

# TRANSDERMAL METHANOL INTOXICATION VIA FOLK MEDICINE

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## Abstract

**Introduction:** Methyl alcohol (methanol) is an industrial solvent and toxic liquid used in such as anti-freezes, paint removers, cologne, perfumes and defroster and also it is the most used denaturant in spirits (methylated spirits) to make it unconsumable. Even oral route seems to be the only way for poisoning, in rare cases inhalation and transdermal routes are possible. We present a case report with transdermal exposure applied according to the folk remedial use of methylated spirit for analgesic effects.

**Case Report:** A thirty-four year old woman was brought to the emergency department by her relatives with extreme fatigue, vomiting, difficulty in walking and sitting, rapid breathing and also confusion. Her laboratory tests suggested deep metabolic acidosis with high anion gap. She was admitted to intensive care unit and received hemodialysis. After her treatment, she was fully recovered without any vision deficit.

**Conclusion:** Prompt diagnosis and treatment are the keys to avoid sequels and deaths due to methanol intoxications by all routes. At least to avoid potential sources, harmful folk medicine applications are should be defined clearly and society-based measurements should be implemented.

**Keywords:** Methanol, Transdermal, Folk Medicine, Intoxication, Blindness

## Introduction

Physicians are more familiar to oral intake of methanol relating to suicidal attempts and unintentional exposures and also counterfeit beverage consumption among low socio-economic societies, therefore oral methanol toxicity and the associated chemical processes in the human body are well defined in the literature. There are however not many papers detailing the transdermal exposure pathway of methanol absorption. Folk medicine is generally based on plants but also some surprising solutions such as spirits. There are examples of it being used in the treatment of rheumatoid arthritis, edema, throat pain and postpartum abdominal pain in China, due to its analgesic and anti-inflammatory effects. But methanol is used as the general solvent in these kind of plant extracts, in fact not the main active ingredient.

In Eastern Europe however, especially in Turkey, it is believed that spirit-soaked bandage compressions, without any additional plant extract are beneficial for joint and muscle pain in as a part of traditional medicine. During the application of these bandages, generally nylon derivatives are used to increase the absorption and decrease the evaporation of spirit fluid. As a result, almost all of the reported transdermal methanol intoxication cases (14 examples) like this case are from

Turkey (1-14). There are atypical examples of transdermal methanol intoxication in the literature as well.

## Case Report

A thirty-four year old woman was brought to the emergency department (ED) by her relatives with extreme fatigue, vomiting, difficulty in walking and sitting, rapid breathing and also confusion. During her neurological examination, confusion and short responses to verbal stimuli with a GCS of 13 were noted. Her visual examination was normal. A right-sided leg and backpain for two days were the only positive detail in her history. Her vitals were in normal ranges (BP:120/70 mmHg, Pulse: 90/min, O<sub>2</sub> sat: 99%) except tachypnea with a rate of 22/min. Complete blood count, renal and liver function tests and also arterial blood gas were planned. The abnormal laboratory test results were pH:7.1, bicarbonate:3.6 mmol/L, haemoglobin:8.2 g/dL. We calculated anion gap as 28. In the light of these extreme results showing metabolic acidosis, the relatives were questioned again. It was then discovered that the patient had used a methanol containing mixture "spirit" under advice by an elderly relative for her leg and backpain. She had rubbed and wrapped her leg with cotton pieces soaked with spirit on the aching areas for 5-6 hours two, days before. After the

administrations of urgent intravenous bicarbonate infusion and 40% ethyl alcohol via nasogastric tube in the ED, the patient was taken to haemodialysis and admitted to the intensive care unit (ICU). At the end of haemodialysis session, all her symptoms and signs were dramatically disappeared. After 2 hours of haemodialysis her pH and bicarbonate levels measured as 7.47 and 21 mmol/L, respectively. The patient was followed up in the ICU for 2 days with supporting therapy and then taken to the internal medicine ward. She recovered fully with no further visual disturbance and was discharged on the 4th day.

The case report has written in an anonymous characteristic, thus secret and detailed data about the patient has removed. Editor and reviewers can know and see these detailed data. These data are backed up by editor and by reviewers.

### Discussion

When we investigated the folk medicine related methanol cases, no sex dominancy was noted (female/male ratio: 8/6) but the age distribution was between 41-68 except for one case of a 19 month-old female infant. These results were not surprising considering that such folk remedies are popular among older adults and the elderly population. Even in the infant case, the parents applied the 'medicine' as would be expected (11).

The reasons for these applications were varied, but were primarily for joint (2, 3, 6-8, 10, 13) and muscle pain (4, 9, 11, 14). There were also one-case examples of tooth pain, cellulitis/thrombophlebitis pain and headache (1, 5, 12). The admission Glasgow Coma Scores (GCS) were 15 in 5 patients and 3-7 in 5 patients. Metabolic acidosis and visual symptoms were detected in almost all of the cases.

The maximum concentration occurs at an average of  $1.9 \pm 1.0$  hours after 8 and 16-minute transdermal exposures. The cases had variable exposure times (5 minutes-5 days). In our case, the patient had wrapped her leg for 5-6 hours and was then admitted to the ED two days after the application. Therefore we cannot comment on when the toxic process started after her exposure.

The number of the exitus cases was 3 and they had a GCS  $\leq 7$  at their presentation. Five were permanently

blind and the rest of them were alive without any further symptoms. Permanent blindness was seen in one patient whose GSC was 15. Our case was discharged with full recovery.

### Conclusion

The diagnosis of transdermal methanol generally depends on clinical doubt. Prompt diagnosis and treatment are the keys to avoid sequels and deaths due to methanol intoxications by all routes. At least to avoid potential sources, harmful folk medicine applications are should be defined clearly and society-based measurements should be implemented.

Patient consent form - Ethics: The case report has written in an anonymous characteristic, thus secret and detailed data about the patient has removed. Editor and reviewers can know and see these detailed data. These data are backed up by editor and by reviewers.

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