

Aspirin: A Common Drug with Multiple Benefits

A brief overview of the history, uses, dosage, risks, composition, and effects of aspirin



History of Aspirin

Aspirin, also known as acetylsalicylic acid (ASA), is one of the most widely used drugs in the world. It has been used for over a century to treat pain, fever, inflammation, and prevent blood clots. The origin of aspirin can be traced back to ancient times, when people used willow bark and other plants that contain salicylates, the natural precursors of aspirin, to relieve pain and fever. The modern synthesis of aspirin was first achieved by a German chemist named Felix Hoffmann in 1897, who worked for the Bayer company. He modified salicylic acid, which was too harsh on the stomach, by adding an acetyl group, which made it more tolerable and effective. Aspirin was patented and marketed by Bayer as a wonder drug that could treat various ailments.

Since then, aspirin has become one of the most widely researched and prescribed drugs in the world, with billions of tablets consumed every year.

Uses and Dosage of Aspirin

Aspirin has multiple uses and benefits, depending on the dose and the condition being treated. Some of the common uses of aspirin are:

- **Pain relief:** Aspirin can reduce mild to moderate pain caused by headaches, toothaches, menstrual cramps, arthritis, sprains, and other conditions. The usual dose for pain relief is 325 to 650 mg every four to six hours, as needed.
- **Fever reduction:** Aspirin can lower the body temperature in cases of fever caused by infections or inflammation. The usual dose for fever reduction is 325 to 650 mg every four to six hours, as needed.
- **Inflammation reduction:** Aspirin can decrease the swelling and redness caused by inflammation, such as in rheumatoid arthritis, osteoarthritis, or bursitis. The usual dose for inflammation reduction is 650 to 1000 mg every four to six hours, as needed.
- **Blood clot prevention:** Aspirin can prevent the formation of blood clots that can cause heart attacks, strokes, or other vascular problems. Aspirin works by inhibiting the enzyme cyclooxygenase, which is involved in the production of prostaglandins and thromboxane, two substances that promote platelet aggregation and blood clotting. The usual dose for blood clot prevention is 75 to 325 mg once a day, as prescribed by a doctor.

Use	Dose	Frequency
Pain relief	325 to 650 mg	Every 4 to 6 hours
Fever reduction	325 to 650 mg	Every 4 to 6 hours
Inflammation reduction	650 to 1000 mg	Every 4 to 6 hours
Blood clot prevention	75 to 325 mg	Once a day

Distribution of prescriptions for countries

Country	Population	Aspirin users	Percentage
Russia	144.4	40.0	27.7%
Germany	83.2	35.8	43.0%
France	65.3	24.5	37.5%
United Kingdom	66.7	22.6	33.9%
Italy	60.3	18.7	31.0%
Spain	46.9	14.1	30.1%

Risks and Composition of Aspirin

Aspirin, like any other drug, has some risks and side effects that should be considered before taking it. Some of the common risks and side effects of aspirin are:

- **Stomach irritation:** Aspirin can irritate the lining of the stomach and cause ulcers, bleeding, or perforation. This risk is higher in people who take high doses of aspirin, have a history of stomach problems, drink alcohol, smoke, or use other nonsteroidal anti-inflammatory drugs (NSAIDs) such as ibuprofen or naproxen. To reduce this risk, aspirin should be taken with food, water, or milk, or use enteric-coated or buffered tablets that protect the stomach.
- **Bleeding:** Aspirin can increase the risk of bleeding in the gastrointestinal tract, the brain, or other organs. This risk is higher in people who take high doses of aspirin, have a history of bleeding disorders, take anticoagulants or antiplatelet drugs such as warfarin or clopidogrel, or have surgery or dental procedures. To reduce this risk, aspirin should be used with caution and under medical supervision, and stopped at least a week before any surgery or dental procedure.
- **Allergic reaction:** Aspirin can cause an allergic reaction in some people, especially those who have asthma, nasal polyps, or a history of allergy to aspirin or other NSAIDs. The symptoms of an allergic reaction can include hives, itching, swelling, wheezing, shortness of breath, or anaphylaxis, which is a life-threatening condition that requires immediate medical attention. To reduce this risk, aspirin should be avoided by people who are allergic to it or have a history of asthma or nasal polyps, and seek medical help if any signs of an allergic reaction occur.

Risk	Symptom	Prevention
Stomach irritation	Ulcers, bleeding, or perforation	Take with food, water, or milk, or use enteric-coated or buffered tablets
Bleeding	Bleeding in the gastrointestinal tract, the brain, or other organs	Use with caution and under medical supervision, and stop before any surgery or dental procedure

Allergic reaction	Hives, itching, swelling, wheezing, shortness of breath, or anaphylaxis	Avoid if allergic or have a history of asthma or nasal polyps, and seek medical help if any signs of an allergic reaction occur
Reye's syndrome	Vomiting, confusion, seizures, coma, or death	Do not give to children or teenagers who have or may have a viral infection, and use other pain relievers or fever reducers instead

The composition of aspirin is simple and consists of only two elements: carbon and hydrogen. Aspirin has the chemical formula $C_9H_8O_4$, which means that it has nine carbon atoms, eight hydrogen atoms, and four oxygen atoms. The molecular weight of aspirin is 180.16 grams per mole, and the melting point of aspirin is 135 degrees Celsius. The structure of aspirin is shown below:

Effects of Aspirin

Aspirin has various effects on the body, depending on the dose and the target organ. Some of the effects of aspirin are:

- **Analgesic effect:** Aspirin relieves pain by blocking the production of prostaglandins, which are chemical messengers that transmit pain signals from the injured tissues to the brain. Aspirin also reduces the sensitivity of the nerve endings to pain stimuli.
- **Antipyretic effect:** Aspirin lowers fever by inhibiting the production of prostaglandins, which are involved in the regulation of body temperature. Aspirin also acts on the hypothalamus, which is the part of the brain that controls the thermostat of the body, and makes it lower the set point of the body temperature.
- **Anti-inflammatory effect:** Aspirin reduces inflammation by inhibiting the production of prostaglandins, which are responsible for the signs and symptoms of inflammation, such as swelling, redness, heat, and pain. Aspirin also modulates the immune system and the inflammatory response by affecting the production and function of various cells and molecules, such as cytokines, leukotrienes, and histamine.
- **Antithrombotic effect:** Aspirin prevents blood clots by inhibiting the production of thromboxane, which is a substance that promotes platelet aggregation and vasoconstriction. Aspirin also enhances the production of prostacyclin, which is a substance that inhibits platelet aggregation and vasodilation. Aspirin also affects the function and structure of the blood vessels and the blood flow.

Total Prescriptions and Patients Per Year (2013 - 2021)

