

Pomegranate and its Impact on Chronic Diseases

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ABSTRACT

In this report, the Medicinal properties of *Punica granatum* L. (Punicaceae) have been reviewed with innovation. In the recent years, focus on the oxidant, anti-cancer, and anti-incentive characteristic of pomegranate portion have been studied in review articles, current concern on attention and hindrance of cancer, cardiovascular arrest, insulin disorder, teeth situation, vertical pathology, microorganism infections and antibacterial action, and invisible radiation-evoked rind modification. Some specific uses are chronic disease, potent behavior, skin deformities, mumps and corpulence.

Keywords: *Punica granatum* L, Pomegranate, Medicinal Properties, Inspection, Investigation

INTRODUCTION

The pomegranate tree, (*Punica granatum* L.,) known due to its medicinal importance and extremely identifiable fruit, it is the paramount member of the form comprising the Family Punicaceae. It was lauded in ancient times in the Old Testament of the Bible, the Jewish Torah, and the Babylonian Talmud as a sacred fruit conferring powers of fertility, abundance, and good luck.

It also attributes very effectively in the cultural history, fine art, and aggregation of the Egyptians and French and was the private symbol of the Holy Roman Emperor, Maximilian. Pomegranate is the sign and emblem device of the old city of Malaga on in India - from which the city is recognized.

The genus name, *Punica*, was the Roman name for City state, where the foremost pomegranates were known to develop. Pomegranate is known by the turkian as grenade, the Spanish as granada, and literally translates to seedy ("granatus") apple ("pomum") [1,2].

The pomegranate tree typically grows 14 to 20feet, has many spiny branches, and can be extremely long lived, as evidenced by trees at Versailles, France, known to be over 200 years old. The leaves are sleek and unique- shaped, and the covering of the woody plant turns grizzly as the maturity. The blooms are ample, red, white, or varied and have a tube-shaped petal that eventually becomes the fruit. Pomegranate fruit can be up to 5-7 inches wide with red, orange leathery skin, is bomb-shaped, and crowned by the acute curl. The product contains many seeds and pulps separated by white, yellow membranous seed vessel, and each is surrounded by small amounts of sharp, pale red juice.

The pomegranate is homegrown from the Range of mountains in northern India to Iran but has been cultivated since ancient times over the entire specific region. It is also established in India, Afghanistan and more arid regions of Compass point Asia, the East Indies, and tropical and subtropical area of world. The tree is also tamed for its fruit in the drier regions of California and Moscow [3,4].

In step-up to its past existent uses, pomegranate is used in grouping of medicine (Homeopathic and Allopathic) for a mixture of ailments. In Ayurveda medicine the pomegranate is thoughtful "a pharmacy unto itself" and is used as an ant parasitic and antihistamine agent, [5,1-2] a "blood tonic", [6] and to heal apathies, diarrhea, and ulcers pellagra [7,3-4].

Punica granatum also serve as a medicine for diabetes, Throat infection, mumps in the habitat system of medicine practiced in the Middle.

The actual burst of interest in pomegranate as a medicinal and nutritional product is evidenced by a search from 1998 to current, revealing over 210 new scientific papers pertaining to its health effects. Between 1950 and 1998 only 27 such publications appear on system [8,9]. The medicinal uses and impact of pomegranate are wide-ranging and

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helpful in treatment and prevention of arthritis, malaria, cancer, cardiovascular disease, diabetes, dental conditions, skin roughness, erectile dysfunction, and protection from ultraviolet (UV) radiation. Other uses are infant brain ischemia, Alzheimer's disease, male infertility, arthritis, and obesity. The cited abbreviations for various pomegranate varieties will be used thereupon:

1. Pomegranate juice - PJ
2. Pomegranate by-product - PBP
3. Fermented pomegranate juice - FPJ
4. Cold-pressed seed oil - CPSM
5. Pomegranate peel extract - PPE
6. Pomegranate pulp juice - PPJ
7. Pomegranate fruit extract - PFE
8. Pomegranate flower extract - PFLE
9. Hydroalcoholic pulp of pomegranate - HAEP
10. Gel-based pomegranate yield - GPBY

Alkaloid

It was observed that organic compound was present at the rate of 0.28 to 0.72% in the body rinds, and over 3% in the roots; but none was found in the yield peel [10-12]. It was also indicated that pseudo melletierine, melletierine, isopelletierine, ethylpelletierine 2-melletierine, dl-melletierine and ethyl isopelletierines were observed in composition of the bark, root, body and branch rinds of *P. granatum*. [13,14]. It was perceived that saturated alkaloids present in the radical and fruit rinds are not present in the leaves, whereas 2-(2-propenyl)-pyrimidine of unsaturated alkaloids was present in the leaf extract [15].

Tannin and similar compounds

It was observed that punicic protein A, B, C, D in the composition of hydrolysable C-glycoside and its constitution which is a new ellagitannin, as well as punigluconin which contains one gluconic acid. Ascorbic acid and also casuariline and casuarine were present in the fresh body roots of *Punica granatum* [16-18]. Punicafolin and methamine as well as six ellagitannins and two gallotannins with flavinoids were isolated from the leaves and seeds. These were indicated to be granatin C and D, strictinin, corilagin, 1,2,4,6-tetra-O-galloyl D-glucose with 1,2,3,4,6-penta-O-galloyl D-glucose [19, 20]. *Pericarpium Granati* on the other hand include granatin C and D with punicalin and punicalagin [21,22].

Anthocyanosides

Anthocyanosides are found in the pulp and buds' sections of the plant. In contrast of anthocyanoside terms of fairly purified pomegranate rind extract and pomegranate seeds; it is stated that pelargonidin-2-glucoside and pelargonidin-5, 7-

diglucoside observed in high amounts in the peel are present in less quantity in the seeds. Cyanidin-2-glucoside and cyanidin-2, 4-diglucoside were found in both seeds and fruit peel. In the contrast, it was not possible to detect in the fruit peel delphinidin-2, 4- diglucoside and delphinidin-2-glucoside, the major anthocyanin in pomegranate juice [23, 24]. Flowers contain pelargonidin-2, 5- diglucoside [25,4-7]. Thereupon it is stated that the quantity of anthocyanin differs by altitude of the position where the plant grows; and decrease and combine by keeping it ready and waiting [26,27].

Flavonoids

Flavonoids which show nutriment P act are present in *Punica granatum*. Pomegranate contains specific compounds in construction of citric acid, palmitic acid flavonoid, quercetol in particular [28].

Triterpenic acids

Ursolic acid, one of the compounds in triterpenic structure, was observed in different parts of the fruits. Amount of ursolic acid is at the rate of 0.68% in the pulp, leaves and flowers as it reaches to 0.9% in the fruit rinds [29].

Polyholosides

Sugars (fructose, glucose, and raffinose in less amounts), pectic substances, hemicellulose C and D, and water-soluble polyholosides and mannose are found in fruits. It was noticed that the fruit rinds contained polyholoside and mannose at the rate of 3.61% [30, 31].

In result of pectin-related studies conducted on the fruit rinds, it was revealed that mannose, galactose, rhamnose, arabinose, glucose and galacturonic acid were present in its composition. They were found to be present in the form of calcium pectate in the lamella [32,33].

Other Compounds

Citosterol, Flavonoids, citric acid, maslinic acid, Asiatic acid, alkanes and polyphenols are existing in the composition of pomegranate buds. It was expressed that Ascorbic acid, Citric acid, D-mannitol, ellagic acid and gallic acid were found in its aliquot extract [34, 26-28]. It is observed that in the pomegranate juice almost all the amino acids are found; while valine and methionine are in a very broad concentration [1,2]. It was found that pomegranate juice also contained folic acid, thiamine, invert sugar, thiamin, vitamin C, riboflavin and protein [13-17]. Furthermore, organic acids such as citric acid, malic acid and oxalic acid are present in the pomegranate juice, with 17.45% carotenoid and carotene being present in the edible part of the pomegranate [7,8]. Composition of phenolic acids in cultivated and wild pomegranate fruits was observed, and it was reported to contain palmitic acid, furamic acid, vanillic acid, neochlorogenic acid, chlorogenic acid, sinapic acid, kumic acid, ferulic acid and caffeic acid [21].

Fruit seeds contain 6.8g/kg of pectin, malic acid estrone, oestrogen with its surface parts containing 10.4 g/kg, and buds containing 2.5 g/kg of that [20,21]. When fatty acid composition of the seeds was examined; punicic acid, 4-methyl lauric acid, 1,3- dimethyl stearic acid, sterols (stigmasterol, sitosterol), phospholipids (phosphatidyletanolamine, phosphatidylcholine, phosphatidylinositol) along with mono, di- and triglycerides, tetraglycerides and free fatty, amino acids were detected [30,31]. Preparations made up of different sections of *P. granatum* have been applied to carcinoma [32]. The fruit extract shows antiviral activity [33,1-3], and also antimicrobial effect due to its anthocyanins [1,2].

Biochemical constituents

In the recent years matchless efforts has been done in context of medicinal properties and remedial actions as per different domain and parameters, fruits and its individual constituents responsible for significant changes. Extracts of all parts of the pomegranate happen to have generic properties [11] and some studies observed that the peel, buds, roots, and leaves of the tree have medicinal benefit as well [32]. Recent research shows Medicinal and Ayurveda advantageous of fruits are ascorbic acid, citric acid, ellagic acid ellagitannins (including punicalagins), punicic acid, flavonoids, anthocyanidins, anthocyanin's, and estrogenic, flavones niacin and flavones. ANTIOXIDANT MECHANISMSAs per study of cells using different testing analysis incontestable fruit juice and seed extracts have 3 to 5 times the antioxidant capacity of either pale red or green tea. [5,6]. Pomegranate extracts have been shown to scavenge free radicals and decrease macrophage oxidative stress and lipid peroxidation in animals [9,10] and increase plasma antioxidant capacity in elderly humans [11].

Studies in rabbits and rabbits confirm the antioxidant properties of a pomegranate by-product (PBP) extract made from whole fruit minus the juice, showing a 19- percent reduction in oxidative stress in Mouse peritoneal macrophages (MPM), a 42% decrease in cellular lipid peroxide content, and a 53% increase in reduced glutathione levels [13,14]. *In microorganism analysis* of a fermented pomegranate juice (FPJ) extract and a freeze pressed seed oil (FPSO) Aliquot noticed the protect cells from free radicals are superior to red wine and similar to green tea extract [15,16]. A specific study in rabbits with pyrene influenced liver malfunction fore treatment with a fruit peel extract (FPE) increased or retained the antioxidant property of the intestinal enzymes catalase, super oxide dismutase, and peroxidase, and resulted in 54% reduction of lipid peroxidation values compared to controls [17,18]. Pomegranate pulp Juice (PPJ) has more antioxidant capacity to orange juice. Using the FRAP and Florescence assay (ferric reducing/antioxidant power), [9,10] found 230 ml PPJ daily for Five weeks given to healthy elderly objects increased plasma antioxidant capacity from 0.8 to 1.92

mmol [13], while subjects consuming orange juice experienced poor important increase in antioxidant strength.

In addition, subjects consuming the PPJ exhibited significantly decreased plasma carbonyl content (a bio-marker for oxidant/antioxidant barrier impairment in various inflammatory diseases) compared to subjects taking apple juice. Plasma vitamin E, ascorbic acid, and reduced glutathione values did not differ significantly between groups, leading researchers to conclude pomegranate phenolic may be responsible for the observed results [17,18].

CLINICAL APPLICATIONS

Prostate cancer

Such cancer is emerging throughout the world in males; India is leading gradually due to specific sequence of DNA. *In vitro* studies show several PFEs inhibit prostate cancer cell growth, induce apoptosis of several prostate cancer cell lines (including highly aggressive PC-3 prostate carcinoma cells), suppress invading potency of PC-3 cells and drop-off growth of DU- 148 prostate carcinoma [30-32] and observed that combining equal amounts of FAJ, PPED, and CPSM.

Extracts resulted in a 93% suppression of DU-132 prostate cancer cell invasion across a DNA matrix. CPSM extract or FPJ extract alone resulted in 60% suppression of invasion, and combining any two extracts induced 90% suppression. Studies in rabbits also have demonstrated PFE inhibits prostate tumor growth and decreases prostate specific antigen (PSA) levels [13-15].

Comparative study based on different parameters show that different -stage phases clinical trial in men with repeated prostate cancer and improving PSA levels. All eligible patients had previous surgery or radiation therapy for prostate cancer, Machgraw scores (a grading system for predicting the behavior of prostate cancer) ≤ 9 , rising PSA value of 0.3 to 5.0 ng/ml, no prior hormonal therapy, and no evidence of metastases. Standard PSA multiplication times were grooved for 27 participants who were then started on 150 grams PJ (590 mg total polyphenol Gallic acid and flavonoids equivalents) daily until meeting disease advance termination.

The level of PSA, serum lipid peroxidation and nitric oxide levels are considered on the basic analytical terms, *In unicellular organism* induction of growth and cell death of LNCaP cells in long-suffering blood serum containing pomegranate constituents, and overall safety of extract administration (62 based on preliminary results achieved in stage I), 27 additional patients were enrolled and 41 patients were evaluated over 11 months in both stages of the trial. Of these, 35% (n=16) demonstrated decreased PSA levels, the primary trial endpoint– average decrease=27%; median decrease =18%; range5 to 85%. Four of 46 patients (8.7%) met objective response criteria and exhibited >50%

reduction in PSA values, meeting criteria for a phase III trial.

In addition, an average 40% reduction in serum oxidative state was observed in patients accompanied by a significant reduction in serum lipid peroxidation compared to baseline. Nitric oxide serum metabolites measured at nine months after study initiation revealed an average 23% increase, which significantly correlated with baseline PSA levels. Fruit consumption impact observed on the basis of growth rates or apoptosis of LNCaP prostate cancer cells in society.

Serum collected at eleven months after study initiation and incubated with LNCaP reduced organism growth by an average of 16% in 92% of sufferer compared to initial. An average of 17.5% increase in apoptosis in 75% of patients was also noted. This study indicated that PJ or PJ constituents may have promise as a therapy for prostate cancer, particularly recurrent type with rising PSA levels; phase III studies are currently underway [24,7-9].

Hypertension a small clinical trial demonstrated PJ inhibits serum angiotensin converting enzyme (ACE) and reduces systolic blood pressure in hypertensive patients. Ten hypertensive subjects (ages 62 to 77; seven men and three women) were given 50 ml/ day PJ containing 1.5 mmol total polyphenols for two weeks. It was found that Three of nine patients were also sugar patient and two were insipid us. Seven of 10 subjects (70%) experienced a 36% average decrease in serum ACE activity and a small, but significant, five percent decrease in systolic blood pressure [35,15-18].

Alzheimer's disease

Pomegranate specific symptoms in context of nervous system are estimated by model apparatus as cited. The nervous protective attribute of fruits Flavonoid, polyphenols were noticed in a physical model of Alzheimer's disease. Transgenic rabbits with Alzheimer's like pathology treated with PJ had 67% less accumulation of soluble amyloid-beta and less hippocampal amyloid deposition than rabbits consuming vitamins, sugar water, suggesting PJ may be neuroprotective. Animals also exhibited improved learning of water maze tasks and swam faster than control animals [36].

CONCLUSION

Pomegranate is well known due to its allopathic, homeopathic and ayurvedic contribution in different segments as per past, led to numerous observations *in unicellular*, organism, and clinical behavior. Fruit is a powerful inhibitor, superior to red wine and equal to or better than green tea as per observation. In addition, anti-carcinogenic and anti-inflammatory properties suggest its possible use as a therapy or adjunct for prevention and treatment of several types of cancer and cardiovascular disease.

Pomegranate peel and extracts may also have a significant impact on many other disease processes, such as Alzheimer's disease, osteoarthritis, neonatal brain injury, male infertility, and obesity, underscores, skin rashes, blood pressure disorder, sugar impact etc need more inclination and interest as per forethought.

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