

Salicylate Poisoning

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Abstract. Aspirin (acetylsalicylic acid) has become a widely used over-the-counter medication. Although salicylate poisoning is rare and the prognosis for poisonings is usually good, severe poisoning with these preparations poses a threat to life. Besides aspirin, poisoning can also occur by using salicylate-containing creams locally or by ingesting keratolytic agents or preparations containing methyl salicylate (wintergreen oil). Typically, these are liquid preparations. Due to their good solubility in fats, they can cause rapid and severe salicylate poisoning. Based on clinical symptoms, metabolic changes, or detection of salicylate concentrations in plasma, it is important to diagnose poisoning timely and initiate appropriate treatment.

The article reviews the epidemiology of these poisonings, salicylate pharmacokinetics, pharmacodynamics, clinical presentation of overdose, treatment, and prognosis.

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Salicylates include aspirin (acetylsalicylic acid) and various creams, liquids containing methyl salicylate. Aspirin has been used for almost 150 years as an antipyretic and analgesic medication, later also as an antiplatelet drug. Worldwide, 50 billion aspirin tablets are consumed annually. Each English person consumes 70 tablets per year.

Liquids, creams, and oils containing methyl salicylate are used externally to relieve muscle and bone pain and inflammation. These preparations contain a high concentration of methyl salicylate, for example, up to 30% in creams, 67% in red flower oil, and 100% in wintergreen oil. People can be poisoned by accidentally or intentionally ingesting salicylates.

Salicylate poisoning is rare. Toxicity is usually mild or moderate, but without proper diagnosis or inadequate treatment, death can occur. According to data from the Poison Control Center in the United States for the years 1991-1995, there were annually 181,000 cases of poisoning with analgesics registered, and 172-235 deaths from poisoning with them. After poisoning with antidepressants, analgesics rank first or second. Acetaminophen (paracetamol) is the most common among analgesics

(about 46%), and aspirin accounts for about 24%. If poisoning with aspirin were separated from all analgesics, it would rank seventh among the causes of poisoning deaths.

Out of 46,587 poisonings registered in England from December 1995 to March 1999, only 41 (0.09%) cases were due to aspirin. The exact number of poisonings in the United States is unknown, but in 2003, analgesics ranked first among the 2.4 million registered poisonings (256,842 patients, 10.8%). Of these, 659 patients died, accounting for 0.257% of all deaths from poisoning.

Toxic Dose

The maximum recommended dose of aspirin is usually stated as 4000 mg/day (650 mg every 4 hours or 1 g every 6 hours). Ingesting a higher dose, for example, up to 150 mg/kg, usually does not cause toxicity; 150-300 mg/kg causes mild or moderate toxicity, 300-500 mg/kg causes severe intoxication. A dose exceeding 500 mg/kg can be lethal.

Liquids and solutions containing methyl salicylate are highly toxic not only because of the high concentration of salicylates in them but also because methyl salicylate is better soluble in fats, thus its toxicity is faster and stronger. A teaspoon (5 ml) of wintergreen oil is a potentially lethal dose for a child weighing less than 10 kg. This dose is equivalent to approximately 7000 mg of salicylate or 21.7 (325 mg each) aspirin tablets. The significant toxicity of these preparations is often underestimated even by doctors.

Pharmacokinetics

When taken in therapeutic or toxic doses, absorption differs. The drug is rapidly and completely absorbed in the stomach and upper part of the small intestine. Absorption may be delayed by pylorospasm, pyloric stenosis, or enteric-coated aspirin tablets. After poisoning, absorption may be delayed by toxic inhibition of gastric motility or the formation of concretions, which occur when large amounts of un-dissolved tablets are ingested.

Aspirin quickly converts to salicylate. After a therapeutic dose of the drug, a high concentration of salicylates in the blood occurs within 30 minutes, and the maximum concentration is reached in less than 1 or 2 hours. When taking enteric-coated aspirin tablets (retard),