DISCUSSION

Ethanol is also called ethyl alcohol; it is the principle component of alcoholic beverages, produced by fermentations of sugars by yeasts (byproduct of the metabolic process of yeast). It also used as a solventand antiseptic.[142,143]

Ethanol is a neurotoxic psychoactive drug. It is a central nervous system depressant, when it reaches the brain, it has the ability to delay signals that are sent between nerve cells that control balance, thinking, and movement.[144]

Alcohol intoxication produced by consumption of sufficient quantity. Treatment is mainly of supportive type (care of airway, respiration, and circulation, with I.V fluids), hemodialysis has also been used with prompt restoration of consciousness in patients with severe ethanol toxicity, respiratory failure, shock, lactic acidosis, and persistent elevated blood levels (greater than 0.5g/dl).[145]

Methanol toxicity remains a common problem in many parts of the developing world, especially among members of lower socioeconomic classes. Toxicity may result from methanol contamination of grain spirits, consumption of methanol containing fluids by alcoholics deprived of their alcoholic beverage of choice, suicidal ingestion of methanol containing products and unintended consumption of such products by children. Methanol is cheaper than ethanol and may be used to fortify illicit spirits. If there is no history of methanol, initial diagnosis is difficult.[146]

Demographic data:

Sex:

Ninety six patients were included in the present work, 50 of them intoxicated by ethanol and 19 by methanol. Males outnumbered females (58% for ethanol and 63% for methanol). This was in agreement with studies done in Royal colleges of physicians, Psychiatrists, and General Practitioners (1995), and in Department of health in London (1995), They showed males were at higher risk for alcohol toxicity than females, and should decrease consumption by less than 21 units/week for males and less than 14 units/week for females.[147,148] Gureje O et al (2007) [149] in their descriptive epidemiology of substance use and substance use disorders in Nigeria during the early 21st century, showed that males consumed alcohol 3 times than females.

AlsoNolla-Salas (1995), and Kraut JA et al (2008) demonstrated the high risk of males than females for alcohol consumption.[150, 151]

On the other hand Kraut and kurtz(2008) in their study of clinical features, diagnosis, and management of toxic alcohol ingestions illustrated that women may be more susceptible than men to alcoholic's effect on cognitive functions (divided attention and memory) even with the same amount of alcohol consumed.[151]

Age:

Range of age:

In the present work, the age of patients that consumed alcohol was wide and ranged from 20 to 67 years old. Several studies demonstrated different ranges according to the sample of the study as Grant BF et al (2004)who showed that alcohol consumption started from age of 18 years old and declines after age of 25 years old.[152]

Hantson P et al (2004) showed that the range of age among alcoholic intoxicated cases was 20 to 30 years old among 200 studied patients of both ethanol and methanol.[153]Another study conducted by Ruan HL et al (2006)demonstrated that the range of age from 30 to 40 years old among patients with ethanol toxicity.[154]

Mean of age:

In the present work, the mean age of ethanol toxicity was 30.60 ± 8.12 which was considered very high in comparison with a study conducted by Wildt et al (2006) who showed that the mean age was13.58± 2.21 for males and 14.01±1.89 for females.[155]

Marital status and education:

Statistical analysis of the present work, showed that almost the half of the studied cases of ethanol toxicity (46.3%) were single, 10% were divorced, and the majority of them (68%) was highly educated, and 34% of them had a professional work. This was in agreement with Elwell RJ et al (2004) who revealed that ethanol consumption increased with those of high level of education and the same pattern was seen with socioeconomic factors and job professionalism.[156]

Residence:

The present study showed that the majority of patients (89.8%) with acute alcohol toxicity admitted to hospital were from urban surrounding, versus only 10% from rural areas. In agreement with Hao W et al in their study conducted in china (2004) mentioned that people with higher incomes in the urban area can better afford alcohol than with those in rural area.[157]

The low incidence of alcoholic intoxication in rural area in the current study could be attributed to conservative environment and religious causes as alcohol drinking is considered there as a religious and social crime.

Time lapse since methanol exposure and hospital attendance:

In the present work, the majority of cases (63.2%) intoxicated with methanol attended hospital after more than 12 hours of exposure to methanol. This is in agreement with Kraut JA and Kurtz I (2008).[151] This could be explained by the fact that during the initial phase of methanol poisoning, individuals may experience effects similar to inebriation with alcohol and thus they may not seek medical attention. Depending on the time elapsed since toxic exposure, biochemical changes may be present to a greater or lesser extent. In the earliest phase of poisoning, the osmolal gap is greater and the anion gap is lower, while as the alcohol is metabolized the osmolal and anion gaps approximate

to each other (both being elevated), and in the latest phase the osmolal gap tends to normalize and the anion gap continue to increase.

In the current work, all cases (100%) of methanol toxicity's patients were seen by physician within 15 minutes of hospital attendance which reflected the serious effect of methanol and the good care that is provided by the medical team.[151]

Risk of heart failure and infarction:

Heart failure, infarction:

In the current study, (40%) of ethanol intoxicated cases were in great risk of heart failure and infarction. This coincided with studies, done by Kupari M et al (1991), Piano MR et al (2002) and Bertolet BD et al (2008) who demonstrated that the risk of heart failure and infarction increased with excessive alcohol intake.[158, 159]

Conversely, Koppes LL et al (2006), and Di Castelnuovo et al (2006) proved that moderate alcohol drinking had a protecting role from heart failure and infarction.[56, 65]

Smoking:

The current work showed that, most of the studied cases of ethanol toxicity (84%) were current smokers. This is in agreement with the study conducted by Hughes and Oliveto (1993)[160] who found that starting of one associated with starting of the other or cessation of one should increase consumption of the other. Also, De Vries N et al (1990) joined alcohol and smoking with increasing the risk of cancers.[161]

On the other hand, Grucza, and Beirut (2007) revealed that there was no definite cause between tobacco and alcohol co-administration.[162]

Clinical pictures:

Ethanol:

Conscious level:

In the current study among 50 patients with ethanol toxicity, the majority (60%) were consciousonly one patient (2%) intoxicated with ethanol was unconscious. . This coincided with Davis AR et al (1986),[163] Perper JA et al [164] (1986),Vonghia L et al (2008).[21] who demonstrated that in patients with alcohol tolerance there was adaptive process and patients just presented with drowsiness, slurred speechand loss of consciousness occurred with high alcohol concentration.[21, 163, 164]

Tachypnea, dyspnea:

In the present study, the most common clinical presentation of acute ethanol toxicity was dyspnea (42%), and both dyspnea and palpitation in (76%) of patients. Happel KI et al (2006) had demonstrated that the risk of dyspnea and other respiratory manifestations increased with increasing alcohol consumption.[165]

On the other hand the studies conducted by Addoloratog et al (1997), Caputo F et al(2001), Hanck C et al (2004), reported that the gastrointestinalmanifestations were the

commonest among patients intoxicated with ethanol.[166-168] This could be explained by the increasing in acetaldehyde as an intermediate product of alcohol metabolites. it binds to protein and other biologically important compounds and causes gastrointestinal manifestations.[169]In the present study the main clinical picture was due to metabolic acidosis which reflect itself on respiratory and cardiovascular systems .

Heart rate:

The present study showed that tachycardia was the most common rhythm presented with ethanol toxicity (76%).[170] This was in agreement with Ruigomez et al (2002) who found that tachycardia was a common presentation with great risk of atrial fibrillation.[171]

Blood pressure:

In the current work nearly half of the intoxicated patients (44%) suffered from ethanol developed hypertension. In studies in which mean blood pressure levels were reported according to alcohol-use categories, blood pressure elevations were 1.6 to 10.9mmgh higher in the higher alcohol use group than in the low or no use groups. When dose response relationship was evaluated, the subjects with the highest alcohol intake had the highest blood pressure. The mechanism of the association between alcohol and hypertension is unknown. Even though alcohol users tend to differ from nonusers in terms of age, sex, cigarette smoking, and obesity, the association of alcohol and hypertension is not dependent on these confounding variables. This relationship is also independent of race, serum cholesterol value, educational achievement, social class, and coffee consumption.[172-175]

Methanol:

Conscious level:

Concerning the nineteen patients intoxicated with methanol in the current study, 11 patients presented to ER were unconisous indicating the severity of poisoning. This coincided with Hales (2010).[176] who showed that there was great affection in conscious level with methanol toxicity.

Respiratory manifestations and seizures:

Dyspnea, tachypnea, cyanosis, palpitation, seizures, and cardiac arrest were common signs seen among methanol intoxicated patients in the present study. This coincided with Barceloux et al (2002) who related most of these signs to metabolic acidosis.[**146**,177]

Visual loss:

Visual loss in three patients in this work could be due to formic acid accumulation. Sharma et al (2012) explained that in their study on the effect of methanol poisoning on ocular and neurological manifestations. They concluded that serum methanol levels greater than 20 mg/dl correlated with ocular injury. Also they showed that Funduscopic changes ranged from retinal edema in the peri-macular region to the entire fundus. Optic disc edema and hyperemia were observed within 48 hours.[132]

Investigations:

Ethanol:

Metabolic acidosis and hypoglycemia:

In the current study, hypoglycemia was a common presentation in alcohol intoxicated patients with mean blood glucose level 71.04 ± 16.66. This coincided with study conducted by McMicken DB et al (1992) who concluded that chronic ethanol ingestion increased the risk of hypoglycemia mostly with young age. This could be attributed to depletion of glycogen stores.[178]

On the contrary,O'keefe SJD et al(1996), reported that hypoglycemia due to ethanol toxicity was uncommon for those with moderate alcohol intake.[179]

In the current work, metabolic acidosis with high anion gap was common among ethanol intoxicated patients with mean PH of 7.32 ± 0.10, mean HCO3 of 21.10 ± 2.98. In agreement with this, Sabatini, S et al (2009) who showed that metabolic acidosis with high anion gap was common among patients with ethanol toxicity, and could be explained by increased lactic acid production found in such intoxication.[180]

ECG changes:

In the present work, the most common electrocardiographic (ECG) finding with ethanol toxicity was sinus tachycardia (66%) with possibility of cardiac arrhythmia, most commonly atrial fibrillation. Similarly Frederikson et al (1998), reported that sinus tachycardia was common among alcohol intoxicated patients.[181] In addition Abelin et al (2000) found that atrial fibrillation was a common ECG finding in those patients. This presented tachycardia could be explained by the effect of alcohol in adrenal medulla and liberation of epinephrine .[182]

In contrast to the present study, Priest et al (2000), showed that T wave changes and ischemia were characteristics of alcoholic cardiomyopathy.[183]

Methanol:

Metabolic acidosis and ABG:

In the current work, the most important finding was metabolic acidosis with a mean PH 7.11 ± 0.26 and mean HCO314.68 ± 5.75. This coincided with Jacobsen and Mcmartin et al (1986), and Osterloh JD et al (1986) and could be explained by formic acid production.[177,184]

In the current work, there was no availability of measuring serum methanol level so the diagnosis depends mainly on history and the presence of metabolic acidosis. LeWitt PA et al (1988), and Weiss HB et al (1999) showed that measurement of serum methanol level was helpful, but the diagnosis was based mainly on an obvious epidemiological context, and above all on the finding of metabolic acidosis with an elevated anion gap and/or osmolal gap.[135,185]

The present workshowed that arterial blood gases (ABG) was determined upon admission for every patients. Because of the delay or lack of facilities of methanol

measurements, the initial treatment with bicarbonate started based on the severity of metabolic acidosis of the patients. This was in agreement with Osterloh JD et al(1986) who demonstrated that ABG was applied on admission for all patients with very high susceptibility for developing severe metabolic acidosis and recommended early starting of treatment with bicarbonate. [184]

Outcome and complications:

Ethanol:

Outcome:

In the present study, the majority of the intoxicated cases of ethanol (70%) were fully recovered with good outcome. This coincided with Golfrank LR et al (2011)who mentioned that patients with ethanol toxicity were fully recovered if 24 hours passed without complications.[186]

In the current study (30%) of ethanol intoxicated cases developed bad outcome with complications; mainly disturbed conscious level (DCL) in 14% of cases, 8% associated with cardiac arrhythmia, 4% with severe metabolic acidosis, 2% presented with unstable angina, and 2% by carpopedal spasm. DeBllis R et al ((2005) showed that intoxicated patients presented after heavily drinking for several days developed withdrawal symptoms after the acute intoxication has subsided.[187]While Gelder M et al (2005) demonstrated that persistent of memory blackout and idiosyncratic intoxication or pathological drunkenness symptoms due to consumption of a dangerous amount of alcohol could be explained by damage of brain structures.[188]

One patient with ethanol toxicity in the present study passed away. Death in case of ethanol intoxication was explained by different mechanisms; it may be due to cardiac dysrhythmia in patients developed alcoholic ketoacidosis, vomiting, aspiration, or respiratory center depression.[189]

Complications:

In the current work, the majority of cases (70%) of ethanol toxicity developed no complications. Explaining the main use of ethanol for self-joys and it was associated with low and non-harmful doses of ethanol. This was coincided with Gordon RSF et al (2003)who showed that patients with alcohol intoxication who took the first aid management of alcohol toxicity (mainly dextrose infusion and oxygen supplementation) usually left the emergency department without complications.[190]

In the present study, low percentage (14%) of patients with ethanol toxicity presented with disturbed conscious level (DCL) which coincided with a study done byMackcay CA et al (2000). They studied the association between the assessment of conscious level using the AVPU (alert, voice, pain, and unresponsive system) and the Glasgow coma scale. They proved that there was a deterioration of the conscious level in case of ethanol toxicity.[191]

Cardiovascular complication in this study occurred in 8% of patients. This was in disagreement withRimm EB et al (1996), and Cooper HA et al (2000) who showed that ischemic changes and dilated cardiomyopathy were more common.[192,193]

Methanol:

Outcome:

In the present work, the majority (63.2%) of Methyl alcohol intoxicated patients recovered with good outcome. In agreement of this Bennett IL (1987)who revealed that only 19% of cases had bad outcome and mortality.[194]

In high percentage of the studied cases (84.0%) follow up to illustrate the dangerous effect of methanol toxicity on them couldn't be completed. It was decided to make an educational awareness through the study to all patients about the harmful effects and complications met as a consequence of drinking alcohol in general and methanol in particular. This was the same track taken by Hovda KE et al (2005), and with the guidelines conducted by world health organization (WHO), which was published in (2014). Unfortunately, some of the patients (5%) just ran away from the wards as they were afraid from legal consequences and/or they ashamed from their drinking behavior.[195]

In the present work, three cases (15.8%) of methanol toxicity had died. Similarily Bennette IL (1987) demonstrated that the mortality with methanol toxicity was 19% .Death might happen as a result of ingestion of large amount of methanol which depressed cardiac contractility and leads to circulatory collapse, heart failure, cardiac arrhythmia, or both. Or with high serum CO2 content.[194]

Complications:

In the current work, the most common complication (68.4%) met with those patients was severe metabolic acidosis. This was in agreement with Chew et al (1985) who showed that the majority of cases of methanol toxicity were acidotic to some degree.[196]

In the present work, three cases (15.8%) suffered from blindness; Data of the current research was in contrast with those of Peterson CD et al (1981). They showed that the majority of the cases of methanol toxicity suffered from either total blindness or visual disturbances following acute methanol intake.[197]

Management:

Ethanol:

In the present work, almost all cases (100%) with ethanol toxicity received primary medical care in the form of circulatory, respiratory supportand gastric lavage (when ingestion within one hour) as primary medical care which should started as soon as possible. This was in agreement with different studies. Atassi WA et al (1999), Yip L et al (2002)and Williams SR et al (2007) demonstrated that all cases with alcohol toxicity should receive primary supportive medical care in the form of fluids, circulatory, and airway support, as there is a high risk of respiratory depression, loss of gag reflex, hypoxemia and aspiration in case of ethanol toxicity.[145, 198,199]

Also, Jacopsen MD et al (1997), Mckmartin KE et al (1997) and Megarbane B et al (2003) demonstrated that supportive care for ethanol toxicity was a current recommendation as a lifesaving therapy for this patients.[200,201]

None of the patients in the present research received any antidote for ethanol toxicity although Yip L et al (2006) recommended thiamine 100mg IV or IM as an antidote for severe cases of ethanol toxicity, comatose patients, or patients who need intubation.[202]

In the current work, no hemodialysis was applied to the intoxicated cases of ethanol, which could be explained by the mild toxicity of those patients. Also metabolic acidosis was corrected simply by the fluids and bicarbonate with no need for hemodialysis. Atassi WA et al (1999) recommended hemodialysis as an effective means of enhancing elimination of ethanol and can therefore be used in cases expected to be associated with high morbidity or mortality with severe metabolic acidosis (PH less than 7.3).[145]

Methanol:

In the present work, the majority (63.2%) of methanol intoxicated patients received pre-hospital care and about half of them (57.9%) were in need for intubation. All patients had received care for respiration, care of circulation and fluid therapy. Only 38% had gastric lavage. The main fluid therapy received as first aid was dextrose to treat the developed hypoglycemia. Three patients (15.8%) arrested with applied cardiopulmonary resuscitation. In agreement with Burns et al (1997) andWilliams GF (1997)they showed that primary medical care was lifesaving in patients with methanol toxicity.[203,204]

The international guidelines of methanol treatment recommended antidotal therapy in each case of methanol toxicity.[146]

In the poison center (AMUHs) they started the management with treatment of acidosis and its consequences and consider ethanol antidote only if methanol ingestion is diagnosed. In agreement with that, Wadgymar et al (1998), and Hantson P et al (2005) who mentioned that treatment of severe methanol poisoning should include management of metabolic acidosis, visual and mental changes. In addition, folic acid is effective for accelerating format metabolism into carbon dioxide and water.[153,205]

Unfortunately the measurement of methanol toxicity was not available in many hospital including (AMUHs).

In the present study, Fomepizole was not used as antidote for management of methanol toxicity as it was expensive. Several authors have emphasized on the use of fomepizole, itwas a corner stone for management of methanol toxicity. Fomepizole has a stronger affinity for alcohol dehydrogenase (ADH) than ethanol and is easy to administer. The monitoring of serum levels is not necessary, and fomepizole has no reported CNS-depressive effects. Because this antidote is well tolerated, it may be administered for days (the half-life of S-methanol is reported to be 50-80 hours during antidote administration). Moreover,Fomepizole may postpone or even obviate the need for hemodialysis and reduce the need for treatment in ICU.[206, 207]

SUMMARY

A person is considered suffering from acute alcohol intoxication when the quantity of alcohol consumed produces behavioral or physical abnormalities. Alcohol misuse has the potential to damage almost every organ in the body, including the brain, liver and spleen.

Initial symptoms of methanol toxicity generally occur 12-24 hours after ingestion and the appearance of symptoms correlate to the volume of methanol ingested.

The aim of the present work was to study the adaptation of international guidelines of management of acute alcohol toxicity in patients admitted to the poison center of Alexandria main university hospital. The subjects of the study where all patients admitted to the poison center of AMUH in a period from 1st December 2012 tell 1st may 2013 in which there was 69 patients collected from emergency department. In this period among 69 patients there were 50 patients with acute ethanol toxicity and 19 patients were under methanol toxicity.

Analysis of the present study demonstrated that:

- No specific age for alcohol toxicity as the age ranged from 20 to 67 years.
- Males outnumbered females in both ethanol and methanol intoxication.
- Highly educated individual were more susceptible for ethanol intoxication, against low educational level with methanol toxicity due to its adulteration use with lack of information about the toxin and accidental ingestion.
- The majority of intoxicated cases in both type of poisons more common among urban than rural area.

- Most of the studied cases of ethanol toxicity (84%) were current smokers.
- Almost All cases of alcohol toxicity were seeing physician in an optimal time in attending emergency department.
- The delay of hospital attendance in methanol intoxicated cases is due to ignorance of manifestations and lack of information about the nature of this poison.
- Most common way of transfer of ethanol intoxicated patients was by the relatives or friends, about methanol intoxicated cases; the majority of cases transferred by ambulance after bad progression and need for life threatening care from the start by a well-trained persons. With great affection in conscious level and need for help to transfer these patients as soon as possible to the nearest hospital available.
- The majority of intoxicated cases with ethanol presented in emergency department were conscious and well oriented of (grade 1 of GCS).
- Dyspnea, tachycardia, and tachypnea were the most common presentation in ethanol toxicity.
- Tachycardia was the most common rhythm presented with ethanol toxicity (76%) and half of the intoxicated patients (44%) with ethanol developed hypertension.
- With methanol intoxication, more than half of the intoxicated cases presented with disturbed conscious level (of grade 2 or 3 GCS), with severe metabolic acidosis, electrolyte disturbances, and cyanosis induced by hypoxemia and accumulation of toxic metabolites of methanol.

- Dyspnea, tachypnea, cyanosis, palpitation, seizures, and cardiac arrest were common signs seen among methanol intoxicated patients.
- Visual loss in three patients occurred with methanol intoxication.

- As regard the investigations; hypoglycemia was a common presentation in ethanol intoxicated patients with mean blood glucose level 71.04 ± 16.66. Metabolic acidosis with high anion gap was common among ethanol intoxicated patients with mean PH of 7.32 ± 0.10, mean HCO3 of 21.10 ± 2.98.
- In methanol metabolic acidosis was seen with a mean PH 7.11 ± 0.26 and mean HCO314.68 ± 5.75
- Almost all cases of ethanol toxicity assessed and received treatment as a primary care in good way with no medical delay due to little and less dangerous manifestations and complications, against those with methanol toxicity which had more dangerous complications with lack of time of attendance to hospital as the majority of this cases ingested methanol accidently without preparation due to industrial use of methanol. And negligence of its manifestations.
- Primary medical care interfering with life was the main concern in the management of all cases of acute alcohol toxicity including secured airway, care of breathing, and that of respiration, fluids therapy with correcting hypoglycemia which was the most common presentation with cases of ethanol toxicity and hypotension, also with correction of severe metabolic acidosis and its complications, which was the most common presentation and complications due to methanol ingestion, also correction of hyperkalemia in some cases with its dangerous complication and bad outcome, need for intubation and ventilation in deteriorated cases.
- In the present study, the majority of the intoxicated cases of ethanol (70%) were fully recovered with good outcome.
- In the present work, the majority (63.2%) of methyl alcohol intoxicated patients recovered with good outcome.
- Almost all cases of methanol toxicity admitted from emergency department to the poison unit center for follow up and observation with further management. With no available antidotal therapy for either ethanol or methanol poison applied in the poison center in Alexandria main university hospital, the main concern was for correction of metabolic acidosis and its complications for methanol toxicity, up to hemodialysis which was applied in the present work in 2 cases with methanol intoxication. And the main concern of ethanol toxicity is correction of hypoglycemia and electrolyte disturbances.
- The majority of cases of ethanol toxicity either discharged from ED after improvement or patients escaped and refused therapy or follow up due to legal responsibilities.
- Methanol associated with bad outcome and increasing mortality among them, among these cases 3 patients died either in emergency department with applied cardiopulmonary resuscitation or from complications.
- Methanol toxicity considered more dangerous than ethanol due to late presentation of symptoms and delay of hospital attendance with the most dangerous complications was severe metabolic acidosis, renal failure and less life threatening blindness and affecting conscious level.

CONCLUSION

From the previous results we can concluded that:

- Almost all cases consuming alcohol for self joy with other materials for getting pleasure while methanol almost accidentally ingested due to adulteration of the alcoholic beverages.

- There was no specific age for alcohol intoxication for both ethanol and methanol toxicity. Males outnumbered females consuming alcohol. Highly educated persons more prone to consume ethanol, against methanol which is more common among low educated persons or illiterate one.

- Hypoglycemia was the most common presentation with acute ethanol toxicity while severe metabolic acidosis with its complications was the most common and dangerous presentation with methanol toxicity.

- All cases of acute alcohol toxicity received primary medical care included secured airway, breathing, respiration and ventilation, with fluid therapy.

- The Majority of cases with ethanol toxicity received treatment in emergency department with little cases admitted for follow up and observation with relatively good outcome to methanol intoxication. Cases intoxicated with ethanol almost escaped from ED for afraid from legal responsibility. Against medical advice, while the majority of methanol intoxicated cases admitted to the poison center due to their serious complications if still alive.

- No antidotal therapy applied either for ethanol or methanol intoxication in the poison center as it already not available, and the main concern is to correct metabolic acidosis, electrolyte disturbances, hypoglycemia, prophylaxis against complications or treatment of it if occurred.

- Definite diagnosis of alcohol toxicity by measuring the alcohol blood level; either for ethanol or methanol toxicity for effective treatment and better outcome without complications with application of international guidelines of management of alcohol toxicity are not followed due to technical and economic difficulties.