The Investigative Methodology to Confirm Alcohol Consumption in All Suspects Brought from Different Cities of Sindh to the Medico Legal Department at a Tertiary Care Hospital

Iqbal Ahmed Khan[1], Mir Ghulam Ali Talpur[2], Naveed Ali Qadri[3], Syed Perwez Alam[4], Hari Ram[5], Hajrah Hilal Ahmed[6], Muhammad Jamaluddin[7]

Abstract

Objective: To identify the investigative methodology carried out by medico legal officer for the subjects' evaluation who were brought by the Police in order to confirm the suspected consumption of alcohol.

Methods: This is an observational cross sectional study, in which data related to the subjects who were brought to the medico legal department in a tertiary care hospital from different parts of Sindh by law enforcement agencies (Police), for suspected intake of alcohol was evaluated and analyzed. This study was done from January 2016 to December 2016. About 53 suspects were included in this study. Statement of Police related to the reason for suspecting the alcohol consumption, subject's (accused) statement who were brought to the medico legal department, findings from the examination conducted by the medicolegal officer (MLO), particulars regarding the body fluids chemical evaluation, and conclusive final report of MLO was retrieved.

Results: In our study a total of 53 subjects, who were brought during this study period, were included. All were male, with the mean age of 33.94 ± 10.018 years. The most common age group involved was of 22 to 40 years. Most of the subjects belonged to Karachi and Hyderabad and were 54.7% and 22.6% respectively. On chemical analysis, all of the subjects (100%) were found to have alcohol in their blood, while only 10 (19%) were found to have alcohol in urine.

Conclusion: From our study it is concluded that blood and urine samples were the main investigative methods for confirmation of alcohol consumption. Significant correlation was found between the doubt of law enforcement agencies (police) regarding alcohol consumption of subjects and opinion of MLO which was based on clinical and laboratory findings. In usual cases, medicolegal officers do not operate under the standard operating procedures.

Keywords: Jurisprudence, alcohol drinking, blood chemical analysis, blood alcohol content.

Introduction

Alcohol consumption has been an integral part of many cultures and are been consumed by hu-

[1]Department of Forensic Medicine,
Karachi Medical and Dental College
[2]Department of Forensic Medicine, Isra University
[3]Department of Forensic Medicine and Toxicology,
Liaquat College of Medicine and Dentistry
[4]Shaheed Mohtarma Benazir Bhutto Medical College
[5,6]Department of General Surgery, Unit-II,
Abbasi Shaheed Hospital & Karachi Medical & Dental College

Correspondence: Dr. Hajrah Hilal Ahmed
Department of General Surgery, Unit-II, Abbasi
Shaheed Hospital & Karachi Medical & Dental College
Email: hajrahhilal@gmail.com
Date of Submission: 23rd June 2020
Date of Acceptance: 19th November 2020

mans since prehistoric times. Its effects can be both toxic as well as beneficial depending upon the quantity of its use. Moderate use might be associated with reduced cardiovascular risk as well as reduced risk of metabolic and neurodegenerative diseases[1]. Nowadays, alcohol intake is a great threat to health and social problems globally and is becoming a major concern. In United States, beside smoking and obesity, the third leading cause of premature deaths is excessive consumption of alcohol[2]. There are many problems associated with it, but mainly the relationship between alcohol intake and body weight has been studied extensively over

the past years, and there is a positive correlation between heavy drinking and abdominal obesity[3].

Although moderate amount of alcohol intake is recommended but if binge drinking is done in a short span of time the condition of the imbiber exceeds the normal state of being drunk. As a result, altered consciousness, ataxia, respiratory depression, hypotension and coma, occurs. In serious cases, it may lead to death. Suicide related to alcohol consumption is very rarely reported[4].

Ethyl alcohol also known as Ethanol is an important component of detergents, mouth washes and industrial solvents and it is now available in the form of beverages. Acute ethanol intoxication is an uncommon cause of adult death. In Pakistan, Alcohol is not freely available due to the Prohibition Order; therefore prevalence of alcohol intake is not very high as compared to other addicting agents such as heroin or charas. Use of alcohol in large quantity causing symptoms and signs of intoxication is illegal all over the world and especially in Pakistan Muslims are not allowed to drink alcohol due to religious issue. Only 10% of people who use addicting agents use Alcohol[5]. Methanol is used as a solvent in paints, varnishes, anti-freeze solutions and denaturant for ethanol. It is used to fortify illicit spirits by whiskey peddlers as it is much cheaper than Alcohol. Exposure to it may be accidental, suicidal ingestion or as a result of consuming adulterated liquor[6].

College drinking is influenced by multiple factors, from the genetic susceptibility to the positive and negative effects of Alcohol. Consequences include missed classes, low grades due to poor performance, lack of concentration and cognitive skills, low memory, sexual assaults and death[7].

After sexual attack, the development of symptoms of post-traumatic stress disorder (PTSD) in many college women is reported, and those people who are engaged in substance abuse are at the greater risk for it[8]. So many incidents have been reported after using alcohol in moderate to large amounts[9,10]. Therefore it is important to know the different diagnostic methods to confirm the consumption of alcohol use. Blood alcohol concentration level, urine analysis etc. are the main diagnostic tools for alcohol consumption confirmation.

Blood alcohol concentration levels remain the standard procedure for the diagnosis of alcohol use[11].

The aim of our study was therefore to bring forth the crude methods for confirmation of consumption of alcohol intoxication on the basis of clinical examination and investigations performed by the medico legal officer. In chemical examiner office laboratory analysis was studied and medico legal aspects of alcohol intoxication were highlighted.

Material and Methods

This is an observational cross-sectional study, carried out at Emergency department, Medico legal section, Civil Hospital, Karachi from January 2016 to December 2016. One-year (January 2016 to December 2016) record of all suspected subjects of alcohol consumption who were brought to the medico legal department by the law enforcement agencies with their medico legal evaluation was retrieved.

As per the local standard operating procedure (SOP), a subject who has been suspected (due to any reason like conducting any crime or rash driving or sexual assault etc.) for intake of alcohol is supposed to be brought by the Police with an official statement in which the reasons are stated for carrying out the examination, then the MLO is supposed to record the subject's statement and conduct his clinical examination and take samples of blood and urine for analysis.

The main focus of the examination was on the subject`s appearance, attention, behavior, orientation, vitals, cooperation, breathe alcohol odor, tendon reflexes and coordination. The opinion of MLO was based on the examination findings and the report of the chemical analysis of body fluids i.e. blood and urine.

Samples of blood from the peripheral veins taken in a sterile syringe and urine in a sterile bottle were collected from subjects showing evidence of alcohol intoxication and were sent to the chemical examiner for analysis. The two tests which the chemical examiner office conducted were:

Sulphomyolybidic acid Test: in a test tube having 2 ml Sulphomyolybidic acid, 2 to 3 ml of urine is poured gently over it, a deep blue ring will appear at the junction of the two liquids. The whole mixture becomes deep blue if the test tube is shaken.

Dichromate Test: if some urine is heated with 1 ml of strong sulphuric acid and 5 ml of strong solution of potassium dichromate, the color changes to green and the odor in the vapor is detected to be aldehyde.

All the subjects who had following information were included in this study: 1) Police statement, 2) examination carried by MLO within one hour of presentation, and 3) final decision associated with the consumption of alcohol or else was available. All those subjects whose one of the above or all information was not available or lacking were excluded from the study. About 53 subjects who fulfilled the inclusion criteria were taken in our study during one year of period. Given data which was required for each of the case were collected in a predesign proforma; 1) Statement of Police for suspecting the subject for consumption of alcohol, 2) subjects` statement accused of consumption of alcohol, 3) findings from the examination of MLO, 4) chemical evaluation details of urine and blood samplesand 5) MLO`s final conclusive report.

A written consent was taken by the principal investigator to record clinical history and demography on a predesigned proforma. To avoid confounding variables a strict exclusion criterion was followed.

Data was analyzed through SPSS version 22 (SPSS Inc., Chicago, IL, USA). Standard descriptive statistics were used. For categorical variables, counts and percentages were described. All the data was expressed as mean, percentage (%), and ± SD (standard deviation) as appropriate. The statistical significance values were assessed by Fisher's exact formula, Chi Square and t-test. The data was statistically significant as the p value was less than 0.05.

Results

In our study total 53 subjects (n=53) who were brought to the causality of Civil Hospital Karachi with suspicion of drowsiness secondary to alcohol intoxication were included. All subjects (100%) were male, with the mean age of 33.94 + 10.018 years. The most common age group (about 83%) presented was between 22 to 40 years of age as shown in Graph-I.

There were 29 subjects (54.7%) who belonged to Karachi, 12 (22.6%) were from Hyderabad, 2 (3.8%) from Badin, one (1.9%) from Hala, one (1.9%) from Landbella, 2 (3.8) from Matiari, one (1.9%) from Sujawal, 2 (3.8%) from Sanghar, one (1.9%) from Tando M Khan, one (1.9%) from Thatta, and one (1.9%) from Umar kot.

All of the subjects (100%) who presented to emergency department; on chemical analysis were found to have alcohol in blood, while 10 of the subjects (18.86%) were found to have alcohol in urine as well.

About 40 subjects (75.5%) presented to emergency department on regular days, 4 subjects (7.5%) on special days (like Eid, marriage ceremony, Holi, Deevali) and 9 patients (17%) presented on weakened days.

The blood alcohol concentration level was divided in to four categories for descriptive purpose in our study in which in category one i.e. Blood alcohol concentration level 01-20 mg/ml about 04 subjects (07.54%) were found, in category two i.e. blood alcohol concentration level 21-40 about 13 subjects (24.54%) were found, in category three i.e. blood alcohol concentration level 41-60 mg/ml about 33 subjects (62.26%) were found while in category

four i.e. blood alcohol concentration level 61 or above mg/ml only 03 subjects (05.66%) were found as shown in Table-1.

Urine analysis was also divided in to two categories for descriptive purpose of our result. In category one urine alcohol concentration level was 01-23 mg/ml in which 06 subjects (11.4%) were found, while in category two urine alcohol concentration level was 24-above mg/ml in which only 04 subjects (7.6%) were found. The final result for blood alcohol concentration p-value 0.068 and urine alcohol concentration with p-value 0.234 is shown in Table-2.

Table 1. Age, Sex, Venue, City, Blood alcohol concentration and Urine alcohol concentration distribution

Characteristics	Frequency No. of Subjects	Percentage Percentage
Age (years)		
22-30 years	21	39.62%
31-40 years	23	43.39%
41-50 years	7	13.20%
51-60 years	1	1.9%
61-75 years	1	1.9%
Sex		
Male	53	100%
Alcohol Consumption Frequency		
Drink on Regular Days	40	75.5%
Drink on Special Days	4	7.5%
Drink on Weakened days	9	17%
City		
Badin	2	3.8%
Hala	1	1.9%
Hyderabad	12	22.6%
Karachi	29	54.7%
Landbella	1	1.9%
Matiari	2	3.8%
Sajawal	1	1.9%
Sanghar	2	3.8%
Tando M Khan	1	1.9%
Thatta	1	1.9%
Umar kot	1	1.9%
Blood Alcohol Concentration (mg/ml)		
1-20 (mg/ml)	4	7.6%
21-40 (mg/ml)	13	24.7%
41-60 (mg/ml)	33	62.7%
61-80 (mg/ml)	3	5.7%
Urine alcohol Concentration (mg/ml)		
10-20 (mg/ml)	6	11.4%
21-above (mg/ml)	4	07.54%

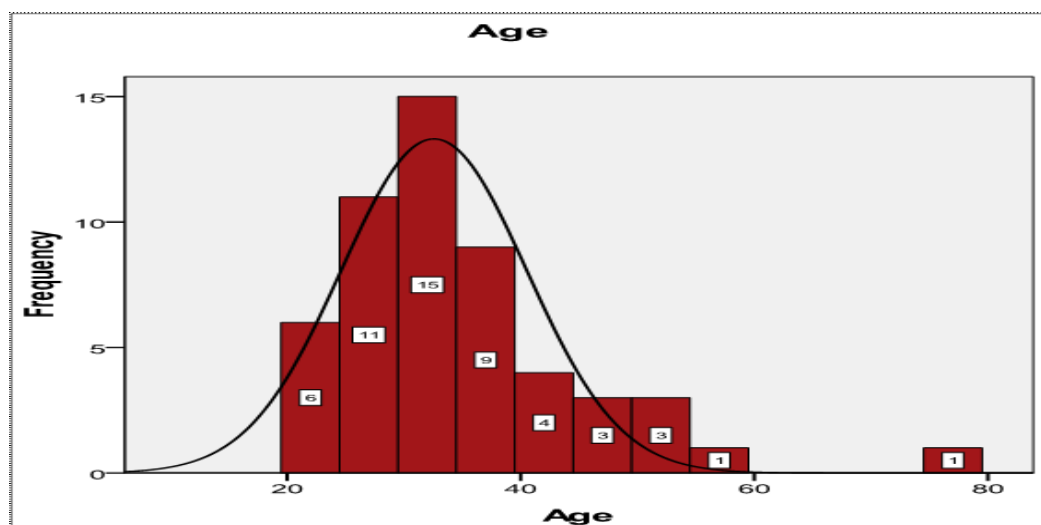**Fig 1.** Frequency distribution of age

Table 2. Distribution of age according to Alcohol in blood and urine (mg/ml) (n=53)

Variables			p value
Age years	Blood alcohol concentration (mg/ml) (n=53)		
	1-40 (mg/ml)	41-80 (mg/ml)	
22-30 years	3	17	
31-40 years	7	13	
41-50 years	5	2	0.068
51-60 years	2	2	
61-75 years	0	2	
Total	17	36	
Age years	Urine alcohol concentration (mg/ml) (n=53)		
	10-23 mg/ml	24-45 mg/ml	
10-20 years	0	0	
21-35 years	4	2	0.234
36-45 years	2	2	
Total	6	4	

Discussion

The Prohibition Order of Pakistan 1979 states that the offence of producing, importing, selling, owning, possessing or consuming alcohol is punishable crime[12]. In our religion it is declared as ummulkhabais (mother of all evils). It plays pivotal role in the committing of various crimes such as rapes, murders, medicolegal negligence and etc. Any drink containing 0.5 to 95% alcohol is considered as alcoholic beverage and its consumption is a criminal act[13].

About 1-2% of consumed alcohol is eliminated via respiratory system and that is the basis of the breath analyzer test; which is the most commonly used test to detect alcohol intoxication among drunk drivers. Ecstasy and rehabilitated mental status are not constrained to acute intake of alcohol and alcoholism. Many drugs i.e. amphetamines and cannabis, metabolic disorders, conditions such as head injury, hypoglycemia, and hypo-manic states can cause this kind of behavior in the normal people. So in addition to the clinical diagnosis of alcohol intake the levels of alcohol should be confirmed by laboratory diagnosis[13,14].

Although alcohol intoxication is found in Pakistan as well but the facility of breath analyzer is not present with traffic police or hospitals of Paki-

stan. For the detection of alcohol other body fluids are also been collected, such as blood and urine by a medicolegal officer and sent for chemical examination. After which a report is produced stating whether the said person has consumed alcohol or not[13]. Findings, like in our country i.e. in Pakistan, government medical officers who run the hospital are considered to accept whatever is said by the police. This means that there is some fault in our system and Pakistani police is either quite efficient or there is the existence of unethical connection between MLO and police. The serious doubt arises when there are any result found which is associated with the intake of alcohol in unconscious subjects alone or injured unconscious alone persons[14].

It is the concentration of alcohol in blood which is more important for a legal action to take place. It is impossible to compare our study with the western world as in their circumstances it is the blood alcohol concentration and associated intoxication for a law to come into an action rather than the mere intake of alcohol[15]. Different countries have set different statutory limits of drunkenness. The effect of alcohol can be clinically detected when its blood alcohol concentration is >100 mg/dl[16] while in our study it is different as peoples of our country in not addicted to alcohol and minor quantity may cause symptoms in initial phase. Statutory limit for charge of drunken driving in most of the European countries is 80 mg/ml but in US it is 100 mg/ml, while in Sweden and Poland it is 20 mg/ml which is exactly similar to our study[17]. Medicolegally, the most important blood alcohol concentration is 100-150 mg/ml when offences are committed which is against our study as our study results showed less than 100 mg/ml[18].

Clinical decisions associated with the intake of alcohol are perhaps highly inaccurate. Doubt of police regarding the intake of alcohol in people who were 'making a noise' or 'making noise and din' were found to be in positive significant correlation with positive medicolegal opinion (clinical and laboratory) of intake of alcohol[15]. A study was conducted in Jordan on 825 patients, which indicated that only 12.6% of people suspected for intake of alcohol on clinical basis, were positive for alcohol on laboratorial evaluation. These findings may re-

flect the unreliability of the clinical decision in positive blood alcohol concentration[16].

A study was conducted in Karachi, 338 persons were brought to the medico legal sections of the government sector hospitals from police stations all over Karachi. Out of these, 260 persons were disposed off by the medico legal officers on clinical grounds, 78 persons were suspected to be under the effect of alcohol intoxication and were referred to the chemical examiner where urine and blood analysis for alcohol was positive in 40 and negative in 38 cases[5].

High rates of comorbidity of stress and substance use disorders are reported in civilian and military populations by the epidemiological and clinical research studies. Higher stressors, lower resilience, younger age, being unmarried and not living as married, being male, and identifying as non-Hispanic were associated with higher levels of serious alcohol-related consequences[19]. Chances of elevation in the blood pressure are caused because of increase in consuming the alcohol beverages, especially in those people who drink in excessive amount. Thus, robust regulation is needed for consumption of alcohol in the context of its effect on the health of the people[20]. A study was conducted in Rawalpindi medical college, most common consumer age group was 30-40 years[13]. As evidenced in our study that the common age group involved is 21-40 years while in a study it is older age who frequently uses alcohol[21], therefore its consumption is very common in college students as well, causing serious consequences. It not only affects physically but has great impact mentally as well. Causing psychiatric, health & behavioral issues[22,23].

According to WHO Global status report on alcohol and health 2018 more than 3 million people died as a result of harmful use of alcohol in 2016 which represents 5.3% of all deaths. This represents 01 in 20 deaths. More than three quarters of these deaths were among men. Overall, the harmful use of alcohol causes more than 5% of the global disease burden. In the age group 20-39 years approximately 13.5 % of the total deaths are alcohol-attributable. Beyond health consequences, the harmful use of alcohol brings significant social and economic losses to individuals and society at large[24].

By the use of clinical and medico-legal applications, a specific alcohol biomarker is established in whole blood samples by Phosphatidylethanol (PEth) measurement. The results of research conducted by Beck et al., has confirmed efficacy of DBS samples for PE[th] measurement[25].

There are number of loopholes in person`s medicolegal evaluation with assumed intake of alcohol but due to limited resources it cannot be highlighted in this study. There are some problems or limitation of our study which are inhalation alcohol analyzers` non availability and trusting Police blindly. Therefore in order to avoid these problems proper administrative measures are required to be taken by the authority for the safety of innocent people; if it is not done then number of innocent people would be punished without committing any crime.

Conclusion

It is concluded from this study that blood alcohol concentration and urine alcohol concentration remains the main diagnostic methods for confirmation of alcohol consumption in the suspects. Significant correlation was also found in between medico legal positive opinion (clinical and laboratory) and police doubt regarding the intake of alcohol. In usual cases, medico legal officers do not operate under the standard operating procedures.

Study limitation

Small sample size in this study is counted to be its main limitation. The other limitation was the involvement of various MLOs and chemical analyzers. Enrolment of subjects in this research was only 53 because of missing notes, incomplete data and exclusion criteria.

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