


Review Article
UNDERSTANDING ALCOHOL ADDICTION: MECHANISM, CONSEQUENCES AND MANAGEMENT
Nagnath S. Gangasagre¹, Ravindra R. Pandhare^{2*}, S. Lahankar³, S.P. Mirajkar⁴, Nilesh M. Salve²
¹Professor and HOD, ^{2*}PG scholar, ³Associate professor, ⁴Assistant professor, Department of Agadtantra, Government Ayurvedic College, Osmanabad, Maharashtra, India.

ABSTRACT

Forensic medicine and toxicology is branch which deals with the study of poison and its treating measure. Forensic medicine is considered as *Agadtantra* and *Vidhivyadyak* in Ayurveda. Alcohol is treated as poison (neurotoxic cerebral inebriant poison) when consume much more dose and as medicine in limited dose. In today's era alcohol addiction is very common, most of youth and student addicted to alcohol but also the aged person becoming addicted to it due to today's stress full life style e.g. educational stress, family stress and job stress that's why they addicted to alcohol for false relaxation or pleasure. Alcohol consumption effects on both the quantity and quality of human life, it has consequences for health and well-being. Approximately 90 percent of absorbed alcohol is oxidized in the liver, harm cause to liver which leads to cirrhosis of liver which is incurable. Excessive intake of alcohol, person is so much under its influence that, he loses control over his mental faculties, he is unable to perform the duties on which he is engaged at particular time, and he may be source of danger to himself or the others. This review article deals with how the addiction takes place control of the normal individual, how alcohol deleteriously acts on the body, what effect of alcohol produce on every system of the body, how much quantity of alcohol proved to be fatal for an individual, what short term and long term effect of alcohol addiction, its complications readdiction techniques and much more, this articles conclude that the health hazardous effect of alcohol addiction and important of its timely managements.

KEYWORDS: Alcohol, Addiction, Mechanism, Withdrawal, Disulfiram, *Sura*.

INTRODUCTION

About 2 billion people world- wide consumes alcoholic-drinks, which can have immediate and long term consequences on health and social life, over 76 million people are currently affected by alcohol use disorder. Alcohol case 1.8 million deaths every year, which represent 3.2 percent of all death world-wide¹. Excessive consumption can cause irreversible damage to parts of the body such as liver and brain. Alcohol is the most commonly used addictive substance in the united-states; 17.6 million people, or one in every 12 adults, suffer from alcohol abuse or dependence along with several million more who engage whisky, binge drinking patterns that could lead to alcohol problem². In 2013, 139,000 deaths globally were directed due to alcohol abuse and additional 384 to cirrhosis from excess alcohol consumption³ There are different kinds of alcohol, ethyl alcohol, the only alcohol used in beverages is produced by the fermentation of grains and fruits, fermentation is chemical process where-by yeast acts upon certain ingredients in the food, creating alcohol. Fermented grain, fruit juice and honey have been used to make alcohol (ethyl alcohol or ethanol) for thousands of years.

Fermented beverages existed in early Egyptian civilization, and there are evidence of an early alcoholic drink in China around 7000 B.C. In India, an alcoholic beverage called *Sura*, distilled from rice, it was in use between 3000 and 2000 B.C. Today, an estimated 15 million Americans suffer from alcoholism and 40% of all car accident deaths in the US involve alcohol⁴. Alcohol

abuse is previous psychiatric diagnosis in which there is recurring harmful use of ethanol despite its negative consequences⁵. There are two types of alcohol abuse, 1) anti-social, 2) pleasure seeking tendencies and those who anxiety -ridden people who are able to go without drinking for long period of time but are unable to control themselves once they start⁶. It is an disorder characterized by excessive drinking that result in injuries to a person's health or adequate social function or both. Alcohol addiction is a phenomenon having variation in social cultural and economic phase. Addiction is harmful to the individual it leads to mental and physical degeneration. It disregards convections, customs and feeling of other. The paper talks about immediate effect of alcohol, when it is characterized by stage of excitement, stage of incoordination, stage of narcosis, one of the most dangerous long term effect is fatty changes in liver, brain and heart. It is an hepato-toxic poison. Alcohol is drug of addiction and is responsible for many socio-economic problems, crimes, morbidity and mortality. Its contributory factor of many deaths⁷. Depending on drinkers habit and susceptibility, organ damage, particularly liver damage, cardio-vascular problems, nutritional deficits, poly-drug use interactions can occur. Alcohol addiction also impairs important life processes e.g. relationship, job, self-worth and even spiritual beliefs⁸. This paper provide a brief overview of the understanding of alcohol addiction, mechanism of alcohol, short term and long term effect of alcohol and its management.

What is Addiction

It is a medical condition characterized by compulsive engagement in rewarding stimuli, despite adverse consequences. Classic hallmarks of addiction include impaired control over substance or behavior, preoccupation with substance or behavior and continued use of despite consequences⁹. Habits and patterns associated with addiction are typically characterized by immediate gratification (short term reward) coupled with delayed deleterious effect (long term cost)¹⁰.

Alcohol

The term alcohol in popular use which is present in various fermented and distilled beverages. It is transparent, colourless, volatile liquid having a spirit-like odour and burning taste. An alcohol is organic compounds in which the hydroxyl functional group (-OH) is bound to saturated carbon atoms. Alcohols are actually (hydroxy) derivatives of (aliphatic) hydrocarbons. There are 3 categories of alcohols: 1) monohydroxy alcohols, 2) dihydroxy alcohols, 3) trihydroxy alcohol. Synonyms: methyl alcohol - methyl hydroxide, monohydroxy methane, colonial spirit, Columbian spirit, pyroxylic spirit, wood alcohol, wood naphthol, wood spirit. Ethyl alcohol: ethanol grain alcohol¹¹.

Mode of Action of Alcohol

Ethanol depresses the CNS by dissolving in the cell lipid membrane and causing dis-organization of the lipid matrix (membrane fluidisation). Ethanol acts by enhancing gamma-aminobutyric acid (GABA)-ergic function through interactions with GABA receptor and associated chloride ion channel. Metabolism of formic acid oxidation via the catalase-peroxidase system or metabolism by the tetrahydrofolic acid dependent one-carbon pool which is catalyzed by 10-formyl-tetrahydrofolate synthetase¹².

Effect of Alcohol

The effect of alcohol can be short term or long term. First sense of well-being, self-confidence and exhilaration in short term effect. In long term effect escapes from stresses and strains of life, suffer from many organic disease¹³. Ethanol is CNS depressant but produces some apparently stimulating effect initially because of depression of inhibitory control mechanisms in the brain, in moderate dose, ethanol produces tachycardia and vasodilation of cutaneous vessels with resultant warm and flushed skin, ethanol normally stimulates salivary and gastric secretion, but if the concentration is too high (>40%) they are inhibited and the GI mucosa becomes congested and inflamed leading to erosive gastritis.¹⁴

Short Term Effect of Alcohol

Depending upon how much is taken and the physical condition of the individual, alcohol can cause, slurred speech, drowsiness, vomiting diarrhea, upset stomach, difficulties distorted vision and hearing, impaired judgment, unconscious¹⁵. Consumed in moderation, the short term effect of alcohol are typically safe and pleasant, increase sleep time and reduce awakening during the night, sedation, impaired memory and comprehension profound confusion, delayed reaction, balance difficulty, unbalanced walk, staggering blurred vision, emotional

changes, inability to feel pain, impaired speech, dizziness often associated with nausea, vomiting, stumbling walk, lapses in and out of consciousness, unconsciousness, amnesia respiratory depression, decreased heart rate, urinary incontinence, decreased reflexes, death¹⁶.

Long Term Effect of Alcohol

Being drinking and continued alcohol use in large amounts are associated with many health problems including unintentional injuries, such as car crash, falls, burns, drowning. Intentional injuries such as firearm injuries, sexual assaults, domestic violence, liver disease, nerve damage, sexual problem, ulcers, cancer of mouth and throat¹⁷. The national institutes on alcohol abuse and alcoholism recommends women limit their alcohol intake to one drink per day and men limit themselves to two drinks per day. Consuming alcohol in larger than these quantities show the negative effect of alcohol such as increased risk of heart failure, heart disease, anemia brain shrinkage, dementia, stroke, liver damage and multiple liver disease, nerve damage, muscle weakness, electrolyte deficiencies, insomnia, tremors, depression, lung disease, loss of sexual desire, impotence, bone loss, skin disorder, multiple types of cancer¹⁸.

Complication of Alcohol Addiction

Excessive drinking over a long period of times creates medical, psychological and social problems. The amount and the frequency of the drinking and overall health affect the degree to which complications develop in alcohol use disorder. Chronic alcohol abuse and dependence can damage all organ system; including resulting in anemia, easy bruising, causing abnormal heart beat, heart failure, high blood pressure, leading to the esophageal varices, inflammation or cancer of the esophagus, gastritis, liver damage, liver cancer, hepatitis, pancreatitis or pancreatic cancer, confusion, loss of coordination, depression, nerve damage, psychosis, short term memory problem, Wernicke-korsakoff syndrome¹⁹. In some people the initial reaction may be stimulation, but as you continue to drink, you become sedated, too much alcohol affects your speech, muscle coordination, and vital centers of your brain, a heavy drinking binge may even cause a life-threatening coma or death, this is particular concern when you are taking certain medication that also depresses the brain function²⁰.

Mechanism of Alcohol Addiction

Tolerance is main cause of addiction. Ethyl alcohol depresses the CNS irregularly in descending order from cortex to medulla. Stage of excitement is due to removal of inhibitions. Alcohol from blood passes into alveolar air through lung; hence breath smell of alcohol. It causes generalized vasodilation, is hypnotic, creates a feeling of warmth but the heat loss is more stimulated appetite is diuretic, diaphoretic and causes gastritis. Methyl alcohol rate of oxidation is 1/5 of that of ethanol and therefore, there is accumulation of methanol and its metabolites; formaldehyde and formic acid, which are very toxic to brain and optic nerve. Mechanism of degree of extent of alcohol depends upon the approximate percent of absolute alcohol in various beverages.

Table 1: showing approximates percent of absolute alcohol in various beverages

S. No.	Beverages	Alcohol % by volume	Proof (degree)
1	Rum	42.8	75
2	Whisky, brandy	75	75
3	Gin	42.8/40.0/37.2	75/70/63
4	Wines	8-15.5	14.27
5	Beer	2-10.0	3.5-17.5
6	Country liquor	11.4-45.7	20-80

Alcohol is CNS depressant that acts on receptor for γ -aminobutyric acid (GABA) the major inhibitory neurotransmitter in the nervous system. Behavioral, cognitive and psychomotor changes can occur at blood alcohol level as low as 0.02-0.03 g/dl²².

Fatal Dose and Fatal Period of Alcohol

This will depends upon the age and habit of the patient and the strength of the liquor taken. Death usually occurs from large quantity taken in short time. A concentration of 0.35 percent (350mg%) and above of alcohol in blood is generally sufficient to cause of death²³. Death usually occurs from a large quantity taken in short space of time. About 150-250 ml of absolute alcohol is considered fatal for adults. About 60 ml of absolute alcohol is probably fatal for a child under 12 years, through very large dose may be tolerated as a matter of habit. The casual fatal period is 12-24 hours, through the death may occur in a few minutes or may be prolonged for five or six days²⁴. One pint (approximately 550 ml) or quart (1100ml) of strong distilled spirit such as whisky taken in a short span of time can be lethal, the usual fatal dose corresponds to approximately 6 grams of ethanol/kg body weight (adults); 3 gram/kg (child), in term of blood alcohol, a level in excess of 400 to 500 mg/100 ml is usually considered to be lethal²⁵.

Treatment

Advice about harmful effect of alcohol and safe level of consumption is often sufficient, altering leisure activities or changing job may be helps, if there are contributing. Psychological treatment at specialized centers is used for patients who have recurrent relapses. Withdrawal syndromes can be prevented or treated with benzodiazepines. Acamprosate may help sustain abstinence by reducing craving. Disulfiram is used with psychological support to deter patient for relapsing, antidepressant and antipsychotics may be needed to treat complication²⁶.the stomach should be washed out with 5 percent sodabcarb in warm water, sodium bicarbonate may be given orally or intravenously to combat acidosis, the patient should be guarded against hypokalemia by giving potassium salts, intravenous injection of 5 percent glucose saline may be used to promote its elimination²⁷. Acute alcohol withdrawal is treated with multiple B-complex vitamin including thiamine, CNS depressant drug are used when seizer or autonomic hyperactivity is present, low potency benzodiazepines with long half- lives

are preferred, fluids- electrolytes status-blood glucose level should be closely followed²⁸. Acute poisoning ; airway protection, ventilatory support, stomach wash, thiamine 100 mg, dextrose intravenous fluids, variety of drug such as naloxone, physostigmine, and caffeine, haemodialysis can eliminate ethanol 3 to 4 times more rapidly than liver metabolism. chronic poisoning; carbamazepine, chlormethiazole, clonidine and gamma-hydroxybutyric acid have also shown promising results in the treatment of withdrawal symptoms, disulfiram therapy is also useful in the management of alcohol withdrawal symptoms²⁹

CONCLUSION

As we have seen that alcohol is very harmful addicted substance and deleterious effect on vital body part. It is toxic by oral inhalation, subcutaneous, intravenous, intra- arterial, intra-dermal routes, mostly 80 % percent alcohol absorbed in small intestine and much more metabolized in liver that's why it shows its toxic effect on liver and damage it. In some cases much more intake and long term drinking of alcohol leads to cancerous stage of various organs. Parents-children relationship is also important cause most off the children influences under alcoholism, parent provide concealing, education and support to give up the addiction of alcohol. Most off the ladies consume alcohol, at pregnancy stage it cause harm to baby, birth defect and disabilities in baby. It may lead to dilatation of small vessels of body that can lead to erectile dysfunction which is main cause of infertility. In India or anywhere in the world most off the accidents happened due to when peoples were so much under the influence of alcohol, it cause visual blurring and motor in coordination, now a days the policies we claim, also has many clauses which states that if any death occurred under the influence of alcohol each lead to debarred the candidate from advantage of policy, such medico legal cases seen due to alcohol addiction in court proceed. Also alcohol addictions lead to mental as well as physical disturbance of individual. Alcohol not only affect well-being or person but also affects families, socio-economical background, lead to poverty, cruelty and sometimes criminal cases. In readdiction phage when patient goes through withdrawal phage he can be very violent, cruel and may murdered have stabbed anyone who is against his wish or will therefore while de-addicting a patient this thing should be kept in mind about the patient and very delicate case should be taken of patient. For the recovery of alcohol withdrawal patient firstly counseling is very important, maintain the high level motivation, education is about alcohol and its hazardous effect on body must be known to everyone and introducing family or friends to stop protecting the person from the problems caused by the alcohol.Help the patient to readjust to life without alcohol and improve his or her lifestyle.

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Cite this article as:

Nagnath S. Gangasagre, Ravindra R. Pandhare, S. Lahankar, S.P. Mirajkar, Nilesh M. Salve. Understanding Alcohol Addiction: Mechanism, Consequences and Management. International Journal of Ayurveda and Pharma Research. 2017;5(2):59-62.

Source of support: Nil, Conflict of interest: None Declared

***Address for correspondence**

Dr. Ravindra R. Pandhare

PG Scholar,
Agadanttra Department
Govt. Ayurvedic College, Osmanabad,
Maharashtra (India).
Mob.- 9579816179
Email:
ravindrapandhare08@gmail.com