patients and placed in Tehran Province, Iran (a city with 12.5 million permanent and 6.5 million temporary residents). The majority of intoxicated patients who require hospital admission are transferred to this center. With an annual ED census of 24,000 to 27,000 ED visits and approximately 10–12 thousands of hospitalizations, this center is one of the largest and busiest inpatient toxicology facilities in the world (Shahnazi et al., 2015; Hassanian-Moghaddam et al., 2014).

### 2.2. Participants/Study design

In this retrospective observational routine database study, we looked for any unintentional, intentional, or recreational pure exposure to camphor. Potential participants were consecutive individuals with camphor poisoning hospitalized within seven years from April 2007 to February 2014. Cases were identified and reviewed by all hospitalized poisoned patients using *International Classification of Disease*-Tenth Revision codes (version 2010).

Those whom were evaluated for possible camphor exposure had the following codes: T49-8 (poisoning chapter; Camphor, medicinal), T60-1 (poisoning chapter; Tar-NEC, Camphor), T60-1 (poisoning chapter; Tar-NEC, Camphor), T60-2 (poisoning chapter; Camphor, insecticide), X44 (poisoning accidental; Camphor, medicinal), X48 (poisoning accidental; Tar-NEC, Camphor), X64 (poisoning intentional self-harm; Camphor, medicinal), X68 (poisoning intentional self-harm; Tar-NEC, Camphor), X61 (intentional self-poisoning), Y11 (poisoning, undetermined intent), Y14 (poisoning undetermined intent; Camphor, medicinal),Y18 (poisoning undetermined intent; Tar-NEC, Camphor), Y49.7 (adverse effects with therapeutic use), and Y56 (Local antifungal, anti-infective, and anti-inflammatory drugs, not elsewhere classified) were evaluated for possible camphor exposure. Eventually, patients who had a history of co-ingestion of Camphor were excluded.A self-made data sheet containing following information was filled for each patient: age, gender, on-arrival vital signs, ingested Camphor amount (grams and mg/Kg), elapsed time between ingestion and presentation (hours), clinical manifestations including loss of consciousness, ataxia, seizure and its repetition (if any), true vertigo, nausea and vomiting, abdominal pain, intention of use, hospitalization period (day), electrocardiogram (ECG) findings, and treatments given was filled for every single patient. Laboratory test results were checked including blood sugar, aspartate transaminase (AST), alanine transaminase (ALT), creatine phosphokinase (CPK), lactate dehydrogenase (LDH), blood gases analysis, creatinine (Cr), blood urea nitrogen (BUN), and serum sodium (Na) and potassium (K) levels.

Patients' weight and the amount of ingested camphor were obtained based on the resident's note. The later categorization was based on the previous consensus on seizure as the main manifes-