Hooch Tragedy

For Prelims: Hooch, Methanol, Ethanol, Alcohols, Fermentation Process, Enzymes.

For Mains: Effect of Spurious Liquor on the Human body, Pros and Cons of Liquor Ban, Government Policies & Interventions.

Source: TH

Why in News?

Recently, around 34 people have died, and around 100 others have been hospitalised after consuming **hooch** or **spurious liquor** in Tamil Nadu's Kallakurichi district.

What is Hooch?

- **About:**
  - Hooch is a commonly used term for **poor-quality alcohol,** derived from Hoochinoo, a native **Alaskan tribe** that was known to produce very strong liquor.
  - It is often produced in **unregulated and unsanitary conditions,** leading to potential health risks.
  - The **lack of quality control** in hooch production makes it difficult for consumers to know the **exact alcohol content** and any **potential contaminants** present.
- **Production Process:**
  - **Fermentation:**
    - The production process is similar to making beer or wine. It starts with a**sugary substance** like fruits, grains, or sugarcane. **Yeast** is added, which **ferments** the sugars into **alcohol** and **carbon dioxide.**
  - **Distillation (Optional):**
    - Hooch often has higher potency (strength), unlike beer or wine, which have lower alcohol content. Distillation **increases the alcohol content** by **heating the fermented mixture.**
    - **Alcohol evaporates** first due to its lower boiling point, and the **vapor is captured and condensed back into a liquid**, resulting in a **stronger alcohol concentration.**

What is Alcohol Content in Liquor?

- **Alcohol in Liquor:**
  - **Ethanol** is the type of alcohol commonly found in **alcoholic beverages** and is the **psychoactive ingredient** responsible for the effects of intoxication.
    - Ethanol (C_2H_5OH) is a compound consisting of two carbon atoms, six hydrogen atoms, and one hydroxyl group (OH^-).
  - Liquor is differentiated by its **alcohol content**. It ranges from **5% in beer** to **40% in distilled spirits** such as vodka and whiskey.

- Inside the body, **ethanol** is metabolised in the liver and the stomach by **alcohol dehydrogenase (ADH) enzymes** to **acetaldehyde.**
    - Then, **aldehyde dehydrogenase (ALDH) enzymes** transform the acetaldehyde into **acetate.**
- **Spurious Liquor:**
    - It is a **fake** or **counterfeit alcohol** that is often made at home.
    - In this **methanol** is added to **make the alcohol stronger** in terms of its intoxicating effects or to **increase the quantity of the liquor** being produced. **It is a harmful substance t**hat can be dangerous if consumed in high amounts.
    - **Hooch production** carries inherent risk due to the presence of **toxic methanol** in the distilled fermented mixture, alongside consumable ethanol.
- **Regulation:**
    - The **Food Safety and Standards (Alcoholic Beverages) Regulations 2018** prescribe the maximum permissible quantity of methanol in different liquors.
    - These values span a wide range, including “absent” in coconut fenny, 50 grams per 100 litres of country liquor, and 300 grams per 100 litres of pot-distilled spirits.

What is Key Facts About Methanol and its Consumption?

- **Methanol:**
    - Methanol, chemically represented as **CH3OH**, is a simple alcohol molecule consisting of one carbon atom bonded to three hydrogen atoms and one hydroxyl group (OH).
    - **Regulations:**
        - Methanol is classified under **Schedule I** of the **Manufacture, Storage and Import of Hazardous Chemical Rules 1989** in India.
        - **Indian Standard IS 517** specifies how the quality of methanol should be determined.
    - **Industrial Production:**
        - Methanol is primarily produced industrially by combining **carbon monoxide and hydrogen** in the presence of **copper and zinc oxide** catalysts, typically at pressures of **50-100 atm and temperatures around 250°C.**
            - Historically, methanol was also produced through the **destructive distillation of wood,** a method known since ancient times, including in ancient Egypt.
    - **Industrial Uses:**
        - Methanol serves as a crucial precursor in the production of acetic acid, formaldehyde, and various aromatic hydrocarbons. It is widely used as a solvent, antifreeze, and in various industrial processes due to its chemical properties.
- **Effect on Human Body:**
    - **Metabolic Acidosis:**
        - Methanol in the body is broken down into toxic byproducts, primarily **formic acid**. This acid disrupts the body's delicate **pH balance** in the blood, leading to a condition called **metabolic acidosis** (production of **excessive acid** that cannot be flushed out by kidneys).
        - This makes the **blood more acidic,** hindering its ability to function properly.
    - **Cellular Oxygen Deprivation:**
        - Formic acid also interferes with an enzyme called **cytochrome oxidase,** which is crucial for cellular respiration. This **disrupts the cells' ability to use oxygen, leading to a buildup of lactic acid** and further contributing to acidosis.
    - **Vision Impairment:**
        - Methanol can **damage the optic nerve and retina,** causing **methanol-induced optic neuropathy.** This condition can lead to permanent vision problems, including blindness.
    - **Brain Damage:**
        - It can cause **cerebral edema (fluid buildup in the brain)** and **hemorrhage (bleeding)**. These can lead to **coma and death.**
- **Treatment:**
    - **Pharmaceutical-Grade Ethanol: Medical ethanol** competes with methanol for the same enzymes (ADH) in the liver. Since the **body processes ethanol much faster**

(around 10x faster), it prevents the methanol from being converted into toxic formic acid.

- **Fomepizole:** It **binds to the ADH enzymes, slowing down the metabolism of methanol** to formic acid. This allows the body to **eliminate methanol before it causes serious harm.**
- **Dialysis:** It may be prescribed to remove methanol and its toxic byproducts (formic acid salts) directly from the bloodstream. This can help protect the kidneys and retina from damage.
- **Folinic Acid:** This medication helps the body **break down formic acid** into less harmful substances like carbon dioxide and water.

Read more:

- Industrial Alcohol Regulation
- Ban on Liquor
- Crack Down on Illegal Liquor Supply

Drishti Mains Question:

Evaluate the health consequences of methanol poisoning caused by illegal alcohol. What measures need to be taken to address it?

UPSC Civil Services Examination, Previous Year Question (PYQ)

Prelims:

Q. Bisphenol A (BPA), a cause of concern, is a structural/key component in the manufacture of which of the following kinds of plastics? (2021)

(a) Low-density polyethylene

(b) Polycarbonate

(c) Polyethylene terephthalate

(d) Polyvinyl chloride

Answer: (B)

Q. '**Triclosan', considered harmful when exposed to high levels for a long time, is most likely present in which of the following? (2021)**

(a) Food preservatives

(b) Fruit-ripening substances

(c) Reused plastic containers

(d) Toiletries

Answer: (D)