

Brief Communication
Methanol related deaths in Edirne

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Abstract

In this retrospective autopsy study, a detailed analysis of methanol related deaths in Trakya region of Turkey is presented and departmental autopsy records, toxicology and histopathology results are analyzed.

We found that methanol poisonings comprise 2.83% of all forensic autopsies ($n:18$), 88.8% of the cases were male, most of the victims were aged between 41 and 45. Blood methanol concentrations range widely from 55 to 479 mg per 100 ml. Ethyl alcohol was detected in 44.4% of the cases. Most of the cases died in hospital and were poisoned through the consumption of alcoholic beverages from illicit sources and colognes.

It is important for physicians to be aware of methanol poisoning symptoms and for forensic pathologists to obtain samples for toxicology during autopsies. Some preventative strategies including to routine control of the stores, to prevent the production of illegal alcoholic beverages, etc. should be developed.

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1. Introduction

Methanol is a colorless, clear and volatile liquid. It is used in an industrial solvent, in windshield wiper fluids and in variety of commercial products [1]. Since it is cheap and easy to obtain, it is used in production of illegal alcoholic beverages in Turkey [2].

Poisoning due to methanol is relatively uncommon in forensic practice [3], but methanol related deaths have been reported [4–11]. Also, several epidemics have been seen [12,13].

The toxicity of methanol is due to its metabolites, which are formaldehyde and formic acid. Formic acid induces severe metabolic acidosis that leads to death and is the primary agent responsible for the ocular toxicity [1,3,14]. Symptoms of acute methanol poisoning are weakness, blurring of vision, nausea, vomiting, headache, epigastric pain, dyspnea and cyanosis. If a fatal amount of methanol has been ingested, the symptoms will be stupor, coma,

convulsions, hypothermia, and death. If the person survives, he may be blind [3].

Poisoning with methanol may be the results of unintentional (accidental) or intentional (suicidal, abuse, misuse) ingestion [2,6,7,9,11]. Rarely, pediatric cases are reported without any history or source of methanol [15].

In this retrospective study, 18 deaths due to methanol poisoning are evaluated and represented in detail from the medico-legal point of view.

2. Materials and methods

For this study, the autopsy records of the Forensic Medicine Department of Trakya Medical Faculty were reviewed. Between 1992 and 2003, 634 medicolegal autopsies were identified from the records. A total of 18 methanol related deaths were used for the study.

For all cases, blood samples were collected from the heart chamber. Samples were sent to the Council of Forensic Medicine, İstanbul for systemic toxicological analysis. Postmortem tissue samples from each case were collected for histopathological examination by the Pathology

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Department of Trakya Medical Faculty. In addition, records of the case history and scene investigation files from the Public Prosecutors of Edirne and Edirne branch of the Council of Forensic Medicine were reviewed to obtain additional informations for the events.

All records were read to evaluate the cases in the terms of age, sex, time and place of death, the source of methanol, blood methanol levels and histopathological findings.

3. Results

During the 12-year period, the total number of forensic autopsy was 634. All of the cases, 18 (2.83%) were due to methanol poisoning. Sixteen of the cases were male (88.8%) and two of them were female (11.1%). Their ages vary from 18 to 49 years, but most of them were between 41 and 45 years old.

According to toxicological results, the blood methanol concentration ranges widely from 55 to 479 mg per 100 ml. There were 17 cases (94.4%) with the methanol concentration over 80 mg per 100 ml. The lowest value was 55 mg per 100 ml.

In eight of 18 cases (44.4%) also had ethyl alcohol in their blood samples. The ethyl alcohol concentrations ranged from 47 to 633 mg per 100 ml. Seven of these eight cases were considered as methanol poisoning since their blood ethyl alcohol concentrations were lower than 250 mg per 100 ml. Of these cases, six died before admittance to hospital.

The scene investigation reports show that six cases (33.3%) were found dead in their home, seven cases (38.7%) were admitted to hospital in coma and died there, three cases (16.6%) died in intensive care unit and one case (5.7%) was found dead in a lift-hole of a building and the last one (5.7%) was found dead in a hotel room.

Ten of 18 cases (55.5%) were treated in hospital, six cases died in 3–6 h, and four cases died in 2–3 days. Despite the treatment, their methanol concentrations in blood were between 116 and 149 mg per 100 ml.

The victims died between October and April. There were psychopathic incisions on different parts of body in four cases and definitional tattoo in one case. There were no evidence of external trauma for all cases.

Twelve (66.6%) and four (22.2%) cases were poisoned thought the consumption of alcoholic beverages mostly named 'False Raki' and cologne, respectively. Consumed products were not known in other two cases because of the insufficient history and data.

The histopathological findings were shown in Table 1. Degeneration, edema, hyperemia and local necrosis were determined on optic nerve and chiasm of five cases that have been treated in hospital for a period.

Table 1
Microscopic autopsy findings

	Histopathologic findings	Number of cases	
Brain	Edema–hyperemia	18	
	Encephalitis	1	
	Cystic resorption	2	
	Intracerebral hemorrhage	1	
Lung	Congestion–edema	12	
	Atelectasis–emphysema	3	
	Intra-alveolar hemorrhage	5	
	Fibrocaceous tuberculosis	3	
	Chronic bronchitis	2	
	Pneumonia	3	
Liver	Infarction	1	
	Hyperemia	10	
	Fatty change	8	
Heart	Steatosis	2	
	Hyperemia	11	
	Lipomatosis	4	
Kidney	Acute myocardial infarct	1	
	Hyperemia	13	
Pancreas	Tubular necrosis	1	
	Chronic pancreatitis	5	
Spleen	Acute pancreatitis	3	
	Hyperemia	16	
	Gastro intestinal system	Acute erosive gastritis	2
		Acute hemorrhagic gastritis	4
Testicle	Chronic gastritis	6	
	Chronic oesophagitis	2	
	Focal necrosis	3	
	Germ cell hypoplasia	2	
Optic nerve and chiasm	Edema–hyperemia	5	
	Degeneration	3	
	Focal necrosis	5	

4. Discussion

The intoxication due to different toxic materials constitutes an important part in legal medicine practice. In this study, various aspects of death among methanol poisonings in Edirne are evaluated and compared with the data in the literature on the subject.

It is a well-known fact that the illicit availability of methanol is associated with an increase of methanol poisonings. In our society, methanol and related products are obtained easily because they are cheap and are sold everywhere.

Methanol fatalities constitute 2.83% of all medicolegal autopsies in Edirne, among the studies reported in Turkey as 1.56% by Inanici et al. [11].

In our study, 88.8% of the cases are male. Male predominance is in accordance with other studies. Deaths mostly occurred between 41 and 45 years of age, thus showing similar results as reported in previous studies [2,5,6,11]. This can be explained by the habitual consumption of alcohol especially, methanol by males more than females. Also, findings indicate that methanol fatalities are important causes of middle age mortalities, which are currently at the highest point.

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