

## Original Article

## ALCOHOL: A MEDICOLEGAL MENACE AND CLINICAL MONSTROSITY

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**Objective:** To emphasize multi-dimensional detrimental systemic effects of alcohol and its medicolegal connotation and lack of mandatory equipment for instant blood alcohol concentration levels

**Methods:** It was cross sectional cohort study conducted in the medicolegal clinic of Services Hospital Lahore for the year of 2015 to 2018. All the cases reported in medicolegal clinic were the target sample of the population and followed up as procedural chain of custody for alcohol analysis from PFSA to whom blood samples were dispatched.

**Results:** Results showed a total of 75 cases in 2015, 88 in 2016, 151 in 2017 & 194 in 2018. Of these 508 cases over 4 years 487 were male and 21 were female. 374 of 508 presented as being oriented in time place & person whereas 134 were disoriented. Behavioral statistical analysis showed 242 were cooperative in attitude, 36 were non-cooperative. 101 were talkative, 78 cases were euphoric. However 14 were quiet, 07 were comatose and 30 were stuporous. 348 individuals had congested facial appearance whereas 160 appeared normal. 137 presented with a staggering gait while the remaining 371 walked in normal.

**Conclusions:** Whether it is a religious function, a celebration, party or any routine social intake, alcohol is the root cause of all the evil in the society. Socioeconomic burden, medicolegal issues, clinical morbidity & mortality, overworked addiction clinics all contribute to deterioration of an individual as well as the nation collectively.

**Keywords:** alcohol, ethanol, breathalyzer, clinical morbidity and mortality .

### Introduction

Alcohol is a transparent, colorless, volatile liquid with spirit like odor and a burning sensation as a taste. Carbon of an organic compound to which a functional hydroxyl group is attached is referred to as chemistry of alcohol<sup>1</sup>. It is classified as an inebriant intoxicant with an initial disinhibitory stimulant effect followed by a depressant action of central nervous system. The term alcohol is vaguely used for a more specific component ethanol of almost all the alcoholic beverages with an exception of a few country liquor or moonshine whiskeys which may contain methanol and other intoxicants like lead mercury or arsenic. Quality and quantity of alcohol is calibrated as 57.10 % by volume of absolute alcohol or 49.28 % by weight of absolute alcohol. In United States alcohol is calibrated as proof which refers to twice the percentage of alcohol by volume. Thus 100 proof whiskeys contain 50% alcohol by volume. Its concentration varies in different beverages ranging from beer (2-6%), cider (4-8%), champagne (12%), wine (8-20%), tequila (40%), gin (40-47%), whiskey (40-50%), vodka (40-50%), rum (40%), brandy (40%) and country liquor (15-60%)<sup>2</sup>. Ethanol drinks that

are prepared via fermentation like beer & wine are of 2-20% concentration; however distilled preparations like vodka, whiskeys have a higher quantity of around 40-50% ethanol. Ethanol has a rapid absorption rate from alimentary tract with about 20% being absorbed from stomach while remaining 80% is intestinal absorption. Presence of alcohol can be detected post ingestion in multiplicity like breath analysis, blood alcohol concentration detection, urine for alcohol metabolic byproducts and hair for any storage depository forms. The cheapest, easiest facilitatory method for alcohol detection is breath analysis based on Henry's law which divulges equilibration of ethanol in exhaled alveolar air with serum concentrate. Blood breath partition ratio is based on concomitant calculation that 1 milliliter of expired alveolar air is equivalent to around 2100 times ethanol in a milliliter of blood<sup>3</sup>. In furtherance blood sample can be analyzed using gas chromatography which is a meticulously designed duplicable technique for ethanol detection in diverse biological specimens<sup>4</sup>. Consequentially ethyl glucuronide test is utilized for detectable ethanol catabolic product found in urine, blood, nails and hair<sup>5</sup>. Blood analytics reveal ethanol ranging from 6-12 hours; breathalyzer can quantify alveolar ethanol up to 24 hours. However EtG can

trace catabolism byproduct of ethanol within a range of 3-5 days and eventually it can be traced up till 90 days in keratinized tissues.<sup>6</sup>

The ubiquitous use of ethanol ranging from experimental youth exploration to serious note of addiction is one of the leading causes of morbidity, mortality globally. Deleterious consequences of this unwelcome influence among every age group involve almost every system of the body initiating from physiological biochemistry disinhibition to morbid pathological diversification. Initiation of effect on brain commences at around 50-100mg/dl. In furtherance this effect is vitiated as the dose increases between 150-300mg/dl influencing parietal lobe causing ataxia, slurred speech and altered perception<sup>7</sup>. Severity of the situation is enhanced by visual impairment and altered equilibrium as alcohol quantifies up to 300-500 mg/dl with involvement of occipital lobe as well as cerebellum.<sup>8</sup> An aggregated volume of more than 500 mg/dl mostly proves fatal due to vital centres failure in medulla. Liquor has a 3-fold effect on thyroid gland, primarily reducing type-II 5'-deiodinase activity with a decline in conversion of Thyroxine to Tri-iodothyronine.<sup>9</sup> Detrimental narrative continuance is elaborated by hepatic insult via CYP2E1 path inductance of reactive oxygen radicals perpetuating oxidative stress causing inimical hepatocyte detriment.<sup>10</sup> Yet another drastic devastating pathology is exhibited in reproductive department with concomitant damage to both sertoli as well as leydig cells of testicles causing decreased spermatogenesis & decline in testosterone productivity respectively.<sup>11</sup> In conjunction with clinical scenario concurrent medicolegal aspect has pivotal significance in accordance with law. Legal implications are inclusive of driving under influence, vandalism, operating any machinery and performing official duties having detectable BAC with ethanol smell in breath.<sup>12</sup>

## Method

Of all the reported medicolegal cases reported in 2015-2018 the specific alcohol intake cases were studied and followed up for the investigative analysis for detection of alcohol/ drugs/ poisons if any in the blood samples sent to Punjab Forensic Science Agency Lahore. Stated cases of alleged ethanol intake were brought in police custody as per legal chain of custody maintenance and report is dispatched back to medicolegal department where the case is finalized as per given report and

finalized case is handed over to the police for further legal court formalities.

## Results

All the cases from 2015, 2016, 2017 & 2018 were meticulously collected considering the variables like gender, clinical examination, blood alcohol concentration, reason for being brought for medicolegal analysis. Their appearance, behavior and gait were noted. Results showed a total of 75 cases in 2015, 88 in 2016, 151 in 2017 & 194 in 2018. Of these 508 cases over 4 years 487 were male and 21 were female. 374 of 508 presented as being oriented in time place & person whereas 134 were disoriented. Behavioral statistical analysis showed 242 were cooperative in attitude, 36 were non-cooperative. 101 were talkative, 78 cases were euphoric. However 14 were quiet, 07 were comatose and 30 were stuporous. 348 individuals had congested facial appearance whereas 160 appeared normal. 137 presented with a staggering gait while the remaining 371 walked in normal. Clinical segregation was analyzed on the sign & symptoms of alcoholism correlated with laboratory blood alcohol concentration analysis provided by police or dispatched to Forensic Medicine department from PFSA. In this regard only 97 cases were reported back to medicolegal clinic with gas chromatographic analysis of blood samples dispatched to PFSA. 411 cases went unreported with no follow up by the investigating agency. Descriptive Statistics of the stated variables correlation revealed that 26 individuals appeared sober, 08 were high & euphoric, 14 were under the influence, 15 presented to be uncoordinated. 32 were drunk and 02 were in narcosis. Eventually reason for being brought in for examination revealed that 228 were arrested for aggressive behavior, 230 were apprehended on police check posts for smell of alcohol in breath. 22 people were brought in for stuporous presentation. 19 were high euphoric in jolly mood. 09 cases were unconscious & unattended with 02 of these had alcoholic smell.

## Discussion

There is not a system in human body that is not deleteriously affected by alcohol<sup>13</sup>. Unlike the myth that only large quantities or high percentage of alcohol can have detrimental outcome; even a single shot of lightest of the alcohol percentage can have inimical results. This malefic denouement is rationalized by effect of alcohol on multiple organs of the body especially the brain to begin with, initializing disinhibition in prefrontal cortex gradually

working its way down the lobes of brain to medulla oblongata having all the vital centres<sup>14</sup>. This scenario can be elaborated with details like volume percent quantity and its mechanism of action along the way of both acute as well as chronic alcoholism. Blood alcohol concentration can be calculated via blood alcohol concentration (BAC) widmark formula, which can conversely be used to assess ingested quantity of alcohol, in an individual of known body weight. Widmark formula.<sup>15</sup>  $A = W r C T / 0.8$  ( $A$  = ethanol ingested,  $W$  = body weight in grams,  $r$  = distribution ratio of ethanol,  $CT$  = blood alcohol concentration,  $0.8$  = specific gravity of ethanol) Considering the discussed alcohol generated intoxication, diversiform variables were listed for multitudinous sequels for years 2105 to 2108. The individuals brought in police custody were categorized as per gender with police docket stating reason for their captivity. General physical examination was considered along with their behavior. Gait and appearance were other duly noted factors. Blood samples were dispatched to Punjab Forensic Science Agency for detection of alcohol levels in the blood, based upon which last variable was analyzed i.e. clinical presentation correlated with BAC. As the law abiding agencies lack the privilege of breathalyzer our analysis was solely dependent on levels of ethanol in blood. There was a gradual rise in reporting of alcohol related incidences as in 2015 only 75 cases were brought in by police with number rising up little up to 88 in 2016. In 2017 151 cases were reported which however escalated to 194 in 2018. This increasing surge in reporting shows not only a spike in ethanol consumption but also concomitantly resultant irresponsible attitude which lead to their detention. Blood sample was sent in all the cases for detection alcohol/drugs/ poison if any in the body

system. 21 out of 75 cases made it to & back from PFSA in 2015, 11 out of 88 cases reported back in 2016 while in 2017, 23 out of 151 were analyzed and finally in 2018, 42 out of 194 cases were dispatched to medicolegal clinic. However ironically speaking not even a single case was followed up by police for final declaration and none of the cases made it to judicial system for any reformatory purposes, penalty or fine. There is no provision of breathalyzer to the police or the medicolegal doctors for prompt detection of blood alcohol levels. At the most after conduction of medicolegal examination the individual is presented in the court of law provisionally without any documentary blood ethanol detection and hence let loose on bail awaiting report from PFSA which is processed in about at least 3 months' time. The main objective of this study is provision of breathalyzers to police at check posts as well as to medicolegal examiners so that a direct correlation of blood alcohol concentration can be made with the clinical features and case be duly processed so that the threat and fear of penalty should deter the people from ethanol consumption.

### Conclusion

Socioeconomic burden, medicolegal issues, clinical morbidity & mortality, overworked addiction clinics all contribute to deterioration of an individual as well as the nation collectively. A complete ban should be observed to avoid the entire futile exercise of arresting such hooligans with no resultant outcome and also reducing patient load related to side effects of ethanol intake.

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