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Case report

A fatal case of pure ethanol ingestion

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Abstract

An adult male was found dead in a car with two empty bottles (500 ml × 2) labeled dehydrated ethanol (>99.5%, v/v). At autopsy, extensive pancreatic necrosis with severe hemorrhage was observed. High concentrations of ethanol were detected in blood (8.14 mg/ml), urine (8.12 mg/ml) and tissue specimens. The cause of death was determined to be an acute alcohol intoxication caused by ingesting approximately 1 l dehydrated ethanol.

Keywords: Alcohol; Fatal case; Concentration; Distribution; Disinfectant

1. Introduction

Alcohol intake frequently influences the cause of death and is often involved in crimes and accidents. Measurement of ethanol is one of the most routine analyses in forensic examinations and blood ethanol concentrations have been well characterized to evaluate possible toxic concentrations. A fatal blood concentration is generally said to be more than 3.5 mg/ml [1], but this varies between cases [2–5]. Liquor that contain high proof of ethanol, such as vodka or spirits, have strong effects and are able to quickly achieve high blood concentrations. Fatal alcohol intoxications usually occur from ingesting these strong alcoholic beverages. However, severe or fatal intoxications sometimes occur from other products containing alcohol such as mouthwashes or solvents that are drunk as alternative to alcohol if availability is restricted [6]. Most of these non-liquor products contain denaturants to discourage drinking such as an added bitter taste, but intoxicating accidents still occur due to the relatively high amount of alcohol and other toxic chemicals contained in the products [7]. There have been numerous cases reported concerning fatal alcohol intoxication, but no case has been reported from ingesting pure ethanol to our knowledge. In this article, we present a case where the victim was considered to have committed suicide by ingesting 1 l of dehydrated ethanol. Tissue ethanol assay was also performed in addition to our routine analysis using blood or urine samples.

2. Case report

A 45-year-old man (174 cm tall and 58 kg body weight) was found dead in his car which was parked in a construction site (the atmospheric temperature was 11 °C). The engine key was left on the passenger seat and the engine was not running. The victim was wearing a sweater and trousers and was sitting on the inclined driver's seat. There was a 2 l polypropylene (PP) cup which was filled with 700 ml of yellow liquid (considered to be his vomit) on the passenger seat and two empty 500 ml bottles labeled dehydrated ethanol (>99.5%, v/v) (Fig. 1a) on the carpeted floor. According to the police the victim had previously attempted suicide several times. He was autopsied to elucidate the cause of death.

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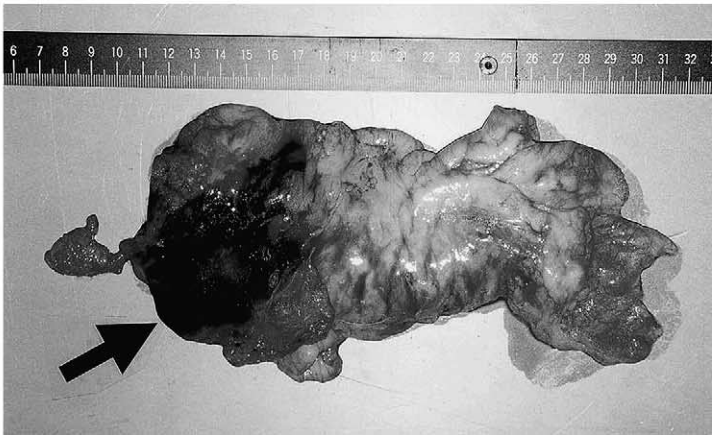
3. Methods

3.1. Ethanol assay

Fluid specimens such as blood, urine and vomit were analyzed immediately after collection. They were stored in a refrigerator for a week, and then frozen at −80 °C. All other tissue samples were stored at −80 °C until assay.

Ethanol concentrations in blood, ethanol exhibit, vomit and tissues specimens (cerebrum, lung, liver, kidney, spleen, pancreas and muscle) were determined by headspace gas chromatography-flame ionization detector (HS-GC-FID) using a capillary column (TC-WAX, 0.25 mm i.d. × 30 m, 0.25 μm film thickness). The temperature of the column oven and detector was set at 40 and 220 °C, respectively and split mode was chosen for injection (split ratio,

(a)



(b)

Fig. 1. (a) The two empty bottles found in the victim's car. The product contains 500 ml of dehydrated ethanol (>99.5%, v/v). (b) Necrosis, severe edema and hemorrhage was seen in the pancreas. (c) The severely damaged portion indicated with arrow on the Fig. 1b revealed severe congestion, neutrophilic infiltration and adiponecrosis (HE ×100).