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REVIEW ON: THE DECIDUOUS SHRUB "*PUNICA GRANATUM*"

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ABSTRACT
The *Punica granatum* belonging to family Punicaceae is a deciduous, unique and long living shrub cultivated throughout the Caucasus, Africa, the Himalayas in north Pakistan and northern India like Kashmir, Punjab and Himachal Pradesh etc. Previous phytochemical investigation on pomegranate seems to indicates the presence of various chemical constituents i.e ellagic acid, ellagitannins, flavanoids, anthocyanidins, anthocyanins, flavonols and flavones which are therapeutically beneficial. Also has various pharmacological activities like hypoglycaemic activity, immunomodulatory activity, analgesic activity, anticonvulsant, anthelmintic, neuroprotective and anticancer activity.

KEYWORDS: *Punica granatum*, Punicaceae, Chemical constituents and pharmacological activity.

INTRODUCTION

A Pomegranate is very useful fruit having various important pharmacological activities. Pomegranate is small growing tree measure up to 8 meters, which bears deciduous shrub. The local inhabitant of pomegranate are Caucasus, Africa, the Himalayas in north Pakistan and northern India like Kashmir, Punjab and Himachal Pradesh etc.[1]

The tree on which pomegranate fruit is grows can live for many years is of the great thing of pomegranate. Pomegranate fruit have a round, spherical shape in which dozens of small ruby-colored seeds are present. The pomegranate fruit is very juicy and has citrus flavor. Pomegranate fruit is used in making many drinks and even foods.

In supermarkets pomegranate in a form of variety become more useful and popular. Pomegranate juice is more popular but pomegranate jellies, pomegranate wine and even pomegranate salad dressing are well liked. Pomegranate is beneficial to our health in many way because pomegranate contains a high amount of antioxidant, i. e shown in recent studies.[2]

DESCRIPTION ABOUT POMEGRANATE

Biological sources[3]

- Botanical name : *Punica granatum*
- Family name : Puniacaceae
- Commen name : Pomegranate, anar
- Part used : Roots, seeds, flowers, leafs and fruits

Fig. 1 *Punica granatum* (Pomegranate)

Taxonomical classification[4]
Kingdom: Plantae
Division: Magnoliophyta
Class: Magnoliopsida
Order: Myrtales
Family: Punicaceae
Genus: *Punica*
Species: *Granatum*

About pomegranate shrub

Leaves- The leaves are opposite or sub-opposite, shiny and smooth, narrow oblong, entire 3-7 cm long and 2 cm wide.

Flower- The flowers are bright red in color and 3 cm in diameter, having four to five petals or often more. Flowers are also grown on fruitless varieties.

Fruit- The pomegranate fruit is fit to be eaten and in size pomegranate fit between a lemon and a grapefruit, 5-12 cm in diameter having a rounded hexagonal shape with thick reddish skin and also contains around 600 seeds. Each seed of pomegranate has a surrounding water laden pulp ,the eatable aril ranging in color from white to deepred or purple. The seeds are impart in a white, spongy, astringent pulp.[4]

Growth habbits

The pomegranate is a small tree and rounded shrub arranged in a tidy way that can grow to 20-30 ft. in height. Draft varieties are also known. It is usually shedding its leaves annually (deciduous), but leaves will persist on the tree in certain areas. The red brown bark later becomes gray, fully covered the trunk, stiff, angular and often spiny branches. Pomegranate tree has strong tendency to sucker from the base. Pomegranate are also living or lasting a long time, more abiding. The strength of a pomegranate declines after aprox.15 years.[5]

CULTURE OF POMEGRANATE

Location- For the best fruit pomegranate should be placed in the sunniest, warmest part of the yard or orchard. An excellent landscaping plant due to the attractive leaves and flowers as well as fruit.[6]

Soil- Pomegranate thrives on calcareous or acidic loam as well as rock strewn gravel but does best in well drained ordinary soil.[7]

Irrigation- For the good fruit production they must be irrigated. For the establishment of new plant, during dry season they should be watered every 2–4 weeks. The plants are permit of moderately saline water which is having salt concentration about 0.3- 1% and soil condition.[8]

Fertilizing– The tree are fertilized by the help of 2 to 4 once application of ammonium sulfate or other nitrogen fertilizer, only the first two springs. And after strong fertilizer very little fertilizer is needed.[9]

Pruning- Pomegranate plant should be cut back when they reaches about 2 feet high height. If a tree is mature but produces less or no fruit, we can cut it more assertively, this phenomenon is called pruning. When we prune the tree we allow 4-5 shoot evenly distributed around the stem, so that the plant is balanced and not tilting any side because of its self weight.[10] Late winter is the best time for structural pomegranate tree pruning before the buds break but after risk of frost has past.[11] For the first third year the pruning is done in such a manner that we get the maximum no. of new shoots around the stem and its gives a strong well framed structure to the plant. After three year only dead branches and suckers are cut down.[12]

Propagation- From seed, pomegranate can be raised but not come sure. Cutting roots without difficulty and plants from them carry fruit after about 3 years. From the mature (one year old wood) plants, 12 to 20 inches long cuttings should be taken in winter. The leaves should be detach and the cutting serve with rooting hormone like indole butyric acid and put about two third their length into the soil or into some other warm rooting medium. Plant can also be air layered but affix is seldom successful.

Pests and disease- Pomegranate trees are comparatively free of all or most pests and diseases. But minor problems with spots of leave and fruit and some time leaves are damage by white flies, thrips, mealy bugs and scale insects.

Harvest- the fruits are when have developed a characteristics color and when tapped makes a metallic sound. Before over maturity fruit must be picked to prevent cracks, particularly when rained on. Like apple pomegranate also having a long storage life.

Commercial potential- The chief commercial growing regions of the world are the India and surrounding countries and southern Europe.[13]

CHEMICAL CONSTITUENTS

According to the current research the most therapeutically effective pomegranate constituents are ellagic acid, ellagitannins, punicic acid, flavanoids, anthocyanidins, anthocyanins and estrogenic flavonols and flavones.[14]

Alkaloids – The amount of alkaloid present in the body rinds is 0.35- 0.6% and in roots is 3% but fruit rinds contains no alkaloids.[15,16] It was shown that pseudopelletierine, pelletierine, isopelletierine, methylpelletierine 1-pelletierine, dl-pelletierine and methylisopelletierine were found in root, body and branch rinds.[17,18]

The saturated alkaloid present only in root and body rinds but not found in leaves, where as 2-(2-propenyl)-piperidine of unsaturated alkaloid was found in leaf extract.[19]

Tannin and similar compounds –It was expressed that punicacortein A, B, C, D which is a new ellagitannin was found in body roots of *Punica granatum* punigluconin which contains one gluconic acid and casuarilline are also present body roots.[20,21] From the leaves punicafolin as well as four ellagitannins and two gallotannins were isolated.[22]

Anthocyanosides

Fruits and flower section of the plant contains anthocyanosides. It is expressed that pelargonidin-3-glucoside and pelargonidin-3, 5-diylucoside found in high amounts in the rinds as compare to the fruits arils. Arils and fruit, rinds both contains cyaniding-3-glucoside and cyanidine -3, 5-diglucoside. Pomegranate juice contains delfinidin-3, 5- diglucoside and delfinidine-3-glucoside i.e major anthocyan.[23,24] Pelarogonidin-3, 5-diglucoside as detected in flowers.[24]

Flavonoids
Flavonoids, referred as vitamins p and its activity are detected in *Punica granatum*. It is shown that the fruit contain several parts in structure of flavonoid, quercetol.[25,26]

Triterpenic acid
Different part of the pomegranate shrub shows the presence of ursolic acid. Quantity of ursolic acid at the rate of 0.45% in the leaves and 0.6% in the fruit rinds.[27]

Polyholosides
Punica granatum contains free sugar (oses) like fructose, glucose and raffinose in less amont, hemicellular A and B, and water soluble polyholoside. 2.58% polyholoside was found in fruits rind.[28,29] It also contains mannose, galactose, rhamnose, arabinose, glucose and galacturonic.[30]

OTHER COMPOUNDS

Composition of pomegranate flower contains sitosterols, masinic acid, Asiatic acid and alkanes. It was shown that alcoholic extract of pomegranate contains D-mannitol, ellagic acid and gallic acid.[24] Almost all type of amino acid are found in pomegranate juice; while valine and methionic are found in very high concentraction.[31,32] It was repoted that invert sugar, thiamin, vitamin C, riboflavin and protein also present in pomegranate juice.[25,33 &34] Some organic acid like citric acid, malic acid and oxalic acid are also found in pomegranate juice with 14.31% carotenoid and carotene.[35,36 &37] Cultivated and wild pomegranate fruit contains composition of phenolic acid and it was stated to contains vanillic acid, neochlorogenic acid, chlorogenic acid, sinapic acid, kumic acid, ferulic acid and caffeic acid.[38] Estrone (4g/kg) is also found in pomogrante seeds, (8.7g/kg) from surface parts and 2.5g/kg from flowers.[39,40] Different sections of *Punica granatum* are used for making various preparation i.e used in cancer therapy.[41] Due to anthocyans fruit extract of pomegranate shows antimicrobial and antiviral activity.[42]

BIOCHEMICAL CONSTITUENTS

All parts (roots, bark, leaves, fiowers and fruits) of *Punica granatum* extract appear to have various therapeutic properties. Various current research seems to indicate the very important therapeutically useful *Punica granatum* constituents arellagic acid ellagitannins, punnicic acid flavonoids, anthocyanidins, anthocyanins, and estrogenic flaverols and flavones.[43]

NUTRITIONAL VALUES OF POMEGRANATE[44, 45]

Nutritional value per 100 g					
s. no.	**Compositions**	**Quantity (unit)**	**s. no.**	**Compositions**	**Quantity (unit)**
1	Energy	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_6	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)	20	Water	80-82.3 (gm)

TRADITIONAL USES

Heart problems: Pomegranate decreases the risk of heart attack and heart strokes because regular intake of pomegranate juice can maintain good flow of the blood in the body.

Stomach disorders: Many parts of pomegranate like peel, bark, and leaves are used to calm the stomach disorder or any kind of digestive problems. Dysentery and cholera also cured by the pomegranate juice.

Dental care: Antibacterial and antiviral properties of pomegranate juice; helps to reduce the effect of dental plaque.[46]

Cancer: Pomegranate consist antioxidant at advanced level i.e flavanoids. These flavanoids are thought to be effective in scavenging various cancer radicals. If any individual facing high risk of prostate and breast cancer should start drinking pomegranate juice, to reduce further risk of developing cancer.[47] Regular consumption of this fruit can reduce the prostate-specific-antigen (PSA) levels in the body and fight with the cancer cells in the body.[48]

Osteoarthritis: Pomegranate minimize the risk of various forms, like atherosclerosis and osteoarthritis. Pomegranate extract act as a p38 MAPK (Mitogen-activated protein kinase) inhibitors thus playing important role in treatment of osteoarthritis and other degenerative/inflammatory disease.

Diabetes: To prevent coronary illnesses, consumption of pomegranate fruit juice is very beneficial for diabetic patient.[49]

Anemia: In any form consuming this fruit maintained healthy blood flow in the body. Fruit seed extract supplies iron to blood and help to decrease the anemia symptoms like fatigue, wooziness and weakness and hear loss.[50]

PHARMACOLOGICAL ACTIVITY

Hypoglycaemic Activity: Ethanol / water (1:1) extract of aerial parts of pomegranate shows hypoglycaemic activity on rats (dose 250 mg/kg orally). Blood sugar level was observed less than 30%.

Immunomodulatory Activity: Aqueous suspension of fruit rind powder shows immunomodulatory activity after the administration to rabbit at dose of 100 mg/kg ,they stimulate the both components (cell-mediated and humoral) of the immune system.[51]

Analgesic activity: Ethanol/water (1:1) extract of aerial parts of pomegranate shows analgesic activity on mice (dose 0.125 mg/kg i.p.) by tail pressure method.

Anticonvulsant activity: Anticonvulsant activity was shown by ethanol/water (1:1) extract of aerial parts of pomegranate after administered to mice (dose 0.125 mg/kg i.p.) was inactive vs. electroshock-induced convulsions.[52]

Anthelmintic activity: Anti helmintic activity was shown by the chloroform extract of dried root and stem of pomegranate, after administered to mice by gastric intubation (dose 250 mg/kg for 3 days).[53]

Neuroprotective activity: Pomegranate is highly useful for neuroprotective potential. Many drugs which have AchE inhibitor property are known to be useful in treating degenerative disorder like alzheimer's disease, improving memory or other CNS related activity.

Anticancer activity: Various pomegranate extracts juice, seed, oil and peel potently inhibit prostate cancer cell proliferation, cause apoptosis and also inhibit tumor growth.[54]

CONCLUSION

Now a days herbal plants are very useful for the purpose and herbs contains more than one chemical entities so it has widely used for the research purposes. Pomegranate shrub used as a natural supply of drugs. Further more studies are required to investigate and to determine the role of *Punica granatum* in treatment of various disease. The possibility that *Punica granatum* (peel, fruit, juice, flowers and root) extract may also have an effect on several diseases such as Alzheimer's disease, osteoarthritis and obesity.

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