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Review Article

## CURATIVE EMINENCE OF POMEGRANATE

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The pomegranate—literally the ‘grained apple’—has received considerable scientific attention in the last decade; persuasively this study indicates that our interest in it is justified. Forty-nine contributors from laboratories in the United States (concentrating in California), Israel, Canada, Spain and India examined most aspects of the pomegranates’ chemistry, health effects (including hormonal and antimicrobial properties), commercialization and horticultural aspects (growth and postharvest biology). As one of the earliest domesticated fruit plants (probably from its indigenous regions in present-day Iran or Turkey or trans-Caucasus regions), ancient Mesopotamian and Indus-valley populations revered the pomegranate both as a food and medicine. It was not introduced to Egypt until the Middle Kingdom. The pomegranate fruit is packed with vitamins and minerals, including vitamins A, C and E, iron and potassium. Vitamin A is important for good vision in dim light and for healthy body linings, hair and nails. Vitamin C is essential for the production of collagen—the connective tissue making up cartilage, ligaments and joints. Furthermore, vitamin C promotes iron absorption from foods and speeds up wound healing. Vitamin E is an important antioxidant and may protect from heart disease. Iron is essential for healthy red blood cells, nervous system function and immune system function. Potassium is used for nerve transmission and muscle contraction. Most of these studies are laboratory, *in vitro* and *in vivo*, studies carefully crafted and judiciously concluded to present to the modern public the importance the pomegranate can bestow on health regimens and, in a few cases, therapeutics.

**Keywords:** Antioxidants, Flavonoids, Cancer, LDL, Superfruit Osteoarthritis, Heart disease

### INTRODUCTION

The word ‘pomegranate’ (*Punica granatum*) comes from the Latin for “fruit of many seeds.” In folk medicine, the fruit’s astringent properties have

been used to treat various ailments (cuts, sore throats, tapeworms, dysentery, and gum disease). Pomegranate juice is marketed in the United States as a major source of antioxidant nutrients

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that protect against heart disease and other ailments. Recent research has focused on its potential use as a treatment for cardiovascular disease, diabetes, and various forms of cancer. The author examines those properties of the pomegranate, as well as its history and nutritional and chemical makeup. Pomegranates are believed to be native to the areas from eastern Iran through northern India, say the authors. More than a dozen cultivars of the fruit ("Wonderful" being the leading commercial cultivar in the United States) have been grown commercially in California's San Joaquin Valley since its introduction by Spanish settlers in the late 18th century. Pomegranates are a good source of vitamin C, providing between 10-20% of the recommended daily allowance according to one source<sup>1</sup> and up to 40% according to another. The potent antioxidant properties of the fruit have been attributed to its high content of soluble polyphenols. When tested *in vitro* on normal and colon-cancer cell lines, the juice was found to have superior antioxidant, antiproliferative, and proapoptotic effects compared with single purified active ingredients, probably the result of synergistic actions among the fruit's multiple compounds. Studies have shown that the antioxidant activity of the pomegranate flowers

yielded activity two to three times the antioxidant potency of tea or red wine.

The authors note research suggesting that pomegranate juice may be cardioprotective, reducing risk factors (such as cholesterol accumulation, foam-cell formation in macrophages, and oxidized low-density lipoprotein [LDL]) without affecting native LDL. Cited by the author is an Israeli study in which 10 patients with carotid artery stenosis (advanced plaque build-up in the arteries) drank pomegranate juice and experienced reduced blood pressure, LDL oxidation, and progression of carotid lesions at 1-year and 3-year study intervals. In a randomized, double-blinded, placebo-controlled study at the Preventive Medicine Research Institute in Sausalito, CA, pomegranate juice drinkers with coronary artery disease had a 17% improvement in blood flow compared with an 18% worsening in the control group. The study team concluded that the antioxidants in the juice may help prevent the formation of fatty deposits on artery walls. In studies of the fruit's anticancer effects, pomegranate fruit extract (PFE) has been found to be chemopreventive in mouse mammary organ culture and in human breast cancer cells *in vitro*. In another study cited by the author, researchers at the University of Wisconsin in Madison found that PFE significantly reduced serum prostate-specific antigen levels and inhibited proliferation of aggressive human prostate cancer cells in athymic mice. Pomegranate extracts have exerted antiproliferative, antiestrogenic, and proapoptotic actions on leukemia cells as well as breast- and prostate-cancer cells.

Results of studies with diabetic patients have shown that supplementing the diet with

pomegranate juice had beneficial antioxidant effects on macrophages, implying that it could reduce the development of atherosclerosis. Australian researchers found that pomegranate flower extract reduced factors (hyperglycemia, hyperlipidemia, and a fatty heart) that can result in increased cardiac-impairing fibrosis in patients with type 2 diabetes. Other studies have shown the benefits of pomegranate in promoting neurologic health, maintaining joint integrity and function, exhibiting estrogenic properties, blocking herpes simplex virus replication and adsorption, enhancing immune function, treating periodontal disease, enhancing the activity of antibiotics used to treat methicillin-resistant and methicillin-sensitive *Staphylococcus aureus* infections, and preventing smooth muscle dysfunction and fibrosis in erectile dysfunction. The authors also mention other uses of the fruit. In Ayurvedic medicine, the astringent properties of pomegranates are linked with bone and cartilage build-up; in the cosmetic arena, fruit-peel extract has been shown to stimulate a type of procollagen synthesis and inhibit a dermal degeneration process. The antioxidant, immune-boosting, and anticarcinogenic properties of the pomegranate, says the author, offers multiple potential medical applications.

All parts of the small tree were subjected to mass spectrometric analysis and many molecular structures are identified and diagrammed. Commercial pomegranate juice, made from the whole plant, reveals antioxidant capacities three times higher than that of red wine or green tea. All tree parts possess antioxidant activities but most powerful were the pomegranate's tannins from bark and stem. Also some studies indicate that this plant has strong anticarcinogenic properties for oral, colon and prostate cancer cell

inhibitions. Additionally, whole pomegranate has three active flavonoids that stimulate production of estrogen, a natural steroid, in actions perhaps similar to soy and licorice. Pomegranate seed beneficially treats diarrhoea, and an extract from its peel promotes wound healing. It is not enough to identify the chemical agents per se, but also to investigate the pomegranate's bioavailability and metabolism—which one study did, primarily with rat populations. Pathways are explored; in rat populations, no toxic effects were found in liver or kidney damage when high oral dosages of pomegranate punicalagin, a pharmacological compound, were administered.

Punicalagin is responsible for the potent antioxidant effects to minimize low-density lipoprotein (LDL) cholesterol and, as a bonus, to inhibit arteriosclerosis in mice and humans. The antioxidants lessen hypertension. One study presents a helpful diagram showing the major pathways by which pomegranate polyphenols reduce macrophage formation associated with advanced arteriosclerosis. Studies with rats show that dietary intake of pomegranate juice reduces ischemic strokes, presumably by improved vascular function. Some studies indicate a beneficial application for human breast cancer; most attention in pomegranate therapeutic applications concentrates on aggressive human prostate cancer by hypothesizing that the cholesterol homeostasis breaks down in the organ with aging and contributes to the induction of malignancy. A separate study by an Indian team explores the pomegranate's chemical constituents for dietary interruption of cell proliferation and differentiation in cancer prevention notably for skin, lung and prostate cancers. While the research is promising, these researchers enter a call for more research. In

line with this call, two California investigators followed human trials of pomegranate juice and concluded that it is “a promising chemopreventive strategy” and a “novel therapeutic agent” for patients with prostate cancer.

There are four biochemistry studies which explore the traditional use of pomegranate for its estrogenic qualities (fertility enhancers and inhibitors and hormonal effects) and its antimicrobial activities. Conclusions of one study were carefully guarded, since the pomegranate’s pathways as a food and dietary supplement are yet to reach definitive results; the study’s research, however, is promising in its chemical identifications and pathway hypotheses. Another human trial study of women ingesting pomegranate juice intake for one week recorded a”significant increase in the production of estrone, a form of estrogen, in postmenopausal women. This study called for a longer-term determination of a cumulative effect because only a single week of ingestion was measured. Since phytoestrogens probably reduced the risk of cardiovascular diseases, endocrine-related cancers and hot flashes, more research is clearly indicated. The study covers the antimicrobial activities of pomegranate with the specific pathogens that could be promising for antifungal, antiviral and antidiarrheal Pomegranate is a new superfruit

The term ‘superfruit’ refers to a fruit which is not only rich in nutrients and antioxidants, but that also has the potential to be beneficial to overall health by affecting the cellular and molecular structure.

Right now pomegranate, the hard red fruit with its innumerable red seeds is being hailed as the superfruit of today and tomorrow, due to its high

content of antioxidants which packs a healthy punch in the wellbeing department.

Pomegranate is packed with superpower qualities like;

- Pomegranates are said to have three to seven times more antioxidant value than green tea and red wine.
- With an estimated 25 grams of sugar from the whole fruit and resulting in just 110 calories pomegranate is an ideal choice for calorie conscious folks.
- Pomegranate juice provides 16% of your daily Vitamin C requirement, per 100 ml.
- It is also a good source of Vitamin B5, potassium and fiber.
- Extracts such as ellagic acid from pomegranates are used in many dietary products.
- Fresh pomegranate juice is made up of 0.2 - 1% soluble polyphenolic flavonoids, 85% water, 10% total sugars, and 1.5% pectin, and ascorbic acid.

All these numbers went above your head? No worries, lets break it down for you.



## POMEGRANATE - THE ANTI-OXIDANT SUPERPOWER

A drink of pomegranate juice Pom Wonderful which has recently entered the market, describes itself as “The Antioxidant Superpower” and this is exactly what this fruit envisages – a superfruit with antioxidant properties that gives it superpowers!

These antioxidant superpowers are due to its high content of flavonoid and anthocyanidin antioxidants. It also contains polyphenol flavonoids which include catechins, ellagic tannins, and gallic and ellagic acids. The antioxidant composition and capacity may vary between pomegranate juice, peel and seeds. A study showed the presence of higher antioxidant activity in the peel than the juice of pomegranate.

Because of this basket of antioxidants present in pomegranate fruit, peel and seeds, it makes an ideal free-radical scavenging solution. The antioxidants act by scavenging free radicals (molecules with one or more unpaired electrons which rapidly combine with other molecules, starting chain reactions in a process known as oxidation). Free radicals are a normal product of metabolism and the body produces its own set of antioxidants (e.g. beta-carotene, vitamin C, vitamin E) to counteract the ill effects of free radicals. But sadly our body does not produce sufficient antioxidants to combat the deleterious effects of stress, aging, and environmental sources such as polluted air and cigarette smoke.

Hence these highly reactive free radicals damage healthy cells and have been linked to changes that accompany aging (such as age-related macular degeneration, a leading cause of blindness in older people) and with disease

processes that lead to cancer, heart disease, and stroke.

Pomegranates help combat just that... and studies have proved that pomegranate contains more antioxidants than green tea, cranberries and even red wine!

In a pilot study of 19 aged patients with atherosclerosis, the administration of pomegranate juice, was shown to reduce the build-up of arterial plaque by up to 30% and was found to be 60% more efficient than other juices in the prevention of the formation of plaque which resulted in the formation of oxidized LDL in the arteries.

## THE HEALING AND CURATIVE PROPERTIES OF POMEGRANATE

Not satisfied? Lets innumerate a few studies explaining the healing and curative properties of this superfruit with regards to these diseases;

**Cancer:** Studies show that pomegranates may be effective in fighting cancers of the breast, skin and prostate. This is due to the presence of flavanoids in high levels. These flavanoids are a type of antioxidant that has been researched to be highly effective in neutralizing cancer-causing free radicals.



**Heart Disease:** the antioxidant properties of pomegranates have been found to improve blood flow to the heart by more than a third. This is because the antioxidants present prevent the formation of bad cholesterol, hence rendering the arteries clear of plaque, thereby reducing the risk of heart attack and stroke.

**Osteoarthritis:** Research suggests that pomegranate extracts could prevent the onset of osteoarthritis. Scientists in America have found that it inhibits the production of the enzyme responsible for causing damage to cartilage.

### **Blood Pressure**

According to the May 2011 issue of 'Complementary Therapies in Clinical Practice,' pomegranate juice may reduce blood pressure through the inhibition of serum angiotensin converting enzyme. This enzyme produces a substance which constricts the arteries, therefore increasing blood pressure. Inhibition of this enzyme is also the mode of action of a class of anti-hypertensive drugs, known as ACE-inhibitors.

**Antioxidant and Anti-Inflammatory:** These key properties of pomegranate extract have been proved to have significant therapeutic benefits with regards to a vast number a diseases. The antioxidant constituents of pomegranate are known to be highly effective due to it being rapidly absorbed by the body and its non-toxicity.

**Helps Resist Brain Injuries in Babies:** pomegranate juice administered to expectant mothers who are most likely at the risk of premature birth, has been studied to help their babies combat brain injuries caused due to reduced oxygen and blood flow.

**Skin Cancer:** The antioxidant qualities in pomegranate extract possesses anti-skin-tumor-

promoting effects and are hence effective in fighting diseases like skin cancer.

What is clear from all this research is that it is truly the antioxidant properties of this fruit which is effective in fighting these diseases?

This fruit is being envisioned as cure for a variety of diseases ranging from Alzheimer's, cancer, heart disease, arthritis and even aging. It is known to cure just about anything that can ail an aging senior citizen. It has become a popular ingredient for mixed drinks, ice cream and even bottled water and The Centers for Disease Control honored it by naming it the fruit of the month.

That is a lot of beneficial qualities for a fruit that was once looked down upon for being tedious to consume because of its innumerable seeds.

So is there anything pomegranate can't do or can't cure? I believe not, because the root cause of many of today's lifestyle diseases is due to the unstoppable number of free radicals being produced in our bodies. And pomegranate in every form is your one-stop solution to all these problems.

Therefore it is evident that including pomegranate in your daily diet is your shot at a healthy life and a healthy body. Who knows, the popular quote may soon be changed to, "A pomegranate a day, keeps the doctor away"!

### **CONCLUSION**

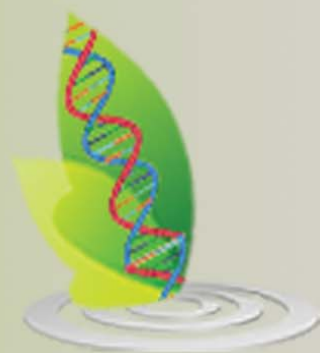
This review should be celebrated as the thorough study of the state of science about a single plant. Strangely, given the subtitle, "ancient roots to modern medicine," the least reviewed aspect is the pomegranate's historical use. Its biochemistry,

therapeutics, nutritional and horticultural dimensions compensate for this minor deficiency. The ancients knew well what we are rediscovering; the pomegranate is one of nature's greatest fruit plants. So let us toast these investigators for their talented scholarship with a pomegranate martini—but hold the gin!

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