Bromelain – health benefits, uses, side effects and interactions

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Bromelain is an enzyme obtained from the stem of the pineapple plant (genus *Ananas*) even though it can be found in all other parts of the fresh pineapple. Bromelain is a white to tan powder which is soluble in water and shows stability at temperatures of 50–60 °C (122–140 °F). As an ingredient it found its uses in cosmetics, meat tenderizer as well as topical medication.

'Bromelain' can refer to either of the two protease enzymes extracted from plants which belong to *Bromeliaceae or* it can be related to a whole mixture of those enzymes together with other compounds produced within an extract. Bromelain enzymes are named *fruit bromelain* and *stem bromelain* respectively.

It is mainly produced in parts of the whole where pineapples are grown including Thailand or Malaysia. After processing the fruit for juice or other purposes bromelaine is withdrawn from the peel, steam or leaves. Afterwards, the material is blended and passed through a filter in order to acquire a supernatant liquid consisting of the soluble bromelain enzyme. Purification and concentration of the enzyme are a part of further processing.

Meat tenderizing and other uses

Together with papain, bromelain is one of the most used proteases for meat tenderizing. Bromelain is sold as powder which is mixed with a marinade or sprinkled directly on the uncooked meat.

Pineapple which has been cooked or canned does not possess tenderizing effect due to denaturation of enzymes throughout the cooking process. Some commercially available products which include meatballs, and some of the processed meat products involve pineapple and/or pineapple -derived components.

Even though the amount of bromelain in a typical serving of a pineapple is not of a great quantity, specific extraction can obtain adequate amount which can be applied in domestic and industrial processing involving baking, anti-browning of cut fruit together with textiles and manufacturing of cosmetics.

Medical uses

Osteoarthritis and joint pain: Clinical studies discovered that bromelain's anti-inflammatory as well as analgesic properties make it an effective treatment for the pain, swelling and join stiffness related to osteoarthritis. Two 650- milligram bromelain tables were administered to patients two to three times daily n an empty stomach (depending on whether they were suffering from acute or chronic pain episodes). Researchers discovered that the pain sensation was reduced up to 60 % in individuals suffering from acute pain and over 50 % in those with chronic disorders. The conclusion was that 'Bromelain presented anti-inflammatory as well as analgesic properties and could provide a safer alternative or adjunctive treatment for osteoarthritis'.

Cardiovascular disease: Bromelain shows to be effective in treatment of cardiovascular diseases including peripheral artery disease, heart attack, stroke as well as high blood pressure. It works by inhibiting blood platelets from sticking together (aggregation). This is beneficial in reduction of clot formation and cardiovascular events.

Asthma and allergies: The journal *Evidence – Based Complementary and Alternative Medicine* highlighted the study outcome related to how bromelain affected mice sugaring from asthma. The results were extremely interesting for instance, that bromelain decreases allergic sensitization and stops various inflammatory responses targeting airways.

These results collectively suggest that this enzyme aids modulation of the entire immune system. Moreover, it can prevent allergies by addressing the main cause – a hyperactive and oversensitive immune system. Throughout the study CD11c (+) dendritic cells and DC44 antigen presenting cells were held aside while bromelain supplements were administered suggesting that this enzyme can target the underlying cause for asthma as well as allergies. That is the reason behind bromelain being effective in targeting symptoms such as runny nose, itchy eyes, inflamed lymph nodes, congestion and troubled breathing.

Surgical pain: Oral bromelain showed to be effective with pain reduction, swelling as well as recovery time following a surgical procedure. Yet, differences have been noted among different individuals and tissues of the same person. In 2016 study bromelain was administered to 40 patients who underwent an oral surgery. Reduction in swelling as well as pain was experienced by 70 % of individuals.

Chronic sinusitis (chronic rhinosinusitis): In order to check whether a daily dose of bromelain (600 milligram tablets) could benefit individuals suffering from chronic sinusitis (inflammation of the sinuses), scientists from the University of Cologne in Germany choose 12 patients who underwent surgical procedures and treated them with bromelain for the course of three months. The following benefits associated with bromelain were discovered: overall symptom score improved, better total rhinoscopy results, overall quality of life was enhanced, and no side effects reported.

Colitis: An animal study showed that purified bromelain cured mucosal ulcers which were a result of inflammatory bowel disease among rats. Moreover, it contributed to reduction of inflammation.

Burns: When applied as a topical cream, bromelain showed to be extremely effective at safe removal of damaged tissue from wounds and from second as well as third-degree burns.

Eye Floaters & Eye Health: New research has shown that usage of pineapple protease supplementation is successful in the proteolytic breakdown of floaters (scientifically named as vitreous capacities). Daily consumption of the actual pineapple fruit has presented beneficial effects on floater elimination, if consumed daily. One study presented that approximately 7-% of individuals who used to consume pineapple each day for a period of three months noticed a great improvement with regards to floaters. It is the bromelain within the pineapple, precisely, that is responsible for the mechanism behind such a beneficial outcome.

Cancer: A study conducted in 2010 showed that bromelain is promising in cancer treatment. It can positively affect cancer cell growth and it could contribute to control of key pathways encouraging malignancy.

Side effects and risks

Bromelain can lead to mild side effects, especially in taken in high doses. The side effects include diarrhoea, vomiting, nausea as well as increased menstrual bleeding. It is advised to avoid taking bromelain while using blood thinners such as aspirin and warfarin. It is shown that bromelain has an antiplatelet effect on blood which leads to an increased risk of uncontrolled bleeding. Hence, it is important not to take bromelain before and after surgical procedures.

Bromelain should be avoided by individuals who are allergic to pineapples together with other substances which may potentially contribute to an allergic reaction (cross-reactivity). These substances involve grass pollen, latex, carrots, wheat and fennel.

Interactions

Bromelain leads to reduction of blood clotting time, therefore individuals who are taking antiplatelet which contribute to prolonged clotting time, may experience bruising together with an excessive bleeding. Blood thinners include warfarin, aspirin, clopidogrel (Plavix), ibuprofen, diclofenac, heparin, enoxaparin, naproxen as well as dalteparin.

Bromalin is a naturally occurring substance in pineapples. It showed multiple valuable effects including cardiovascular diseases, osteoarthritis, asthma, burns and digestive problems. Yet, it is advisable to discuss the usage of bromalin with a medical doctor especially if is an additive to existing treatment.

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