ALCOHOL AND IT'S COMPLICATIONS

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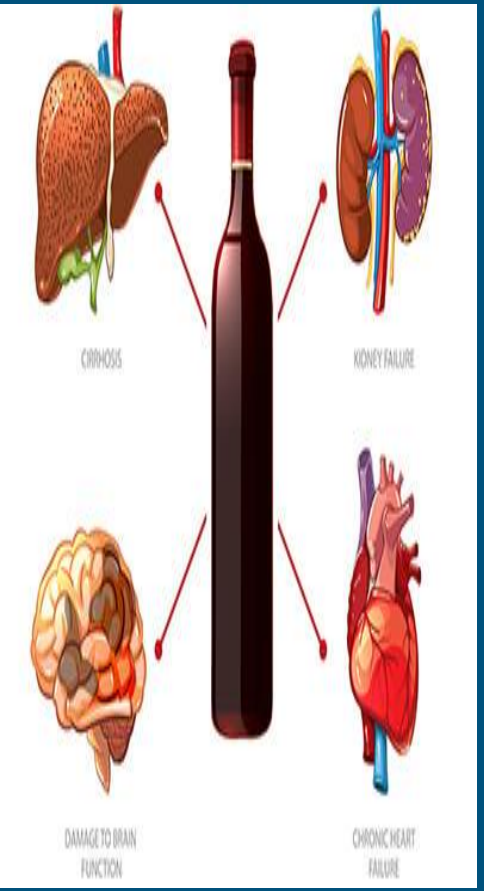


Introduction

- **Alcohol contributes to 1.8million deaths each year(worldwide)**
- **The 4 most commonly available and accessible alcohols;ethanol,isopropanol, methanol, and ethylene glycol.**
- **Acute intoxication with any of the alcohols can result in respiratory depression, aspiration, hypotension, and cardiovascular collapse.**
- **Prompt recognition and treatment of patients intoxicated with these substances can reduce the morbidity and mortality associated with these**

Terms

- ***Standard drink***: An alcoholic drink containing 14.0 g (0.6 oz) of pure alcohol
- ***Excessive alcohol use***: A pattern of alcohol use that involves binge drinking, heavy drinking, any alcohol use in pregnant women, and any alcohol use in individuals < 21 years of age.
- ***Heavy drinking***: a pattern of drinking that is associated with an increased risk of developing negative health consequences

♀: consumption of > 7 standard drinks per week or > 3 standard drinks per day

♂: consumption of > 14 standard drinks per week or > 4 standard drinks per day

- ***Binge drinking***:Consumption of > 4 standard drinks in women and > 5 standard drinks in men in 2 hours.A pattern of alcohol use that brings a person's blood alcohol concentration (BAC) to above 0.08%

Properties of alcohol

- **Well absorbed through the mucosa lining of the digestive tract in the mouth,esophagus,stomach and intestines.**

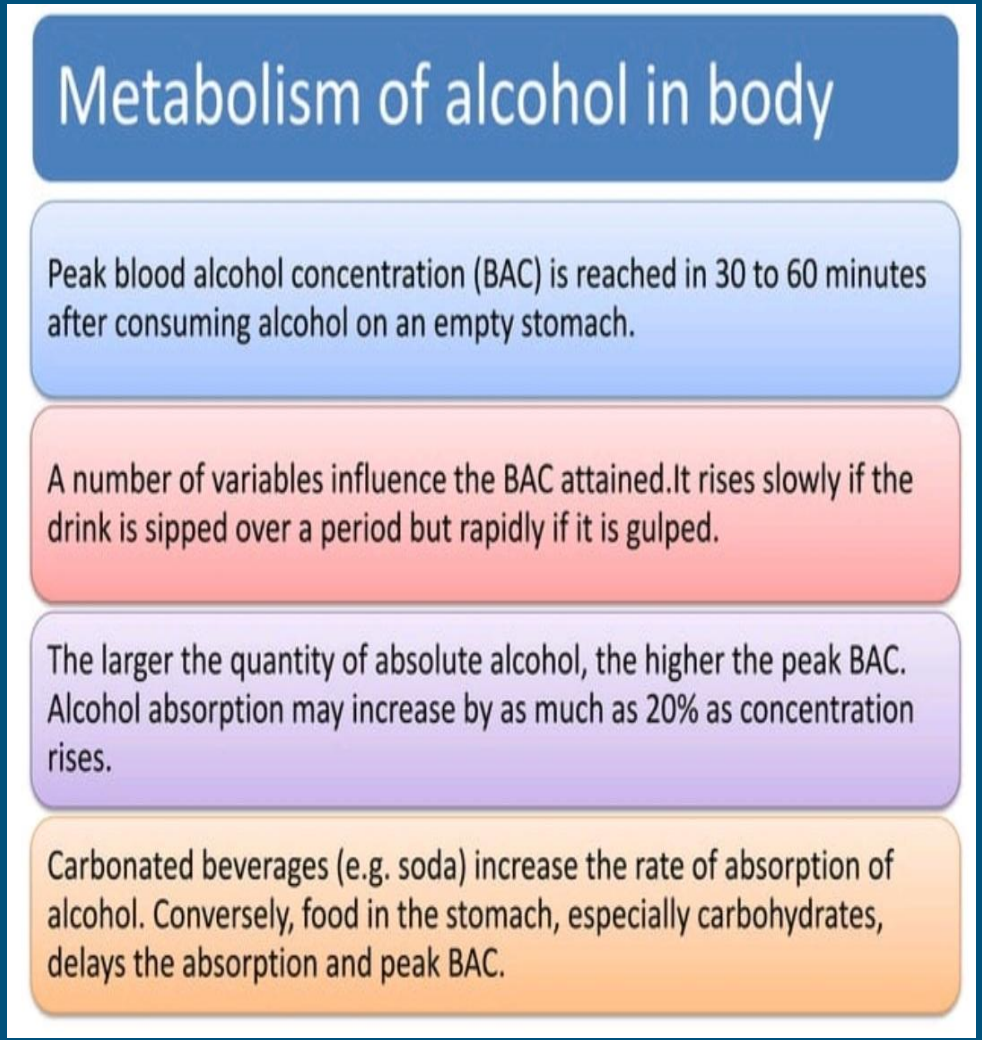
  Most common site of absorption being the proximal small intestine which is also the site of absorption of the B complex vitamins.

- **Rapidly enters the bloodstream and as a result of its high solubility in water it's distributed to almost every system.**
- **Has modest fat solubility hence likely to have effects on membranes rich in fat including neurons.**

	Ethanol	*Methanol*	*Isopropanol*	*Ethylene glycol*
Peak concentration	20-60mins	30-90mins	30-120mins	1-4hrs
Enzyme	Alcohol dehydrogenase,cyp2e1,peroxidase catalase system	Alcohol dehydrogenase,aldehyde dehydrogenase	Alcohol dehydrogenase	Alcohol dehydrogenase,aldehyde dehydrogenase
End product	Acetaldehyde	Formic acid	Acetone	Glycolic acid
Source	Alcoholic beverages,cough& cold medications,mouth wash	Paint thinners,photocopier fluid,windshield washing fluid	Sanitizers,solvents,mouth wash	Automobile freeze
Clinical clues	CNS depression,hypoglycaemia,myocardial depression	Visual abnormalities ‘snowstorm’ vision,Abdominal pain,hyperventilation	Hypersomnolence, Coma,fruity breath	Calcium oxalate kidney stones,wide QRS,prolonged QT,AKI/RF,Hypocalcemia

Factors that influence absorption

- Concentration of the drink
- Amount consumed
- Food in the stomach



Alcohol related disorders

- **Alcohol intoxication-the acute onset of behavioral and psychomotor impairment shortly after an episode of drinking.**

- **Alcohol use disorder (AUD) - characterized by clinically significant psychosocial and behavioral problems associated with alcohol use.**

- **Alcohol withdrawal-develops after a sudden cessation or reduction of alcohol use in patients with a history of excessive drinking.**

Alcohol intoxication

Mild intoxication (BAC 0.01–0.1%, < 100 mg/dL)	Moderate intoxication (BAC 0.1–0.3%, 100–300 mg/dL	Severe intoxication (BAC > 0.3%; > 300 mg/dL)
• Emotional lability, increased agitation, euphoria • Disinhibition, urge to speak, impaired judgment • Unsteady gait and difficulties standing upright • Skin flushing • Mild tachycardia and hypotension	• Pronounced disinhibition • Significant reduction of attention, responsiveness, alertness, and reaction time • Impaired vision and sound localization • Increasing unsteadiness of gait and slurred speech • Dizziness • Psychomotor agitation • Nausea and vomiting • Amnestic gaps (blackouts)	• Delusions and hallucinations • Severe dysarthria • Nausea and vomiting • Ataxia • Nystagmus • Alcoholic coma (usually occurs at BAC levels 0.40–0.50%) including: ◦ Severely impaired consciousness ◦ Lack of response to external stimuli ◦ Absent airway defense reflexes and respiratory depression

Alcohol withdrawal

- ***Alcohol withdrawal syndrome***

Onset: usually 6–24 hours after cessation of or reduction in alcohol consumption

Clinical features: Autonomic symptoms (e.g., palpitations, sweating, tachycardia, elevated blood pressure, hyperthermia)Anxiety, insomnia, vivid dreams,Tremors, hyperreflexia,headaches,anorexia, nausea, vomiting

- ***Alcohol withdrawal seizures***

Onset: usually 8–48 hours after cessation of or reduction in alcohol consumption

Clinical features:Usually brief, generalized tonic-clonic seizures.Often *a single episode*

- ***Alcohol withdrawal delirium*-persistent alteration of consciousness and sympathetic hyperactivity due to alcohol withdrawal**

Onset: usually 72–96 h ours after cessation of or reduction in alcohol consumption

Clinical features:symptoms of altered mental status,impaired consciousness and disorientation,visual and tactile hallucinations, worsening symptoms of autonomic instability(tachycardia,hypertension,anxiety,nausea,sweating,worsening symptoms of neurological impairment,psychomotor agitation (e.g., fidgeting, restlessness, tearfulness)Alcohol withdrawal seizures can occur during this phase.Insomnia,rest and intention tremor .

Duration: usually 2–3 days; may be lethal

- ***Alcohol induced psychotic disorder***


Complications of alcoholism

Complications of alcoholism

Complications can be subdivided into

Acute

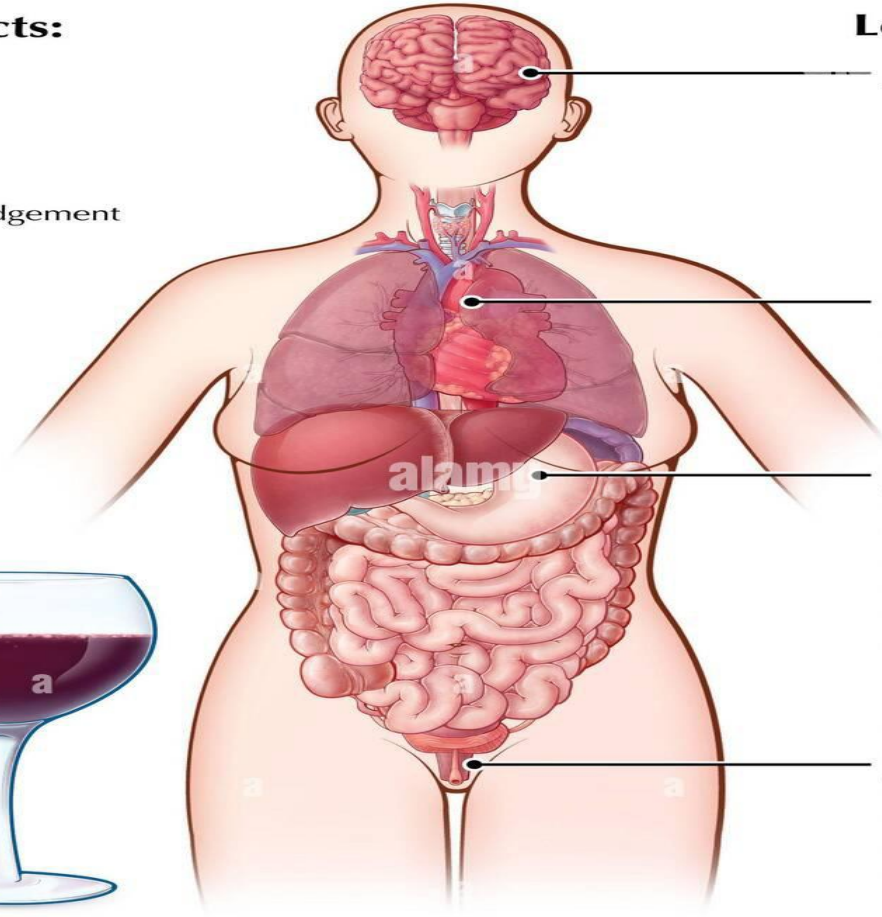
- Physiological
- Psychological

Chronic

- Physiological
- Psychological

Short-term effects:

- Euphoria
- Loss of coordination
- Blurred vision
- Slurred speech
- Slowed reaction time
- Impaired memory/ judgement
- Nausea/ vomiting
- Sedation
- Analgesia
- Improved mood & self-confidence



Long-term effects:

Nervous
- Changes in mood and behavior
- Chronic fatigue
- Stroke
- Lesions
- Blackouts/ memory loss
- Insomnia

Cardiovascular
- Cardiomyopathy
- Arrhythmia
- Heart attack & stroke
- Hypertension
- Anemia

Digestive
- Stomach ulcers
- Mouth/ esophageal cancer
- Intestinal inflammation
- Fatty liver
- Alcoholic hepatitis
- Fibrosis
- Cirrhosis
- Pancreatitis
- Diabetes

Reproductive
- Hormonal imbalance
- Impotence (men)
- Breast cancer (women)
- Pregnancy complications (women)

Complications of alcoholism – acute effects

Physical Effects
Flushed face
Rapid pulse
Headache
Stomach ache
Diarrhoea
Sweating
Slurred speech
Motor in coordination
Unsteady gait
Nystagmus
Respiratory depression

Complications of alcoholism- acute effects

Mental & Behavioural Effects
Drowsiness
Impaired attention
Impaired memory
Impaired judgement
Impulsive behaviour
Inappropriate sexual behaviour
Aggressive behaviour
Inappropriate social conduct
Impaired occupational performance
Mood lability(rapid changes)
Stupor/Coma

Complications of alcoholism- in long term

Physical consequences of long term alcohol use

- **Gastrointestinal system** - Fatty liver, Alcoholic Hepatitis, Cirrhosis, Esophagitis, Gastritis, Peptic ulcer Pancreatitis, Malabsorption
- **Nutritional deficiencies** - Thiamine, Pyridoxine, Vitamin A, Folic acid, Ascorbic acid
- **Haematological disorders-** Anaemia, Leucopenia, Thrombocytopenia
- **Cardiovascular system** -Cardiomyopathy, Hypertension
- **Central nervous system** - Wernicke- Korsakoffs syndrome, Dementia, Cerebellar degeneration, Peripheral neuropathy, Myopathy, Head injury
- **Metabolic disorders-** Ketoacidosis, Hypoglycaemia, Hypocalcemia, Hypomagnesemia
- **Miscellaneous**- Fetal alcohol syndrome, Osteoporosis, Tuberculosis, Psoriasis,Domestic & traffic accidents
- **Cancers** -Oral, Esophagus, Colon, Hepatocellular, Breast (women)

Complications of alcohol use disorder[5]

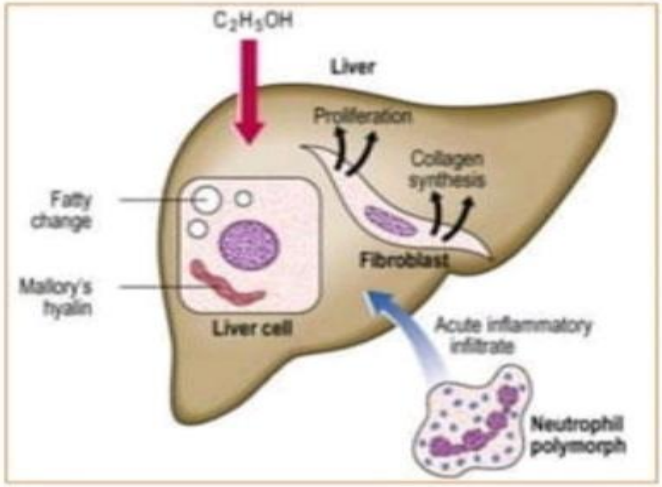
System	Complications
Neurologic	Peripheral neuropathy, delirium tremens, alcoholic hallucinations, dementia, cerebellar degeneration, central pontine myelinolysis, Marchiafava-Bignami disease
Gastrointestinal	Gastritis, gastroesophageal reflux disease, peptic ulcer disease, cancer of the stomach and esophagus, pancreatitis
Hepatic	Fatty liver, hepatitis, cirrhosis, hepatocellular carcinoma, liver failure
Nutrition	Malnutrition
Cardiac	Cardiomyopathy, heart failure
Musculoskeletal	Sarcopenia
Reproductive	Sexual dysfunction
Psychiatric	Depression, Wernicke-Korsakoff psychosis
Social	Accidents, marital disharmony, divorce, increased drug dependence, criminality, financial problems

Complications of alcoholism-in long term

Psychiatric complications of long term alcohol use:

- **Dependence syndrome**
- **Withdrawal syndrome**
  - Delirium tremens
  - Alcoholic hallucinosis
  - Withdrawal seizures
- **Psychotic disorders**
  - Schizophrenia like
  - Manic / depressive / mixed affective symptoms
- **Anxiety disorders**
- **Amnestic syndrome (Korsakoff's psychosis)**
- **Personality disorders**
- **Dementia**

Dysfunction of hepato-billiary system



- Alcoholic Liver Disease: Increase in fat accumulation in liver cells (**fatty liver**)
- **Cirrhosis** may occur in upto 15% chronic alcoholics
- Hepatic encephalopathy

Changes are reversible in healthy individuals, but with repeated exposure to ethanol, more severe changes in the liver occur, including alcohol-induced **hepatitis**, **perivenular sclerosis**, and **cirrhosis**

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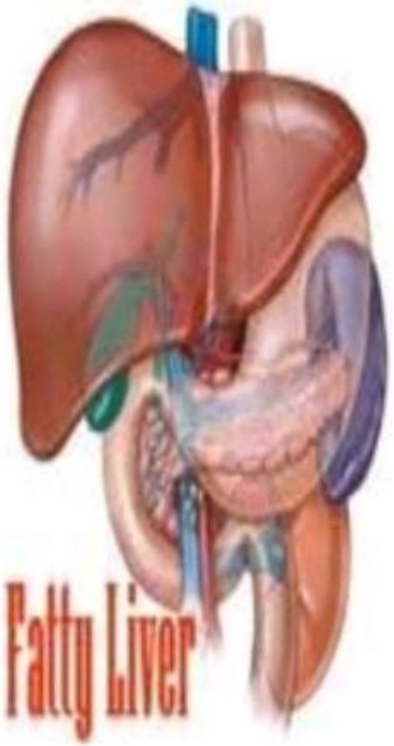


Fatty Liver	Clinical Features
Symptoms	Often asymptomatic
Signs	Hepatomegaly
Investigations	Elevated AST, ALT, Bilirubin
Treatment	Abstinence
Prognosis	Completely reversible with abstinence

Dysfunction of hepato-billiary system

Alcoholic hepatitis

Symptoms	**Anorexia, nausea, vomiting, pain abdomen, fever**
Signs	Icterus, tender hepatomegaly
Investigations	Elevated AST, ALT & bilirubin, prolonged prothombin time
Complication	Fulminant hepatic failure, ascites, encephalopathy, gastrointestinal bleed, coagulopathy
Prognosis	In the absence of complications reversible with abstinence

Dysfunction of hepato-billiary system

Cirrhosis of liver

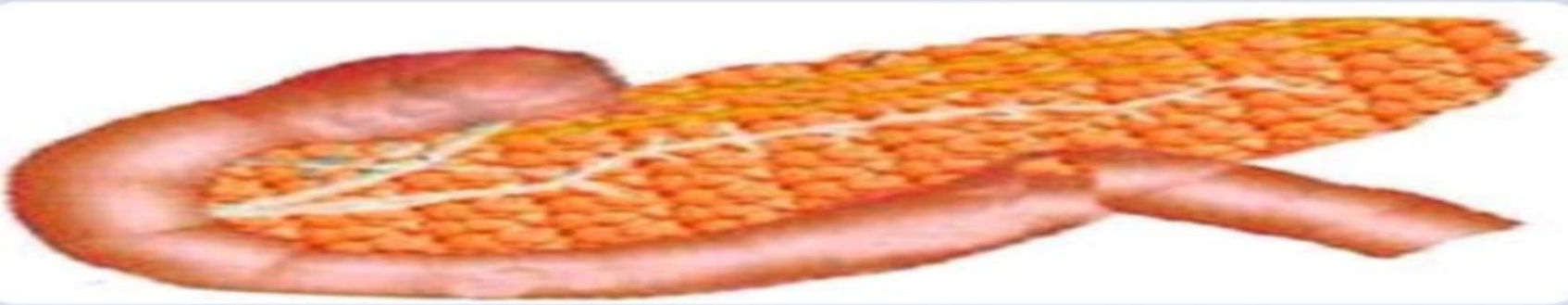
Symptoms	Anorexia, weight loss, abdominal discomfort, distension of abdomen
Signs	Jaundice, spider naevi, clubbing, parotid enlargement, palmar erythema, gynaecomastia, testicular atrophy, Dupuytren's contracture, distended veins over abdomen, hepatomegaly or shrunken liver, splenomegaly, ascites
Complications	Ascites, variceal bleed, hepatic encephalopathy, spontaneous bacterial peritionitis, hepatic failure, renal failure

Dysfunction of hepato-billiary system

Hepatic encephalopathy

Symptoms	**Agitation, mood swings, confusion, disorientation, disturbed sleep, altered sensorium, coma**
Signs	Flapping tremor, Hyper-reflexia, coma
Precipitating factors	G.I. bleed, infection, increased protein intake, use of sedatives, Electrolyte imbalance
Investigations	Elevated levels of serum ammonia, abnormal liver function tests, prolonged PT, abnormal EEG

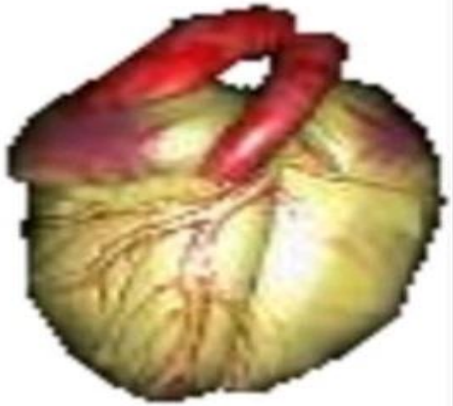
Dysfunction of gastro-intestinal system



In gastro-intestinal system

- Alcohol slows down functioning and interferes with digestion.
- Irritates the lining of the esophagus and stomach.
- Causes gastritis and ulcer.
- Increases Incidence of cancer.
- Pancreatitis can be life threatening

Dysfunction of cardiovascular system



Adverse effects on cardiovascular system-

- Interferes with normal heart rhythm
- Excessive alcohol use can
  - - damage blood vessels
  - - weaken heart muscles
  - - cause enlargement
- Café coronary – sudden cardiac arrest leading to death due to vagal inhibition (during binge eating in intoxicated state)

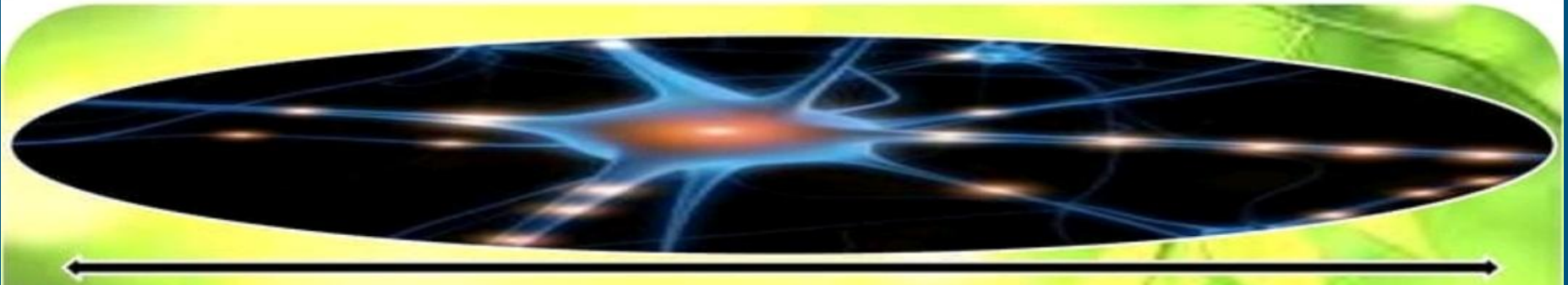
Dysfunction of the nervous system

Alcohol is neurotoxic.

It causes -

- Peripheral neuropathy
- Wernicke – Korsakoff syndrome
- Cerebellar degeneration
- Dementia
- Myopathy
- Cerebro-Vascular accidents
- Central pontine myelinosis
- Toxic amblyopia
- Subdural hematoma (following head injury)

Dysfunction of the nervous system



Adverse effects on cognitive function-

- Slows down the functioning
- Causes loss of inhibitions and affects judgment and coordination
- Impairment of attention and concentration
- Impairment of short term memory
- Delayed reaction time
- socially disinhibited behavior

Malignancies

The risks of developing **lip, tongue, throat, oesophagus and liver cancer** increases proportionally with the amount of alcohol consumed

Even moderate alcohol consumption can cause **breast cancer (in women)**, according to recent research, and a series of studies confirm that the risk increases with the amount consumed

Evidence of a possible link with alcohol consumption is weaker for cancers of the stomach, prostate, colon, rectum and ovaries.

There is no established relationship between alcohol consumption and cancer of the salivary glands, uterus or bladder

Nutritional deficiencies

Nutritional deficiency	Signs and symptoms
Protein calorie malnutrition	Weight loss, lethargy, fatigue
Vitamin B1 deficiency	Beriberi, Wernicke – Korsakoff syndrome
Vitamin B2 deficiency	pellagra
Vitamin B6 deficiency	Peripheral neuropathy
Vitamin A deficiency	Night blindness, keratomalacia
Vitamin C deficiency	Scurvy

Miscellaneous

The fetus is at risk when the mother consumes alcohol during pregnancy

Miscellaneous

Alcohol consumption during pregnancy can also cause

- Spontaneous abortion
- Slower fetal growth in the womb
- Premature birth
- Low birth weight

Lab Workups

- Blood glucose levels-hypoglycemia with high BAC of ethanol
- Arterial blood gases-metabolic acidosis
- Urea Electrolyte Creatinine
- Full blood count-megaloblastic anemia
- Liver function tests -chronic alcohol intoxication->Liver damage •↑ γ-GT (most sensitive marker of alcohol abuse)↑ ALT, ↑ AST
- Serum calcium
- ECG
- Blood alcohol concentration levels-high BAC levels associated with acute intoxication

Management

Supportive care-Airway,Breathing,Circulation ,Thiamine replacement(for Wernicke encephalopathy proxylaxis and treatment),Hypoglycemia management,Seizure control,electrolyte repletion

Treatment of ethanol and isopropanol intoxication is largely supportive.Because of the hemorrhagic gastritis that can follow isopropanol ingestion, H2 blockade or proton-pump inhibitors may be helpful. Hemodialysis, while effective, is rarely indicated, and should only be used in the setting of profound hemodynamic compromise.

Once either methanol or ethylene glycol intoxication are suspected, treatment should be initiated without delay.The primary antidotal treatment of methanol or ethylene glycol involves blocking alcohol dehydrogenase. This enzyme can be inhibited by either ethanol or fomepizole.

In addition to blocking alcohol dehydrogenase, significant metabolic acidosis should be treated with sodium bicarbonate infusions. If methanol is suspected, folinic acid should be administered at a dose of 1 mg/kg, with a maximal dose of 50 mg. It should be repeated every 4 hours. If folinic acid is not immediately available, folic acid can be substituted at the same dose

Folic acid enhances elimination of toxic metabolite formic acid produced when methanol is metabolized

Management

In methanol overdose, sodium bicarbonate should be administered liberally, with the goal being to completely reverse the acidosis.

If ethylene glycol overdose is suspected, the patient should also receive 100 mg of intravenous thiamine every 6 hours and 50 mg of pyridoxine every 6 hours. The purpose of the thiamine and pyridoxine is to shunt metabolism of glyoxylic acid away from oxalate and favor the formation of less toxic metabolites.

If ethanol is used as an antidote, the recommended target serum concentration is 100-150 mg/dL

5% or 10% ethanol solution-loading dose of 600 mg/kg, followed by a drip of 66-154 mg/kg/h, Chronic alcoholics require doses at the higher end of the scale.

Ethanol infusions are however labor intensive,expensive and associated with more frequent adverse reactions hence fomepizole has become the preferred antidote for methanol or ethylene glycol poisoning.

Fomepizole-loading dose of 15 mg/kg. Subsequent doses should be at 10 mg/kg every 12 hours for 4 doses.if additional doses are needed, the dose should be increased to 15 mg/kg. Fomepizole needs to be re-dosed during hemodialysis

Management

Hemodialysis is frequently required in patients with significant methanol or ethylene glycol ingestions. Indications include;

- **Arterial pH < 7.10**
- **A decline of >0.05 in the arterial pH despite bicarbonate infusion**
- **pH < 7.3 despite bicarbonate therapy**
- **Rise in serum creatinine level by 90 mmol/L**
- **Initial plasma methanol or ethylene glycol concentration ≥50 mg/dL**
- **Hemodialysis should also be considered in the treatment of severe alcohol intoxication with serum ethanol levels > 450 mg/dL**

In the case of alcohol withdrawal :

Seizures: rapid administration of parenteral fast-acting benzodiazepines: e.g., Diazepam5–10 mg IV; repeat every 3–5 minutes as needed until a total dose of 30 mg has been administered.

Alcohol-induced psychotic disorder: consider combination therapy in consultation with a specialist.Benzodiazepines: Consider a front-loading dose for AWS to reduce symptoms.Adjunct: consider adding antipsychotics (e.g., haloperidol, risperidone)

Alcohol withdrawal delirium:High-dose benzodiazepines: Administer a front-loading dose for AWS until mild sedation is achieved.

In alcohol use disorder

- To promote alcohol cessation

Naltrexone (first-line agent): reduces cravings for alcohol

Disulfiram: exacerbates intoxication symptoms and induces negative conditioning (only recommended in patients who show strong motivation and commitment for abstinence)

Acamprosate: blocks central glutamate receptors and reduces cravings for alcohol

Topiramate or gabapentin: for patients who do not tolerate or respond to other medications

- Vitamin supplementation-Vitamin B1 (thiamine)Vitamin B6 (pyridoxine) Vitamin B12 (hydroxocobalamin)Folic acid.Given as pabrinex I and II for 3-5days

Other considerations

- Psychological and psychiatric review of the patient before discharge
- Patient education on effects of alcohol use
- Management of complications of alcohol(pncreatitis,dilated cardiomyopathy)
- Rule out other differential diagnosis of alcohol toxicity(acute hypoglycemia,head injury,dka)

References

amboss

medscape

Davidson Principles and Practice of medicine


THANK
YOU