Soursop as an Alternative Medicine

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Introduction

Soursop, also referred as guanabana, graviola, and its scientific name *Annona muricata*, is produced in tropical regions like Africa, South America, and South East Asia. Soursop has a unique taste and appearance, and has been used in folk medicine for the medicinal properties from its leaves, roots, and seeds that have biological or pharmacological characteristics, such as anti-hyperglycemic and anti-tumorigenic properties. Besides its raw form, it is also commercially found as capsules, tablets, or drinks. To gain a deeper understanding of the medicine related properties of soursop, the topic of soursop as a possible treatment for cancer cells is furthered explored.

History

Soursop, also known as its scientific name *Annona muricata*, is a tropical fruit that has been used as herbal medicine. In 1526, it was most abundant in the West Indies and in northern South America. Soursop germinates on bushy trees from seeds and was one of the first fruit trees carried from America to the Old World Tropics and has been grown in Florida for possibly 90 years (Morton, 1966). It comes from rain forest trees in Africa, South America, and Southeast Asia, and is very popular in South India and Guam due to the preferred sweetness of this fruit. Over time, soursop has been used for many different traditional or medicinal purposes, which will be discussed later on.

Description

Soursop is an oval, curved shaped fruit that grows from seeds. There are usually 12-24 fruits per tree and the fruit can contain up to 200 seeds. When the soursop is ripe, it is yellowish-green with a tender, bitter, and leather-like outer layer. It has flowers that emerge on
the tree trunks, branches, or twigs while its leaves are dark green, smooth, glossy, and highly aromatic when it is crushed (Morton, 1966). It also has “spikes” that protrude from the outer layer. The inside of the fruit smells pineapple-like and is white, fibrous, and juicy but it can also be dry. Although the fruit has an acid-like flavor, the taste is a cross between pineapple and papaya. Sweet and sour versions of this fruit are mostly used for drinks.

**Uses and Doses**

**Historically**

Soursop has been used for different purposes in folk medicine in many parts of the world, either as a tranquilizer, or to help alleviate symptoms of alcohol intoxication. For example in Guyana, broken soursop leaves soaked in water and rubbed on an intoxicated individual's head can help alleviate the impaired symptoms of alcohol (Morton, 1966). In the Netherland Antilles, placing soursop leaves under pillows promoted a good night sleep (Morton, 1966). Populations in Africa and South America have used soursop to treat infections with viruses, or parasites, rheumatism, arthritis, depression, and sickness (“Can graviola cure,” n.d.). Due to the natural properties of soursop, it still actively used today.

**Modernly**

Nowadays, people can purchase guanabana “soursop” in certain locations in America. While its seeds, bark, and leaves of the soursop have been extracted for human diseases to treat stomach ailments, hypertension, and cancer and is sold as capsules, tablets, powder for infusions, and tinctures (Cassileth, 2008). Commercial operations add water to the pulp to reduce the viscosity sugar to 15% and citric acid to adjust the pH to 3.7 (Love & Paull, 2011). The pulp is usually frozen without any additives or sterilized to be used later in syrups, soups, and desserts.
such as ice cream, mousse, jelly, souffle, or sorbet. Overall, soursop has been used for many years but there has been no supporting evidence in terms of dosage recommendations.

**Scientific Research**

**Effectiveness and Efficacy**

The effectiveness of soursop related to the treatment of cancer comes from the bioactive component, Annonaceous acetogenins, which is extracted from different parts of the plant. These are derivatives of long chain fatty acids that is selectively toxic to cancer cells including multidrug-resistant cancer cell lines (Torres et al., 2012). Cancer cells have a higher demand for energy as well as a higher resistance to apoptosis when compared to normal active cells. In the case of pancreatic cancer cells, Annonaceous acetogenins intervene ATP productivity by inhibiting mitochondrial complex I involved in ATP synthesis, thus reducing the amount of energy produced to ultimately delay the growth of cancer cells. This natural product also inhibited signaling pathways regarding metabolism, cell cycle, survival, as well as metastatic properties of pancreatic cancer cells (Torres et al., 2012).

A study conducted at University of Nebraska Medical Center has shown a decrease in the development of pancreatic cancer cells in mice when the test subjects were treated using soursop extract. The study was developed to compare and contrast the results of three test subject groups, the control and two groups treated with different dosages of the extract, 50mg/kg and 100mg/kg respectively. After the mice were monitored every two weeks in a period of 35 days, cancer cells were taken out and observed. Results showed that the tumor growth inhibition in mice treated with a dose of 50mg/kg Graviola extract was 59.8% whereas in mice treated with 100 mg/kg Graviola extract, the inhibition was 50.3% (Torres et al. 2012). Although the studies have shown
a significant decreased in the rate of cell growth thus decreasing proliferation of cell and survival, it does not eliminate pancreatic cancer cells completely.

Another study conducted by Adeyemi et al. (2009), also used the methanolic extracts of *A. murciata* leaves to determine its effects on glycemic control. For this study, researchers randomly assigned three groups (A, B, and C) - Group A was the control, non-diabetic group, and Group B and C were both induced with diabetes mellitus (STZ) but Group C was treated with *A. muricata* extract. After being monitored and evaluated for a four-week period, Group C blood glucose levels gradually decreased and weight gradually increased back to pre-induced weight whereas Group B blood glucose levels stayed high. The results demonstrated the effectiveness of *A. muricata* extracts as an antihyperglycemic agent, beneficial for diabetics.

**Nutrition facts**

Research has shown that one hundred grams of raw soursop fruit yields 66 kcal and normally consists of 67.5% edible pulp, 8.5% seeds, 20% peel, and 4% core by weight. The white edible pulp contains about 80% water, 18% carbohydrate, 1% protein, 24.5% non-reducing sugar, and an abundant source of vitamins C, B1, B2, and some minerals such as potassium, calcium, phosphorus, and chloride. In addition, the fruit is low in sodium, saturated fat, and contains no cholesterol. The oil consists of 28.07% saturated and 71.93% unsaturated fatty acids. The unsaturated oil includes linoleic, oleic, and saturated oils palmitic and stearic acid. Sugar, of soursop pulp constitutes about 67.2 % - 69.9 % of total solids. Traces of 1.8 % fructose, 2.27% D-glucose, and 6.57% sucrose is also found in the pulp.

Furthermore, research shows that 3.3g dietary fiber is found in one hundred grams of the fruit, and pectin is the one mainly found (Watson & Preedy, 2010). The soursop seeds are also
rich in oil and protein and low in toxicants such as tannins, phytate, and cyanide. Therefore, seeds could be harnessed in human or animal nutrition. A high content of magnesium and zinc is found in the seeds (Watson R & Preedy, 2010). To further understand the nutritional information of soursop, additional research is needed.

**Drug Nutrient Interactions and Side Effects**

Despite the fact that soursop may have anticancer properties, the drug nutrient interactions and side effects of consuming soursop and using it as an herbal medicine is not fully understood at this point. Although there are some studies that discuss the side effects of soursop, there is little information regarding the drug nutrient interactions involved. The active ingredients of soursop are thought to be the leaves and twigs. Extracts of alkaloids from soursop have shown to be detrimental to the survival of dopaminergic cells in laboratory test tubes, which may lead to neural dysfunction and degeneration (Cassileth, Yeung, & Gubili, 2010). It has also shown to cause symptoms like motor and neural function problems similar to Parkinson’s disease if the fruit is eaten often for a long period of time. Holanda et al. (2009) found that herbal compounds like soursop used with aloe vera may cause liver toxicity and potentially lead to liver failure in rats but it is questionable whether or not this information pertains to humans.

**Discussion**

Besides being used for traditional purposes as sedatives or tranquilizers, soursop (or *A. murciata*) has also shown to be effective for its anti-hyperglycemic (Adeyemi et al., 2009), anti-tumorigenic and anti-cancerous (Torres et al., 2012) properties as evidenced by research. However, these results were only seen in research that experimented on animals, mostly rats, which shows that there is limited research on humans. Also, there was no specific dosage
explaining its effectiveness to kill cancer or tumor cells as an alternate cancer/tumor therapy. For instance, *A. muricata* extract showed potential anti-tumorigenic and anti-cancerous characteristics that targeted important metabolic pathways all at once, however, inhibiting glycolysis alone may not be enough to destroy tumor or cancer cells completely (Torres et al., 2012). It may be more effective to take soursop capsules regularly as a supplement but should not be a replacement for standard therapy (Torres et al., 2012).

**Conclusion**

Soursop is a unique tropical fruit that contains medicinal properties that is unknown to most people. Folk medicine has used this fruit as a natural remedy for its tranquilizing, cancer, and tumor healing properties for almost a century. As evidenced by research, soursops’ bioactive components are shown to be effective against many types of cancer and tumor cells. Due to the limitations of most research on the effectiveness of soursop, further studies need to be focused on humans to determine a specific dosage, toxicity levels, and its effectiveness as a possible replacement for standard therapy. Soursop has the potential to be an effective complementary and alternative medicine, but for now, it can be enjoyed for its sweet and delicious taste.
References


