

Original Article

Morbidity and Mortality in Methanol Poisoning: An Observational Study Conducted in Karachi

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Abstract

Background Alcohol poisoning is a serious issue in both the developed and developing countries. Illicit alcohol is commonly called as moonshine or bootleg whereas in Pakistan it is ordinarily known as tharra, kuppi, desi sharab, or daroo. This alcohol is mainly prepared by fermenting the mash of sugar cane pulp in a clay pot up to near 100% alcohol, however, it may contain impurities and many toxic materials. The awareness and basic knowledge of methanol poisoning is quite scarce in our society due to the cultural aspects. The goal of our study is to identify the clinical factors associated with the alcohol poisoning along with the frequency of mortality. **Methodology** A cross sectional has been conducted on the patients who were admitted in the National Poison Control Centre, Jinnah Postgraduate Medical Centre, Karachi. The patients who presented in a critical condition afterwards the alcohol consumption were included in the study from the year 2011 to 2015. **Result** The inclusion criteria conscripted a total of 188 patients in the study amongst which majority was observed during a single outbreak in the month of September 2011. The results of the study recorded mortality in 38.83% of the study group while 35.64% indicated survival with sequelae. On the other hand, 25.53% of the patients were discharged with recovery. **Conclusion** Morbidity in the cases of methanol poisoning tends to be crucial and high along with an eminent rate of mortality. Sequelae from methanol poisoning predominantly involves the visual disturbances including the blindness.

Keywords

Methanol poisoning, alcohol, acidosis, hemodialysis, mortality, morbidity

Introduction

More than 45 fatalities on account of drinking of illicit alcohol were reported in Karachi in the month of September 2011. This is not an isolated incidence of such nature. In the past many such and even more grave cases of mortalities have been reported from the city as well as other parts of the country because of the illicit alcohol poisoning (Naraqi, S., et al. 1979; Swartz. R., D., et al. 1981). Pakistan is not the only country where fatalities due to consumption of illicit alcohol occur. Such poisoning continues to remain a serious problem in

both the developing and developed countries.

Normal alcohol chemically consists of ethyl alcohol (ethanol). However, the alcohol available for regular consumption may also contain a number of impurities. Among these impurities, methanol is the most significant chemical which itself only mildly toxic but its metabolic products are lethal. So it has been observed that in Pakistan fatalities in illicit alcohol consumption mainly occurs due to the contamination with methanol.

In such cases, the quantity of alcohol consumed is never the point of concern but the level of methanol is which makes it poisonous for the human body. Methanol, once consumed is metabolized into highly toxic compounds that are responsible for the acidosis and blindness (Røe, O., 1946). The lethal dose of pure methanol is estimated to be 1-2 ml/kg however; permanent blindness and death have been reported with as little as 0.1 ml/kg (6-10 ml in adults), (O'Neill, B., et al. 1983).

Methanol is metabolized in the body of the consumer into formaldehyde and then into formic acid by the enzymatic actions (Uotila, L., & Koivusalo, M., 1974). Formic acid then gets metabolized into carbon dioxide and water which is excreted through the kidneys and lungs.

The formic acid here is the primary cause of the damage (Noker, P. E., & Tephly, T. R. 1980). The aim of this study had been to identify the outcomes of the methanol poisoning in order to record the morbidity and mortality of such cases for establishing the basis for generating an effective and more efficient treatment strategies.

Methodology

A cross-sectional study has been designed and conducted in the National Poison Control Centre, Jinnah Postgraduate Medical Centre, Karachi. The inclusion criteria was implemented that required the patients who were presented into the study

setting with a critical condition after the consumption of alcohol, from the year 2011 to 2015.

The individuals were investigated with the medical history, physical examination and laboratory testing for the confirmation of methanol poisoning and observation of the clinical features for indicating the morbidity and mortality. The Ethical approval had been provided by the department while the consent was received from the immediate family of the patient.

Results

A total of 188 patients fulfilled the inclusion criteria and were observed for the study. Out of them, 108 patients were received within a single outbreak in the month of September 2011 in which 45 mortalities were recorded.

The entire study population has mainly indicated mortality as dominant factor in the cases of methanol poisoning with the incidence of 38.83% (n=73). Likewise, amongst the survivor's majority ended with sequelae with the prevalence of 35.64% (n=67) while the survival with recovery had been seen in 25.53% of the cases (n=48).

Visual loss had been observed in all of the cases with sequelae. Furthermore, it had been observed that most of the affected individuals belonged to the age group of 45 to 65 years while all of recruited participants were males.



Figure 1: Outcomes in the Case of Methanol Poisoning

Figure 1 emphasizes that mortality is a predominant factor in the case of methanol poisoning.

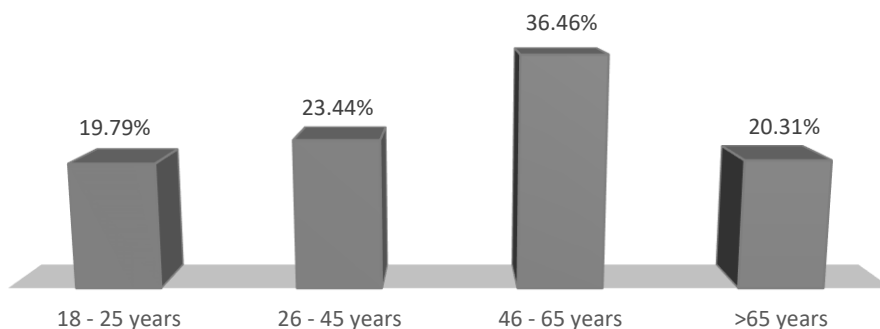


Figure 2: Age Record of the Methanol Poisoning Patients

Figure 2 reveals that the age range between 46 to 65 years forms the highly affected group.

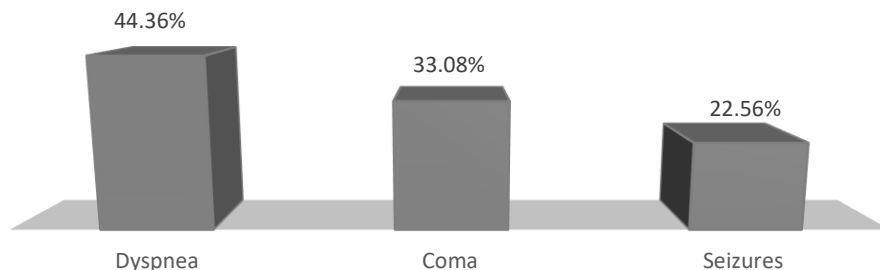


Figure 3: Account of Morbidity in Methanol Poisoning

Figure 3 indicates that dyspnea is the highly prevalent clinical presentation observed in the cases of methanol poisoning.

Table 1: Biochemical and Clinical Analysis of the Methanol Poisoning

Group	Frequency (N=188)	pH	PCO ₂ (kPa)	Anion Gap (mEq/l)	Hemodialysis	Base Deficit (mEq/l)
Dead	73	6.5	7.8	35	13	29
Sequelae	67	6.8	3.1	29	40	23
Recovery	48	7.2	2.3	20	05	17

Table 1 provides with the average observations for the patients of methanol poisoning with frequency distributed according the resultant status of the patients.

Discussion

Despite recent development in the treatment, interventional options and early reorganization of risk factors of possible methanol poisoning, the mortality and morbidity rate is still recorded to be high. Diagnosis can easily be missed in sporadic cases however it is not neglected in the outbreaks. (Sejersted O. M. et al. 1981) Majority of the symptoms on arrival in the presenting patients had been noted to be the dyspnea, coma and seizures (Figure 3).

Apart from the clinical manifestations, 35.64% sequelae also included the gastrointestinal irritations and visual loss. The accumulation of formic acid due to the intra-metabolism of methanol in the body leads to the acidosis which in first instance inhibits the cellular respiration and causes ocular. It also inhibits normal metabolism in optic nerve cells. Both of these led to blindness (Sejersted O. M. et al. 1983; Baker, R. N., et al. 1969).

The alcohol consumers do not get any bad symptoms till after 12 hours of ingestion or even up to 24 hours. In addition, the initial symptom of poisoning is similar to the overdose of normal alcohol therefore, usually it is considered as hangover and may consist of drowsiness, confusion, and ataxia, as well as weakness, headache, nausea, vomiting, and abdominal pain. But with the passage of time metabolic acidosis develops which is mainly indicated by shallow respiration, cyanosis (blue discoloration of body), tachypnea (fast respiration), coma, seizures, electrolyte disturbances, profound hypotension (low blood pressure) and cardiac arrest. Patients usually report blurred or misty vision, double vision, changes in color perception, constricted visual field or total loss of vision. Loss of memory, confusion, agitation

and stupor leading to coma is followed as acidosis increases which may lead to death. Most surviving patients are left with permanent blindness and other neurological defects (Clay, K. L., et al. 1975) and so it has been observed in our study that the patients with sequelae had lower blood pH and lesser partial pressure of carbon dioxide with elevated base deficit, thus explaining the visual loss (Table 1). Treatment of methanol poisoning requires to control and treat acidosis, control of further methanol metabolism elimination of toxic metabolites (Agnier, K., et al. 1949; Alha, A., R., et al. 1958; Barceloux, D. G., 2002).

Supportive therapy is aimed at initiating airway management, correcting electrolyte disturbances, and providing adequate hydration. The metabolic acidosis may necessitate administration of bicarbonate and assisted ventilation. The elevated base deficit indicates the decreased concentration of bicarbonates in the patients in our study (Table 1). Thus, bicarbonates potentially may reverse visual disturbances. In addition, bicarbonate may help to decrease the amount of active formic acid (Burns, M. J., et al. 1997).

Early introduction of hemodialysis is crucial in these cases and they are based on clinical and laboratory parameters. Patients presenting coma, seizures, dyspnea and hypotension are considered for early introduction of hemodialysis. Delayed arrival is another indication for dialysis. Early recognition of pH <7 increase in anion gap, osmolar gap and osmolarity, early introduction of dialysis may be lifesaving (Megarbane B. et al. 2001). However, our results show that most of the patients who underwent hemodialysis survived the condition with sequelae.

Conclusion

Morbidity in the cases of methanol poisoning tends to be crucial and high along with an eminent rate of mortality. Sequelae from methanol poisoning predominantly involves the visual disturbances including the blindness. There is dire of need raising awareness and basic knowledge for methanol poisoning on both clinical and social levels.

Conflict of Interest

N/A

Acknowledgement

We are thankful for generous support from Better Health Company.

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