



Review Article

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**Biomedical Sovereignty of Prunes for Gastrointestinal Ailments
Rehabilitation**

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Abstract

Prunes, also known as dried plums, are one of the healthiest foods known to be useful in relieving constipation, but offers more benefits than just this. Prunes are rich in a many nutrients, minerals and vitamins. It has a rich collection of vitamins A and K, fibres. Prunes are filled with a lot of antioxidants which protect the body from unwanted radicals or toxins. Much of the antioxidant power of prunes can be attributed to the high levels of hydroxycinnamic acids they contain. The hydroxycinnamic acids present in prunes include neochlorogenic and chlorogenic acids, both of which appear to be highly effective at scavenging free radicals. In addition to hydroxycinnamic acids, prunes and plums are rich in anthocyanins, flavonoid pigments with strong antioxidant properties. Prunes are rich in fibre which helps in proper digestion of food, removing the unnecessary substances which in turn cause weight gain and stomach bloating. Prunes are quite good for our digestion, the friendly bacteria in our body and our intestines. Prunes are considered to be very good for our heart. This is because they reduce cholesterol level in our body. Prunes reduce heart diseases and chances of getting any heart strokes or heart attacks. Prunes help to reduce cholesterol in our body as it contains the health omega 3 and other nutrients required by our heart. There have been recent studies that prunes help in the absorption of minerals like Fe in the body. Prunes have a well-deserved reputation as an aid to regularity. Prunes sound more upscale when called dried plums, but their gastrointestinal actions are the same by any name. Dried plums are rich in phytonutrients namely chlorogenic and neochlorogenic acid. The high amount vitamin C helps in increasing immunity and aids formation of collagen, which then aids in supporting the development and maintaining of strong as well as healthy tissue. Sorbitol occurring in prunes absorbs into the bloodstream more slowly than glucose, which gives it more time to absorb water from the intestine. This might contribute to the laxative effect of prune juice.

Keywords: Hydroxycinnamic acids, Vitamin C, Laxative, Gastrointestinal actions, Dihydroxyphenyl, isatin,

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1. Introduction

Prunes are dried plums, fruits of *Prunus domestica* L. tree (Fig.1), cultivated and propagated since ancient times. The dry fruit has rough skin on the outer covering, a sticky chewy textured pulp and a hard seed on the inside. But as we all know looks are deceptive. The odd looking prune has many health benefits and should be included in the regular diet of every individual. Dried prunes contain ~6.1 g of dietary fiber/100 g. The laxative action of both prune and prune juice could be explained by their high sorbitol content (14.7 and 6.1 g/100 g, respectively). Prunes are good source of energy in the form of simple sugars, but do not mediate a rapid rise in blood sugar concentration, possibly because of high fiber, fructose, and sorbitol content. Prunes contain large amounts of phenolic compounds (184 mg/100 g), mainly as neochlorogenic and chlorogenic acids, which may aid in the laxative action and delay glucose absorption. Phenolic compounds in prunes had been found to inhibit human LDL oxidation in vitro, and thus might serve as preventive agents against chronic diseases, such as heart disease and cancer. Additionally, high K content of prunes (745 mg/100 g) might be beneficial for cardiovascular health. Dried prunes are an important source of B, which is postulated to play a role in prevention of osteoporosis. A serving of prunes (100 g) fulfills the daily requirement for boron (2 to 3 mg). More research is needed to assess the levels of carotenoids and other phytochemicals present in prunes to ensure correct labeling and accuracy of food composition tables in order to support dietary recommendations or health claims.



Figure 1: Prune Tree & its Twig

A handful of prunes twice a day could keep hunger at bay. A vast percentage of populace suffers from constipation - infrequent, painful or hard bowel movements -- at some point in their lives. Prune juice can help keep bowel movements soft and regular. Sugar alcohol in prune juice, called sorbitol, might also contribute to softer stools that pass more quickly through the intestinal tract. Sugar alcohol is an incompletely digested sugar that, despite the name, has no intoxicating effects. Eating prunes as part of a weight control diet can improve weight loss, research shows. Could prunes be the key to successful slimming. Study finds they make dieting easier by suppressing appetite. Dieters are usually told to avoid dried fruit because it contains a lot of sugar. But, those who eat prunes lose more weight than those who do not. This is because the fibre in the fruit makes dieters feel fuller for longer. Controlling sugar level by means of increasing the level of insulin, and keeping a watch on diabetes is one of the health benefits of prunes. Prunes also help to reduce hunger cravings. It helps one prevent over eating which avoids weight gain. Prunes are good for digestion related problems. They help to avoid constipation problems and decrease the bloating of stomach. Prunes also help in bile production and removing excess bile along with urine or faeces. Prunes also contain some insoluble fibre which is food for the friendly bacteria in our intestines, responsible for proper digestion in our body. [1-3]

2. Therapeutic Applicability

Prunes or dried plums (Fig.2a,b) are considered one of the healthiest foods there is, but exactly why are prunes good for one? And why are prunes good for constipation? This article discusses the health benefits of eating prunes,

including their ability to relieve constipation, provide antioxidant protection, prevent pre-mature aging, promote cardiovascular health, and reduce the risk of cancer and osteoporosis. A study conducted by researchers from Tufts University (Boston, US) ranked prunes, or dried plums, as #1 food in terms of antioxidant capacity. Using a laboratory analysis called ORAC (Oxygen Radical Absorbency Capacity), it was found that prunes had more than twice the antioxidant capacity of other high ranking foods such as blueberries and raisins. With a score of 5770 ORAC units/ 100g, the antioxidant power of prunes also topped that of fresh plums, which scored 949 on the ORAC scale. Antioxidants are compounds that help protect cells from damage caused by free radicals, unstable molecules that result from normal cell metabolism, smoking, pollution and UV irradiation. Research suggests that excess free radicals may contribute to pre-mature aging, wrinkling of the skin, cardiovascular disease and certain types of cancer. Much of the antioxidant power of prunes can be attributed to the high levels of hydroxycinnamic acids (types of phenolic compounds) they contain. The hydroxycinnamic acids present in prunes include neochlorogenic and chlorogenic acids, both of which appear to be highly effective at scavenging free radicals. In addition to hydroxycinnamic acids, prunes and plums are rich in anthocyanins, flavonoid pigments with strong antioxidant properties. In addition, prunes and prune juice contain sorbitol (14.7 and 6.1g/ 100g, respectively). Sorbitol is a mild colonic stimulant that helps reduce the transit time of stool and consequently the risk of constipation, colorectal cancer and hemorrhoids. Also the neochlorogenic and chlorogenic acids present in prunes may improve their laxative action. A clinical study conducted at FSU (Florida State University) and published in Aging Research Review suggests that dried plums may be able to reverse osteoporosis in post-menopausal women. Those women that were asked to eat 100 grams of dried plums per day had improved bone formation markers after only three months, compared to a control group who were eating 75g of dried apples. These health benefits of prunes may be linked to their high concentration of the trace element B which is postulated to play a role in prevention of osteoporosis and osteopenia. A single serving of prunes (100g) fulfils the daily requirement for boron. Also the K found in prunes may help support bone health [4-13].

Dried prunes have been found to contain high doses of a chemical called acrylamide which is a known neurotoxin and a carcinogen. Acrylamide does not occur naturally in foods but is formed during the cooking process at temperatures > 100 °C. Although the common drying mechanism of prunes does not involve high temperatures, formation of high amount of acrylamide has been reported in dried prunes as well as pears. However, although acrylamide has known toxic effects on the nervous system and on fertility, a June 2002 report by the FAO (Food & Agriculture Organization) of the United Nations and the WHO concluded the intake level required to observe neuropathy (0.5 mg/kg body weight/day) was 500x higher than the average dietary intake of acrylamide (1 µg/kg body weight/day). For effects on fertility, the level is 2,000x higher than the average intake. From this, they concluded acrylamide levels in food were safe in terms of neuropathy, but raised concerns over human carcinogenicity based on known carcinogenicity in laboratory animals. Phytonutrients in plants can have powerful, health-promoting effects on the human body. The good news—prunes are literally teeming with these compounds. They contain several disease-fighting carotenoids, including - carotene, lutein, and zeaxanthin. In addition, prunes are brimming with anthocyanins, proanthocyanidins, phenols, and neochlorogenic acid. While all these nutrients work in unique ways in the body, they all have a common weapon against disease: their antioxidant ability. Antioxidants are crucial to good health because they fight harmful free radicals that can cause cellular damage. Modern research continues to confirm their power. Studies have shown that the particular antioxidants in prunes can help prevent prostate, cervical, gastric, lung, and breast cancer. That's not surprising when one consider prunes have a higher ORAC value (a measure of antioxidant activity) than the highly touted blueberry. The ORAC value of a 100 g serving of prunes is 8,059; the value for the same amount of cultivated blueberries is 4,669. And remember B, the prune's bone-building mineral? Amazingly it's also been found to be cancer preventive as well as a powerful cancer therapeutic. Several studies have shown it can help prevent prostate cancer and, in women who smoke, lung cancer. [Nutrients (per 100 g, about 10 to 12 prunes): Calories – 240; protein – 2.18g; fibre – 7.1g; Ca – 43mg; Fe – 0.93mg; Mg–41mg; K–732mg; B–0.3mg; niacin–1.9mg; riboflavin–0.18mg; Vit. K–59.5mcg, vit. A–781IU].



Figure 2a, b: Prunes & Dried Plums

Although rich in simple sugars, prunes do not cause a rapid rise in blood sugar levels, possibly because of their high fiber, fructose, and sorbitol content. Therefore, prunes have a low GI (Glycemic Index) rating of 29. The GL (Glycemic Load) of prunes is 9.57 (low). [5-14]. Prunes have a long-standing reputation as a remedy for constipation and as a nursing home staple. This rather dowdy image hardly suggests superfruit. But things are about to change. While prunes may not be the most glamorous fruit on the market, new research suggests they may be one of the healthiest. Let's take a look at why prunes deserve superfruit status. We all know prunes are nature's laxative. That's because they are high in insoluble fibre, the type that stays in the digestive tract absorbing water, making stools larger and easier to pass. But they aren't just a bulking agent. Prunes also contain a compound called dihydroxyphenyl isatin, which stimulates the intestine, causing it to contract. This process is essential for regularity and good gut health. In addition to insoluble fibre, prunes also contain an impressive amount of soluble fibre, the type that lowers cholesterol and with it the risk for heart disease. In fact, a recent study it was confirmed that diets high in fibre reduce the risk of mortality from all types of CHD (cardiovascular disease). But fibre isn't the only heart-healthy substance in prunes. The little wrinkly fruit is also chock full of potassium, a mineral known to help lower blood pressure. In addition, phenolic compounds, which inhibit the oxidation of LDL cholesterol, abound in prunes. At the forefront to over milk prunes are what our bones really need. In a surprising new study conducted at Florida State University, researchers discovered that eating 10 to 12 prunes/ day can actually reverse bone loss in postmenopausal women. The women who participated in the clinical study showed improved bone formation markers after only three months on the prune-enriched diet. Prunes work by stimulating osteoblasts, enabling them to promote new bone formation. It's believed that this may be due to prune's high B content. Boron helps regulate mineral metabolism and optimizes estrogen levels, which in turn increases calcium absorption. Additionally, boron helps convert vitamin D to its active form, which helps the osteoblasts utilize calcium for bone formation. Impressed? Consider this: the unheralded prune also contains other nutrients essential for bone health, such as K, Mg and vitamin K. Phenolics are constituents that can be found throughout the plant world. They are a major source of anti-oxidants, thus protecting our body against oxidative stress and cell aging. [in 100g of prunes/100g of prune juice – neochlorogenic acid; chlorogenic acid; caffeic acid coumaric acid; rutin – 131mg/22.5mg; 44mg/19.3mg; 0.9mg/0.3mg; 1.0mg/0.4mg; 3.3mg/0.4mg respectively]. One side benefit of phenolics for constipation is that they act as stimulating laxatives. They stimulate the enteric nerves and provoke peristalsis. The stools move faster in the colon, thus getting less dehydrated. [11-16]

Prunes and prune juice contain a fair amount of sugars. [In 100g of prunes/ 100g of prune juice – glucose; fructose; sucrose; sorbitol – 23.1g/0.01g; 13.1g/6.2g; 0.6g/0.0g; 14.7g/6.1g respectively]. This is not surprising of course, as they taste quite sweet. But when it comes to constipation, not all sugars are equal. The interesting one in the list is sorbitol, which makes prune juice for constipation remarkable. All the other sugars (glucose, fructose and sucrose) have a high rate of absorption in the gut. When the food residues reach the colon, those sugars have been digested. Not so for sorbitol. Its concentration remains high in the colon. It is not as digestible. We have seen in the introductory pages of this website that the colon absorbs water from the stools in order to avoid dehydration. Fluids are precious to our physiological processes and must be conserved. But sorbitol creates an opposing force. As the colon drives water from the stools back into our body, sorbitol drives water from our body into the colon. The water located in our colonic mucosa wants to dilute this high sugar concentration through what's called an "osmotic force". Sorbitol therefore reduces stool dehydration and combats constipation. Sorbitol is one of the main reasons why we are looking at prunes, and prune juice for constipation. Sorbitol is called a "non-stimulating laxative". It does not stimulate peristalsis (the forward, wave-like movement that gets things moving through our digestive tract), which is the role of a "stimulating laxative". Stimulating laxatives sometimes cause cramping too. Rather, sorbitol acts through fluid exchange in the colon [17-27].

Gastronomic Usage

Prunes are used in cooking both sweet and savory dishes. Stewed prunes, a compote, are a dessert. Prunes are a frequent ingredient in North African tagines. Perhaps the best-known gastronomic prunes are those of Agen (pruneaux d'Agen). Prunes are used frequently in Tzimmes, a traditional Jewish dish in which the principal ingredient is diced or sliced carrots; in the Nordic prune kisel, eaten with rice pudding in the Christmas dinner; and in the traditional Norwegian dessert fruit soup. Prunes have also been included in other holiday dishes, such as stuffing, cake, and to make sugar plums. Prune filled Danish pastries are popular primarily in New York and other parts of the US East Coast. Prune ice cream is popular in the Dominican Republic. Prunes are also used to make juice. In the Cotswolds, prunes were fermented to form a cider-like drink called jerkum. Due to the high sugar content of prunes, it was considered particularly potent as compared to contemporary ciders and beers. Prunes and their juice (Fig. 3a,b,c,d) contain mild laxatives including phenolic compounds (mainly as neochlorogenic acids and chlorogenic acids) and sorbitol.[2] Prunes also contain dietary fiber (about 7%, or 0.07 g/ of prune). Prunes and prune juice are thus common home remedies for constipation, however at least one review (by the EFSA) could not

find sufficient reliable evidence to either confirm or refute the efficacy of this remedy. Prunes also have a high antioxidant content [28-30].



Figure 3a, b, c, d: Prune Juices

3. Conclusion

With their dark and wrinkled skin, prunes may not be the prettiest fruits in the fruit stand, but there is no doubt that they are some of the healthiest foods one can eat. Prunes are rich in carbohydrates. They are also an excellent source of dietary fiber (7.1g/ 100g). Prunes contain very little protein and hardly any fat. Prunes are a good source of vitamin A and vitamin K. Prunes are a good source of K, Cu, B, Mg. Prunes are rich in phenolic compounds (184 mg/100 g) such as neochlorogenic and chlorogenic acids. Whether one are dealing with bowel movement problems or trying to lose weight, prunes are an ideal fruit that one should add to oner diet. Here are the benefits that prunes can bring to oner health. Aside from helping with constipation, prunes have also been found to protect the heart from diseases. Because of their high antioxidant content, prunes prevent cholesterol in the body from oxidizing, thus, preventing build-up of plaque in the arteries. Prunes also contain plenty of potassium that helps in lowering blood pressure. Scientists are also studying the presence of certain antioxidants in prunes that are not present in most foods. Prunes are also extraordinarily rich in vitamin A. In case of a post-menopausal woman or someone who is just about to enter her menopausal years then preventing osteoporosis should start being one of oner concerns. Studies conducted on animals showed that a regular supply of prunes can contribute to bone mass. Someone trying to lose weight then prunes should be part of oner diet. Because of their high fiber content, prunes are able to give one that full and satisfied feeling, which prevents one from overeating. Prune consumption appears to not only slow bone loss, but also reverses some types of BMD (bone mineral density) loss.

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