CONDITION

Eugenol oil overdose

Eugenol oil overdose is poisoning caused by swallowing or absorbing too much eugenol, often from concentrated clove oil.

WHAT IT IS
Toxic illness from too much eugenol or clove oil

BODY SYSTEM
Liver, digestive system, nervous system, lungs, and blood

MAIN SYMPTOMS
Vomiting, abdominal pain, drowsiness, breathing problems

WHAT CAUSES IT
Swallowing or excessive exposure to eugenol-containing oil

HOW IT IS DIAGNOSED
Exposure history and tests for liver, kidney, and clotting injury

MAIN TREATMENT
Poison-centre-guided supportive care and selected antidote treatment

CAN IT BE CURED?
Sometimes - prompt care can reverse poisoning

IS IT AN EMERGENCY?
Yes - swallowing concentrated oil needs immediate poison advice

LONG-TERM OUTLOOK
Often good; severe liver injury may be fatal

Overview

Eugenol is a chemical found in clove oil that gives cloves their strong smell and numbing effect. It may also be present in dental materials, toothache products, flavourings, fragrances, and essential-oil preparations.

An eugenol oil overdose happens when enough enters the body to cause poisoning. Most serious cases follow swallowing concentrated clove oil or another eugenol-rich product. Product strengths vary, so risk cannot be judged from volume alone.

Concentrated eugenol can irritate or burn the mouth and digestive tract. After absorption, it can affect the brain, breathing, liver, kidneys, and blood clotting. Children are particularly vulnerable because a small amount may be a large exposure for their body size.

Liver or clotting problems may develop after someone initially appears well. Suspected swallowing of concentrated eugenol therefore needs prompt poison-centre advice, even without symptoms. This differs from the small, controlled amounts used by dental professionals or mild irritation from touching a diluted product.

Symptoms

Symptoms depend on the product, concentration, route of exposure, and amount absorbed. Some begin quickly, while liver injury may take hours or longer to become apparent.

Early symptoms after swallowing may include:

Serious poisoning can cause confusion, poor coordination, seizures, reduced consciousness, or slow or difficult breathing. Oil or vomit may enter the lungs, leading to coughing, choking, low oxygen levels, and lung inflammation.

Liver injury may cause worsening nausea, upper abdominal pain, yellow skin or eyes, dark urine, or unusual bleeding. Blood tests may detect damage before these signs appear.

Other effects include low blood sugar, abnormal blood acidity, kidney injury, blood in the urine, and clotting problems. Severe clotting disruption may cause widespread bruising or bleeding.

Skin exposure can cause redness, burning, irritation, or an allergic rash. Eye exposure may cause severe pain, watering, redness, and injury to the eye's surface.

- Burning or pain in the mouth and throat
- Nausea, vomiting, diarrhoea, or abdominal pain
- Dizziness, weakness, or unusual sleepiness
- A strong clove-like smell on the breath

Causes and risk factors

The usual cause is swallowing concentrated clove oil or another eugenol-rich product. This may happen when a child reaches an unsecured bottle, a product is mistaken for medicine or food, or someone takes more than directed.

Risk depends on:

Repeated or extensive application to the mouth or damaged skin may increase absorption. Undiluted oil can injure tissues directly. Cooking with cloves is not equivalent to swallowing concentrated essential oil.

Labels such as "natural" or "pure" do not mean a product is safe to swallow. "Pure" essential oil usually indicates a highly concentrated product.

- The concentration and other ingredients
- The amount swallowed or absorbed
- The person's body size
- Whether oil entered the lungs during choking or vomiting
- Whether medicines, alcohol, or other chemicals were also taken

Diagnosis

There is no widely used bedside test that directly confirms an eugenol level. Diagnosis is based on the exposure history, product, symptoms, and tests for organ injury.

If possible, take the container or a clear photograph of its label to the hospital. Note when the exposure happened, the possible amount, whether vomiting occurred, and whether other substances were involved. Do not delay emergency care to gather this information.

Assessment may include breathing, oxygen level, heart rate, blood pressure, temperature, and alertness. An electrocardiogram, or ECG, may be used to record the heart's electrical activity.

Blood and urine tests may measure:

Tests may be repeated because liver and clotting abnormalities can develop after the first assessment. A chest X-ray may be needed if oil could have entered the lungs. Additional testing may look for other poisons when the contents or circumstances are uncertain.

- Blood sugar, salts, and acid balance
- Liver and kidney function
- Blood cell counts
- How quickly the blood clots
- Blood or signs of kidney injury in the urine

Treatment and management

Call a poison centre promptly after suspected swallowing and do not wait for symptoms. In the United States, call Poison Control at 1-800-222-1222. Elsewhere, contact your local poison information service or emergency number.

Do not make the person vomit because this increases the risk of oil entering the lungs. Do not give food, drink, charcoal, or a home remedy unless a poison specialist or medical professional specifically instructs you to do so.

Hospital care depends on symptoms and test results. Treatment may include observation, oxygen, intravenous fluids, anti-nausea treatment, correction of low blood sugar or abnormal blood chemistry, and medicines for seizures. Reduced consciousness or weak breathing may require a breathing tube and mechanical ventilation.

Activated charcoal is not a home treatment. A toxicology team may consider it in selected cases, but essential oils can be inhaled into the lungs, especially when someone is drowsy or vomiting.

N-acetylcysteine, or NAC, has been used for severe eugenol-related liver injury. Evidence comes mainly from toxicology practice and case reports rather than large clinical trials. A poison specialist decides whether it is appropriate; it does not replace monitoring and supportive care.

Severe liver failure may require intensive care and consultation with a specialist liver centre. Liver transplantation is rarely considered if liver failure continues to worsen.

For skin exposure, remove contaminated clothing and wash the skin with running water. For eye exposure, rinse with clean, lukewarm running water and seek poison-centre or medical advice. Persistent pain, redness, or vision changes require urgent eye assessment.

Complications

Concentrated eugenol can cause serious complications, including:

Acute liver failure may affect the brain as toxins build up. It can also cause low blood pressure, bleeding, infection, and failure of other organs. Severe eugenol poisoning is uncommon but can be fatal.

- Chemical burns of the mouth, throat, or digestive tract
- Oil entering the lungs and causing inflammation
- Seizures, coma, or respiratory failure
- Acute liver failure
- Kidney injury
- Low blood sugar and abnormal blood acidity
- Severe clotting failure and uncontrolled bleeding

Prevention

Treat concentrated oils like medicines and household chemicals, not foods. Keep clove oil and other essential oils in their original containers, secured out of children's sight and reach. Never transfer them into drinking bottles, cups, or unlabelled containers. Replace the cap immediately after use.

Read the ingredients and directions before using toothache, dental, fragrance, or essential-oil products. Do not swallow a product unless its label clearly says it is intended for that use. Taking more is not more effective, and dilution does not make an unapproved oral product safe to drink.

Do not put undiluted clove oil directly on the gums, mouth, or broken skin. It may burn tissue and be absorbed. Although clove oil can briefly numb tooth pain, it does not treat decay, infection, or a cracked tooth. Dental assessment is still needed.

Dispose of unwanted products safely. After an exposure, keep the packaging so the poison centre can identify the ingredients and concentration.

Living with it and what to expect

Eugenol oil overdose is usually a single poisoning event rather than a long-term condition. The outcome depends on the amount absorbed and whether the liver, lungs, brain, kidneys, or clotting system were affected.

Someone with a minor exposure and normal assessments may recover without lasting problems. Observation may still be advised because important blood-test changes can appear after the person initially seems well.

Recovery from significant poisoning may take days or weeks. Blood tests are generally followed until liver function, kidney function, and clotting improve. Tiredness, reduced appetite, and abdominal discomfort may persist temporarily after liver injury.

People who recover from an uncomplicated exposure do not usually remain poisoned or require lifelong treatment. Major liver, kidney, or lung injury may require longer follow-up and rehabilitation.

A deliberate overdose also requires compassionate mental health support before and after discharge. This addresses the circumstances surrounding the poisoning and is not a judgment about the person.

When to get medical help

Get immediate poison-centre advice after any suspected swallowing of concentrated eugenol or clove oil, even if the person feels well. Routine follow-up is not enough for a new ingestion because serious effects may be delayed.

Call emergency services now if the person has:

Do not make the person vomit. If they are unconscious but breathing, place them on their side if it is safe to do so. Do not put anything in their mouth.

Seek urgent medical assessment for yellow skin or eyes, dark urine, worsening upper abdominal pain, unusual bruising, reduced urination, or new confusion after an exposure. These can indicate liver, kidney, or clotting injury.

After discharge, attend all planned blood tests and follow-up visits. Contact the treating service promptly if symptoms return or worsen. Mild skin irritation that settles after washing may need only routine advice, but ongoing burns, blistering, eye pain, or vision changes need urgent assessment.

- Trouble breathing, choking, or blue or grey lips
- A seizure
- Severe confusion, collapse, or difficulty waking
- Repeated vomiting with increasing drowsiness
- Heavy bleeding, vomiting blood, or black stools

Common questions

Is clove oil poisonous if swallowed?

Concentrated clove oil can be poisonous because it often contains a large amount of eugenol. Risk cannot be judged by taste, smell, or number of drops. Contact a poison centre rather than waiting for symptoms.

How quickly do symptoms start?

Mouth irritation, nausea, vomiting, dizziness, or drowsiness may begin early. Liver and clotting problems can appear later, so a symptom-free period does not rule out significant poisoning.

Should I make someone vomit after swallowing clove oil?

No. Vomiting can draw oil into the lungs and cause serious breathing problems. Call a poison centre and follow its instructions.

Is there an antidote for eugenol oil overdose?

There is no simple antidote that reverses every effect. Treatment supports breathing and circulation while monitoring the liver and other organs. NAC may be considered for significant liver injury under specialist guidance.

Can a few drops be dangerous to a child?

Children are more vulnerable because of their smaller body size, and concentrations vary. Do not try to calculate safety at home. Contact a poison centre promptly and have the bottle or label available.

Can clove oil safely treat a toothache?

Clove oil may briefly numb pain, but concentrated oil can burn the mouth and does not treat the cause. Use only products labelled for that purpose and follow their directions. Persistent tooth pain needs dental care.

Sources

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