

# Ricin Poisoning

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**ABSTRACT:** *The tremendous toxicity of ricin makes it one of the most potent poisons in the world. It comes from the seeds of the Ricinus Communis plant, which produces castor beans. Another name for ricin is a possible bioterror agent that people might be exposed to through food, water, and air. One of the strongest and most deadly drugs is ricin, especially when breathed. Ricin causes organ failure and cell death by preventing cells from synthesizing proteins. Inhalation and injection are the most dangerous methods of exposure because oral absorption is poor and intact skin absorption is improbable. Its toxicity primarily harms reticuloendothelial system cells, causing bleeding, loss of fluids and protein, and compromised cellular defenses against endogenous toxins.*

**KEYWORD:** *Ricin Poisoning, Reticuloendothelial System, Bio - terror, Oral absorption.*

## INTRODUCTION

Castor oil plant *Ricinus Communis*, a member of the plant family Euphorbiaceae, is found in a variety of tropical and subtropical climates where it either commercially cultivates or grows invasive endemic plants. Ricin is one of the deadliest poisons that can be found in nature. It comes from the Greek "ricinus," which means "tick," and alludes to the nature of its seeds.

Because of its leaf shape, it is also known as Christuspalm [The palm of Christ], Kreuzbaum [cross three], or Wunderbaum [Wonder tree]. The castor oil plant is grown all over the world, but it originated in Africa. Widespread in tropical areas, castor beans are grown for their non-yellowing oil. Castor oil was utilized as a laxative and component by a number of ancient civilizations, including Egypt, Greece, and Rome. The first scientists to isolate the deadly glycoprotein from castor beans and give it the name "ricin" were Peter Hermann Stillmark [1860–1923]. He also observed that ricin caused hemagglutination and serum protein precipitation; however, he also noted that the ricin that Stillmark isolated was a combination of RT and R. *Communis* agglutinin. Additionally, Iranians employed castor beans for commercial and medicinal

uses. Castor bean oil finds extensive use in paint, lubricants, cosmetics, medical applications, and other industrial items. It is a water-soluble glycoprotein that, upon phase separation, does not separate into oil extract. Common in warm areas, ricin is a globular glycoprotein that constitutes up to 1–5% of the beans of the castor oil plant. Depending on the cultivar, the castor oil plant yields seeds that are 8–20 mm long and 4–12 mm wide. These seeds have 46–45% oil, which is made up of glycerides of various acids, including iso-ricinoleic and ricinoleic. Cold-pressed castor oil is used as a laxative and purgative, whereas hot-pressed castor oil is utilized for specialized oils and lubricants after solvent extraction. Because of its high protein content, pressed oil is used to make organic fertilizer. Rich in ricinoleic acid, this high oil content seed (46–45%) finds application in a wide range of industrial, pharmaceutical, and cosmetic goods. Residue that is utilized as fertilizer or in animal feed. It is composed of two chains, A and B, connected by disulfide bonds. The cellular toxicity of ricin is conferred by the A chain, whereas the characteristics of the plant molecule lectin are provided by the B chain, which are highly attracted to cell surface receptor glycoproteins. Additionally, ricin attracted a lot of interest as a possible bioterrorist or WMD. An adult can be killed by as little as 500 µg. People may come into contact with it through food, water, and the air. Among the many poisons found in *Ricinus Communis* are the type II ribosome-inactivating protein and the extremely poisonous lectin ricin, sometimes referred to as *Ricinus Communis* agglutinin 60 [RCA60]. It has been calculated that 1–10 g/kg of ricin administered intravenously or intramuscularly is the deadly dose for humans. Worldwide, there is significant worry about the potential of ricin as a chemical weapon of mass destruction and bioterror agent, especially when it comes to the use of inhaled, refined particles that can be aerosolized for a mass attack. Mass spectrometry is utilized in clinical settings to detect ricinine, a biomarker for identifying exposure to castor oil and ricin. Intentional or unintentional consumption of castor seeds, including infrequently deadly exposure, is linked to ricin poisoning in

humans. When ricin is released through chewing or maceration, such as when consuming a herbal medical concoction that contains ricin bean powder, the seeds are typically hazardous. One of the most deadly ways to be exposed to ricin is by inhalation or parenteral injection.

#### LITERATURE WRITING

Because of its reputation as an assassination agent, stability, ease of access, and ease of extraction, ricin is unquestionably a toxic weapon of terror. Because of its possible application in bioterrorism, it can be fatal in little amounts. The toxin is spread by contaminated food, water, or aerosol sprays. It is taken out of easily accessible castor beans. There aren't many real examples of its widespread use.

Because of its strong effects and variety of exposure pathways, ricin poisoning poses a serious health risk. clinical signs and symptoms that can change according to exposure modalities. In order to control symptoms and avoid consequences, supportive care must be prioritized in the absence of a specific antidote. Ricin mostly causes cell death and extensive tissue damage by preventing the synthesis of proteins. There are several methods for determining the toxicity of ricin in food, blood, and environmental samples.

The Ricin vaccine focuses on creating effective vaccines to counteract the toxic effect of poison. How poison inhibits protein synthesis at the cellular level. Various platforms are being explored, subunit vaccines to stimulate immunity vector based vaccines to deliver ricin antigens, DNA and mRNA vaccines induce strong immune responses. Government has spent a lot of resources on ricin vaccines. It is disappointing that there are no longer supporting clinical trials for the ricin vaccine.

The ability of ricin antibodies to neutralize various isoforms and cultivars is essential for creating efficient treatments and safeguards against ricin poisoning. Depending on the particular isoform or cultivar, antibodies may differ in their capacity to neutralize ricin, underscoring the necessity of specialized treatment strategies.

In animal models like mice, ricin is administered intramuscularly to evaluate the systemic effect and possible pathophysiological mechanism. Mice who are poisoned with ricin suffer damage to their organs,

especially the heart, spleen, and bone marrow. Myocardial cell loss in cardiac cellular necrosis, Within the spleen The immune cell population was decreased by lymphocyte apoptosis, and the splenic architecture was disrupted histopathologically. Marrow of bones Myelosuppression reduced hematopoietic stem cell loss, cellular apoptosis, and blood cell synthesis.

In albino rats the exposure of ricin poison leads to significant alteration in biochemical and biomarker. The toxicological effect shows multi-organ failure driven by oxidative stress, inflammation and tissue damage. These include elevated liver enzymes [ALT, AST], kidney function markers [Creatinine, BUN] and oxidative stress markers [MDA] Reductions in antioxidant enzymes activities [SOD, GSH] changes in hematological markers and increased inflammatory marker [CRP, Cytokines] are observed. Biochemical effects are generally dose and time dependent with more severe toxicity observed at higher doses or with prolonged exposure.

#### GROUP DISCUSSION

One of the most harmful compounds that humans have ever encountered is ricin, which is extracted from the seeds of the castor oil plant. It works by preventing cells from synthesizing proteins, which results in cell death and organ failure. Ricin is most toxic when inhaled, injected, or consumed, and even in trace doses, it can be lethal. It is essential for the domains of medicine and toxicology to comprehend its characteristics, impacts, and available treatments.

#### CONCLUSION

Exposure to the toxin ricin, which is generated from castor beans, can result in ricin poisoning, a dangerous and potentially lethal illness. Since there are no known cures for ricin poisoning, supportive care is the mainstay of treatment. This covers actions like eliminating the toxin from the body, controlling symptoms, and, if required, offering breathing support. Improving results requires early detection and timely medical intervention. avoiding exposure, particularly in circumstances when ricin could be used as a weapon.

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