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## Review On: "The Aspects of Punica Granatum"

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### ABSTRACT:

Pomegranate (*Punica granatum*) is an ancient fruit with exceptionally rich ethno medical applications. The peel (pericarp) is well regarded for its astringent properties; the seeds for conferring invulnerability in combat and stimulating beauty and fertility. Pomegranate seed oil, but not aqueous extracts of fermented juice, peel or seed cake, was shown to stimulate keratinocyte proliferation in monolayer culture. In parallel, a mild thickening of the epidermis (without the loss of ordered differentiation) was observed in skin organ culture. The same pomegranate seed oil that stimulated keratinocyte proliferation was without effect on fibroblast function. In contrast, pomegranate peel extract (and to a lesser extent, both the fermented juice and seed cake extracts) stimulated type I procollagen synthesis and inhibited matrix metalloproteinase-1 (MMP-1; interstitial collagenase) production by dermal fibroblasts, but had no growth supporting effect on keratinocytes. These results suggest heuristic potential of pomegranate fractions for facilitating skin repair in a polar manner, namely aqueous extracts (especially of pomegranate peel) promoting regeneration of dermis, and pomegranate seed oil promoting regeneration of epidermis.

**Key words:** Pomegranate, *Punica granatum*, Dadham (Gujarati), Anar (Hindi)

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### INTRODUCTION:

A Pomegranate is a very useful and important pharmacological fruit. It is a fruit which bears deciduous shrub or small tree growing up to 8 meters tall. The Pomegranate is native to the Caucasus, the Himalayas in North Pakistan and Northern India {Kashmir, Punjab, Himachal Pradesh etc}<sup>[1]</sup>

The great thing of pomegranate fruit is that the trees on which it grows can live for many years. Aside from being a great décor for a backyard it produces the delicious pomegranate fruit. Pomegranate fruit have a round, spherical shape. Inside, you'll find dozens of small ruby-colored seeds. The pomegranate fruit has a citrus flavor and is very juicy. There are many drinks and even foods that are made with the pomegranate fruit.

This fruit is now becoming more useful and popular can be found in supermarkets in a variety of forms. The most popular is pomegranate juice but there are also pomegranate jellies, pomegranate wine, and even pomegranate salad dressing. The wide adoption of the pomegranate is due to recent studies that have shown that the fruit contains a high amount of antioxidants that are beneficial to our health in many ways<sup>[2]</sup>

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**Figure 1: Pomegranate Fruit** <sup>[3]</sup>

It has a long history of use as food and medicine in Asia and South America. In the United States, pomegranate is juiced or is used as food. Pomegranate may have medicinal use as an anthelmintic and antidiarrheal agent, although many reports are conflicting. Several sources note that the fruit rind of pomegranate is actually contraindicated in diarrhea (1;2;3). The seeds may have phytoestrogenic qualities and may be used in hormonally-related conditions, such as menopause {women's problem}. <sup>[2]</sup>

#### **DESCRIPTION:**

The leaves are opposite or sub-opposite, glossy, narrow oblong, entire, 3-7 cm long and 2 cm broad. The flowers are bright red and 3 cm in diameter, with four to five petals (often more on cultivated plants). Some fruitless varieties are grown for the flowers alone. The edible fruit is a berry and is between a lemon and a grapefruit in size, 5-12 cm in diameter with a rounded hexagonal shape, and has thick reddish skin and around 600 seeds. Each seed has a surrounding water-laden pulp the edible aril ranging in color from white to deep red or purple. The seeds are embedded in a white, spongy, astringent pulp. <sup>[4]</sup>

#### **Growth Habits:**

The pomegranate is a neat, rounded shrub or small tree that can grow to 20 or 30 ft., but more typically to 12 to 16 ft. in height. Dwarf varieties are also known. It is usually deciduous, but in certain areas the leaves will persist on the tree. The trunk is covered by a red-brown bark which later becomes gray. The branches are stiff, angular and often spiny. There is a strong tendency to sucker from the base. Pomegranates are also long-lived. There are specimens in Europe that are known to be over 200 years of age. The vigor of a pomegranate declines after about 15 years, however. <sup>[4]</sup>

**Foliage:** The pomegranate has glossy, leathery leaves that are narrow and lance-shaped.

**Flowers:** The attractive scarlet, white or variegated flowers are over an inch across and have 5 to 8 crumpled petals and a red, fleshy, tubular calyx which persists on the fruit. The flowers may be solitary or grouped in twos and threes at the ends of the branches. The pomegranate is self-pollinated as well as cross-pollinated by insects. Cross-pollination increases the fruit set. Wind pollination is insignificant. <sup>[4]</sup>

**Fruit:** The nearly round, 2-1/2 to 5 in. wide fruit is crowned at the base by the prominent calyx. The tough, leathery skin or rind is typically yellow overlaid with light or deep pink or rich red. The interior is separated by membranous walls and white, spongy, bitter tissue into compartments packed with sacs filled with sweetly acid, juicy, red, pink or whitish pulp or aril. In each sac there is one angular, soft or hard seed. High temperatures are essential during the fruiting period to get the best flavor. The pomegranate may begin to bear in 1 year after planting out, but 2-1/2 to 3 years is more common. Under suitable conditions the fruit should mature some 5 to 7 months after bloom.

#### **CULTURE**

**Location:** Pomegranates should be placed in the sunniest, warmest part of the yard or orchard for the best fruit, although they will grow and flower in part shade. The attractive foliage, flowers and fruits of the pomegranate, as well as its smallish size make it an excellent landscaping plant.

**Soil:** The pomegranate does best in well-drained ordinary soil, but also thrives on calcareous or acidic loam as well as rock strewn gravel.

**Irrigation:** Once established, pomegranates can take considerable drought, but for good fruit production they must be irrigated. To establish new plants they should be watered every 2 to 4 weeks during the dry season. The plants are tolerant of moderately saline water and soil conditions.

**Fertilizing:** In the West, the trees are given 2 to 4-ounce applications of ammonium sulfate or other nitrogen fertilizer the first two springs. After that very little fertilizer is needed, although the plants respond to an annual mulch of rotted manure or other compost.

**Pruning:** Plants should be cut back when they are about 2 ft. high. From this point allow 4 or 5 shoots to develop, which should be evenly distributed around the stem to keep the plant well balanced. These should start about 1 ft. from the ground, giving a short but well-defined trunk. Any shoots which appear above or below should be removed as should any suckers. Since the fruits are borne only at the tips of new growth, it is recommended that for the first 3 years the branches be judiciously shortened annually to encourage the maximum number of new shoots on all sides, prevent straggly development and achieve a strong well framed plant. After the 3rd year, only suckers and dead branches are removed.



**Figure 2: pomegranate tree**



**Figure 4: pomegranate arils (seeds)**



**Figure 3: pomegranate sepals**



**Figure 5: white pomegranate**

**Propagation:** The pomegranate can be raised from seed but may not come true. Cuttings root easily and plants from them bear fruit after about 3 years. 12 to 20 inches long cuttings should be taken in winter from mature, one-year old wood. The leaves should be removed and the cuttings treated with rooting hormone and inserted about two-thirds their length into the soil or into some other warm rooting medium. Plants can also be air-layered but grafting is seldom successful.

**Pests and Diseases:** Pomegranates are relatively free of most pests and diseases. Minor problems are leaf and fruit spot and foliar damage by white flies, thrips, mealy bugs and scale insects. The roots are seldom bothered by gophers but deer will browse on the foliage

**Harvest:** The fruits are ripe when they have developed a distinctive color and make a metallic sound when tapped. The fruits must be picked before over maturity when they tend to crack open, particularly when rained on. The pomegranate is

equal to the apple in having a long storage life. It is best maintained at a temperature of 32° to 41° F. and can be kept for a period of 7 months within this temperature range and at 80 to 85% relative humidity without shrinking or spoiling.

**Commercial Potential:** The primary commercial growing regions of the world are the Near East, India and surrounding countries and southern Europe. In California commercial cultivation is centered in the southern San Joaquin Valley. Consumer demand in this country is not great.

**Table 1 NUTRITIONAL VALUES OF POMEGRANATE** <sup>[5]</sup>

Nutritional value per 100 g (3.5 oz)					
1	Energy	346 kJ (83 kcal)	11	Zinc	0.35 mg
2	Carbohydrate	18.7 g	12	Niacin	0.29 mg
3	Sugar	13.7 g	13	Pantothenic acid	0.38 mg
4	Dietary fiber	4.0 g	14	Vitamin B <sub>6</sub>	0.08 mg
5	Fat	1.2 g	15	Folate	38 µg
6	Protein	1.7 g	16	Vitamin C	10 mg
7	Thiamine	0.07 mg	17	Calcium	10 mg
8	Riboflavin	0.05 mg	18	Iron	0.30 mg
9	Magnesium	12 mg	19	Phosphorous	36 mg
10	Potassium	236 mg			

**PHARMACOLOGICAL ACTIVITY & USE:**

» **Pomegranate, As a Cosmeceutical Source:** The peel (pericarp) of fruit is well regarded for its astringent properties; the seeds for conferring invulnerability in combat and stimulating beauty and fertility. The watery fractions prepared from the fruit's peel and fermented juice and lipophilic fractions prepared from Pomegranate seeds were examined for effects on human epidermal keratinocyte and human dermal fibroblast function. Pomegranate seed oil, but not aqueous extracts of fermented juice, peel or seed cake, was shown to stimulate keratinocyte proliferation in monolayer culture. In parallel, a mild thickening of the epidermis (without the loss of ordered differentiation) was observed in skin organ culture. The same Pomegranate seed oil that stimulated keratinocyte proliferation was without effect on fibroblast function. In contrast, Pomegranate peel extract (and to a lesser extent, both the fermented juice and seed cake extracts) stimulated type I procollagen synthesis and inhibited matrix metalloproteinase-11 (MMP-1; interstitial collagenase) production by dermal fibroblasts, but had no growth-supporting effect on keratinocytes. These results suggest heuristic potential of Pomegranate fractions for facilitating skin repair in a polar manner, namely aqueous extracts (especially of Pomegranate peel promoting regeneration of dermis, and Pomegranate seed oil promoting regeneration of epidermis).<sup>[6]</sup>

» **Antioxidant and antimicrobial activity:** The antioxidant and antimicrobial potential of pomegranate peel and seed extract is good. Pomegranate peel extract (PE) showed excellent antioxidant activity while the seed extract (PS) did not have any significant activity. The IC<sub>50</sub> value of PE for 2, 2-diphenyl-1-picrylhydrazyl radical scavenging was 4.9 mg mL<sup>-1</sup> while that of Butylated hydroxy toluene was 21.2 mg mL<sup>-1</sup>, indicating that it was a stronger antioxidant. The efficacy of PE in scavenging hydroxyl and super oxide anion radical was also very high. It also had good reducing power and iron chelation capacity. PE showed good antimicrobial activity against *Staphylococcus aureus* and *Bacillus cereus* having minimum inhibitory concentration of 0.01%. An important potential application for the anti microbial properties of Pomegranate is its use as a topical microbicide for HIV prevention.<sup>[6, 7]</sup>

» **Potent antifungal activity:** Activity-guided repeated fractionation of crude hydro alcoholic extract prepared from the fruit peel of *Punica granatum* on a silica-gel column yielded a compound that exhibited strong antifungal activity against *Candida* spp. Based on spectral analyses, the compound was identified as punicalagin. Punicalagin showed strong activity against *Candida albicans* and *Candida parapsilosis*, with MICs of 3.9 and 1.9 mg/ml, respectively. The combination of punicalagin and fluconazole showed a synergistic interaction. MIC for fluconazole decreased twofold when combined with the extract. The FIC index was 0.25. The synergism observed in disk-diffusion and checkerboard assays was confirmed in time-kill curves.<sup>[6]</sup>

» **Cancer chemoprevention by Pomegranate:** Pomegranate fruit from the tree *Punica granatum* has been dubbed as the nature's power fruit. However, the unique biochemical composition of the Pomegranate fruit being rich in antioxidant tannins and flavonoids has recently drawn attention of many investigators to study its exceptional healing qualities. Recent research has shown that Pomegranate extracts selectively inhibit the growth of breast, prostate, colon and lung cancer cells in culture. In preclinical animal studies, oral consumption of Pomegranate extract inhibited growth of lung, skin, colon and prostate tumors. An initial phase II clinical trial of Pomegranate juice in patients with prostate cancer reported significant prolongation of prostate specific antigen doubling time. This review focuses on recent investigations into the effects of Pomegranate fruit on cancer.<sup>[6]</sup>

**POMEGRANATE AND DRUG INTERACTION:**

Pomegranate products can potentially interact with several medicines. Although an occasional consumption of pomegranate fruit or juice is probably not likely to lead to drug interactions, excessive consumption (either through fruit, juice, extracts, or supplements) may possibly result in drug interactions.

Combining pomegranates with high blood pressure medications could cause problems. Pomegranates may lower blood pressure, and combining them with a blood pressure medication could result in undesirably low blood pressure (hypotension).

There is also some evidence that pomegranates may inhibit some of the liver enzymes that break down many different medications. This could cause high levels of these medications to accumulate in the body, increasing the risk of side effects and toxicity. If you take any medication that has the potential to cause serious side effects (such as arrhythmia medications, tricyclic antidepressants, statin cholesterol drugs, or numerous other types of medications), it is a good idea to check with your healthcare provider before drastically increasing your pomegranate intake.

It is likely that not all pomegranate drug interactions are known at this time. Therefore, you should talk with your pharmacist or healthcare provider about the pomegranate interactions that may apply to you.<sup>[8]</sup>

#### **EFFECTS OF POMEGRANATE OVERDOSE:**

If people could drink large quantities of pomegranate juice or take too much of a pomegranate extracts or supplement or a person could take too much pomegranate by consuming the fruit (because it is usually quite time-consuming to eat pomegranate fruit), it is not known what exactly to expect in such cases when they take overdose of this fruit because people may unlikely take overdose, so no possibility of side effects

#### **An Overview of Pomegranate and Pregnancy**

A normal intake of pomegranate from food sources is probably no cause for concern for pregnant women. However, it is not known if unusually large intakes of pomegranate supplements or extracts are also safe for pregnant women

#### **Is Pomegranate Safe During Pregnancy?**

In ancient times, the pomegranate was used as a contraceptive and as a substance used to cause miscarriages. However, there is no evidence that pomegranates actually possess such properties.

It is not known if pomegranate extracts or supplements are safe for pregnant women. If you desire to take pomegranate during pregnancy, it is probably best to simply eat pomegranate fruit or drink pomegranate juice.

If you are pregnant, it is always a good idea to have a discussion with your healthcare provider before taking any medication or supplement, including pomegranate extracts

or supplements. Also, it is a good idea to check with your healthcare provider before drastically increasing your intake of pomegranate juice or fruit

#### **Benefits of Drinking Pomegranate Juice:**

Pomegranate juice has a beneficial effect on cardiovascular health. It is revealed that drinking a glass of pomegranate juice a day for one year reduced blood pressure (particularly systolic pressure) and slowed down LDL cholesterol (the bad cholesterol) oxidation and prevents the hardening of arteries. Also it has found that drinking 8 ounces of pomegranate juice daily for three months improved the amount of oxygen getting into the heart muscle of patients with coronary heart disease.

Pomegranate juice is a natural Viagra. Also long term consumption of pomegranate juice may help combat erectile dysfunction. Apparently those same free radicals that damage your cells and DNA are also a big contributing factor in erectile dysfunction. The antioxidant power of pomegranate juice helps prevent and repair that damage. Pomegranate juice helps destroys breast cancer cells while leaving healthy cells alone. It may also prevent breast cancer cells from forming.

Pomegranate juice, like aspirin, can help keep blood platelets from clumping together to form unwanted clots

#### **Pomegranate as an Ayurvedic Herbal Remedy:**<sup>[10, 11]</sup>

[Home Remedies]

For cough and wheeze, ginger juice and pomegranate juice mixed with honey and taken internally every 3 hours (3 -5 teaspoonful) brings quick relief.

Juice of pomegranate flower and tender grass (cynodon dactylon) (arugampul in Tamil) taken in equal quantity (10 ml) 3 times a day can stop nosebleeds.

Powder of dried pomegranate flowers taken with sugar candy of palm tree brings down cough.

Pomegranate taken first thing in the morning (empty stomach) every alternate day can strengthen your bones.

Pomegranate taken every night (for 14 days) before going to bed can cure impotence.

Pomegranate juice is an excellent natural ayurvedic remedy for ulcers in stomach.

Decoction of pomegranate flowers cures stomach pain.

Crushed pomegranate flowers taken with honey stops blood in stool.

Pomegranate juice taken with sugar candy (kalkandu in Tamil) cools down your body.

If women are constantly losing pregnancy, they should extract this tree's leaves juice along with sandalwood paste and consume daily (100ml) during initial 6 months of pregnancy

If there are ring worms in stomach or intestine, then boil this tree's root in water and consume 10 ml, twice per day to kill those worms.

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