

## Phytoconstituents and Biological Potential of *Punica granatum* L.

Prashant Kumar Dhakad\* and Birendra Shrivastava

\*School of Pharmaceutical Sciences, Jaipur National University, Jagatpura, Jaipur, Rajasthan, India.

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### ABSTRACT

Apart from being a fruit *Punica granatum* L (pomegranate) have restorative properties that have pulled in light of a legitimate concern for researcher all around the globe. The pomegranate parts have an inhibitory impact on cancerous cells and possess clinical benefits. Pomegranate contains strong disease counteractive action operator development and has a high wellspring of ellagitannins, anthocyanins and hydrolysable tannins. The pomegranate juice is known to be a rich wellspring of malignant growth avoidance containing polyphenols, tannins and anthocyanins including supplement C, supplement E, coenzyme Q10 and lipoic acids. Pomegranate possesses anti-diabetic action, antihypertensive action, anti-hyperlipidemic action, anti-inflammatory actions.

**Keywords:** *Punica granatum* L., Pomegranate, Anti-diabetic, Anti-hyperlipidemic, Anti-inflammatory

### INTRODUCTION

Pomegranate (*Punica granatum* L.) is better referred to in certain nations as the product of Eden [1] for its charming taste and fantastic wellbeing beneficial actions. *Punica granatum* is a small tree with height of 5 to 9 m and chiefly found in northern India, USA, Mediterranean region and China [2]. The organic product is delimited by a rugged pericarp, contained inside are various arils, each a solitary seed encompassed by a translucent juice containing sac. Thin bitter tasting layers stretch out into the inside of the natural product from the pericarp, giving a lattice work to suspending the arils. Along these lines, the natural product itself offers ascend to three sections: the seeds, about 3% of the weight of the organic product and themselves containing about 20% oil, the juice, about 30% of the natural product weight and the pericarp [3].

Ubiquity of pomegranate has expanded hugely particularly in the most recent decade on account of the demonstrated antimicrobial, against viral, hostile to malignant growth, intense enemy of oxidant and against mutagenic impacts of the natural product [4]. In the customary Chinese drug, strips are considered as a ground-breaking astringent and mitigating specialist and are related to the treatment of awful discharge, ulcers and diseases and upset of the gastrointestinal tract, for example, looseness of the bowels and diarrhea [5]. In India, Tunisia and Guatemala, water decoction of dried pomegranate strips is utilized as a solution for ulcers [6].

Pomegranate fruits have restorative properties, for example, mitigating and antibacterial actions. The pomegranate seed

oil has inhibitory impact on skin and bosom malignancies. The pomegranate seed oil has phytoestrogenic mixes and the natural product is wealthy in phenolic mixes with solid cancer prevention agent action. The juice and seeds are viewed as a tonic for throat and heart. It is utilized to stop nose and gum drains and treating hemorrhoids [7,8].

### PHYTOCONSTITUENTS

Pomegranate contains solid cancer prevention agents and has a high wellspring of anthocyanins, hydrolysable tannins and ellagitannins [9]. The most segments of the pomegranates are polyphenolics and tannin [10]. Phytochemical examinations showed that pomegranate plant have dynamic inhibitors, including flavonoids and phenolics [11]. Pomegranate parts have ellagic acid, ellagitannins [12] hydroxybenzoic acids, such as, gallic acid, ellagic acid glycosides and gallagic acid.

Pomegranate peels which records for about half of natural product weight is portrayed by the nearness of high subatomic weight ellagitannins, phenolics, complex

**Corresponding author:** Prashant Kumar Dhakad, Assistant Professor, School of Pharmaceutical Sciences, Jaipur National University, Jagatpura, Jaipur, Rajasthan-302017, India, Tel: 8824872613; E-mail: dhakadprashant654@gmail.com

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polysaccharides, proanthocyanidin, flavonoids and calculable amounts of microelements that, in general, show solid enemy of cell reinforcement, mutagenic, apoptotic and antimicrobial properties. The natural product contains a rich assortment of flavonoids, establishing almost 0.2 to 1% of the organic product weight; roughly 30% of all natural product anthocyanidins are gathered in the strip parcel. The equal convergence of these mixes relies upon the cultivar type and on the different formative periods of the organic product and is in charge of the varieties in pomegranate strip shading. Mounting proof recommends that hydrolysable polyphenols in pomegranate peels, explicitly ellagitannins, are the most dynamic cancer prevention agents among the tannins contained in that. These mixes (punicalagin, ellagic acid, gallagic acid and punicalin) have been appeared to hold elevated cell reinforcement and pleiotropic organic exercises and quite, to act synergistically together [13].

The arils of the pomegranate natural product in that capacity or when crushed for juice extraction comprise chiefly of

fructose and glucose, gelatin, citrus extract, malic acid and bioactive mixes, for example, flavonoids and phenolics. The juice is known to be a rich wellspring of cancer prevention agents from the anthocyanins, tannins and polyphenols including Vitamin E, Vitamin C, lipoic acid and coenzyme Q10. Anthocyanins are the most significant gathering present in the arils or juice, which even give the natural product or juice its shading. The degrees of cell reinforcements have been observed to be higher than in other characteristic juices, even red wine and green tea [14-17].

The oil obtained from pomegranate seeds has as of late gotten more regard for be utilized in modern procedure and furthermore in giving essential unsaturated fats. Immersed and unsaturated fats represent the principle extents of unsaturated fats composites [18]. The various bio active pharmaceutical constituents are described in **Figure 1** and therapeutic benefits of pomegranate are expressed in **Figure 2**.

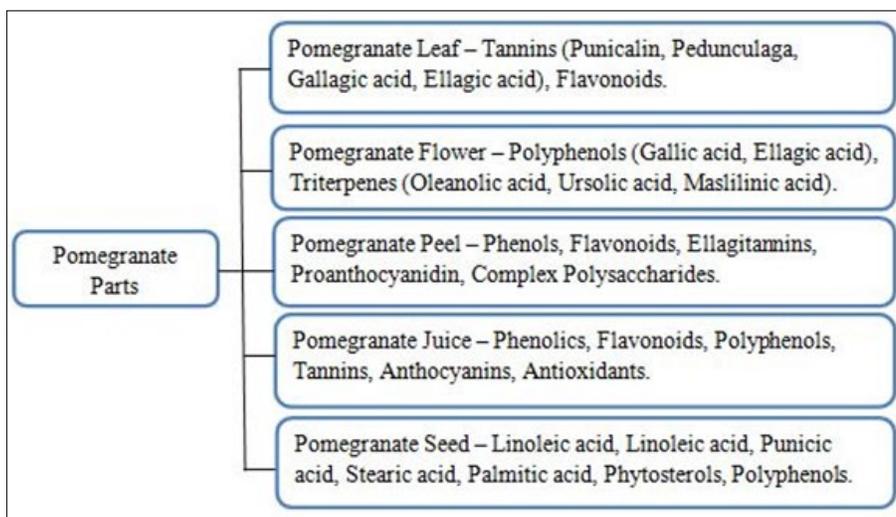


Figure 1. Phytoconstituents found in various parts of pomegranate plant.

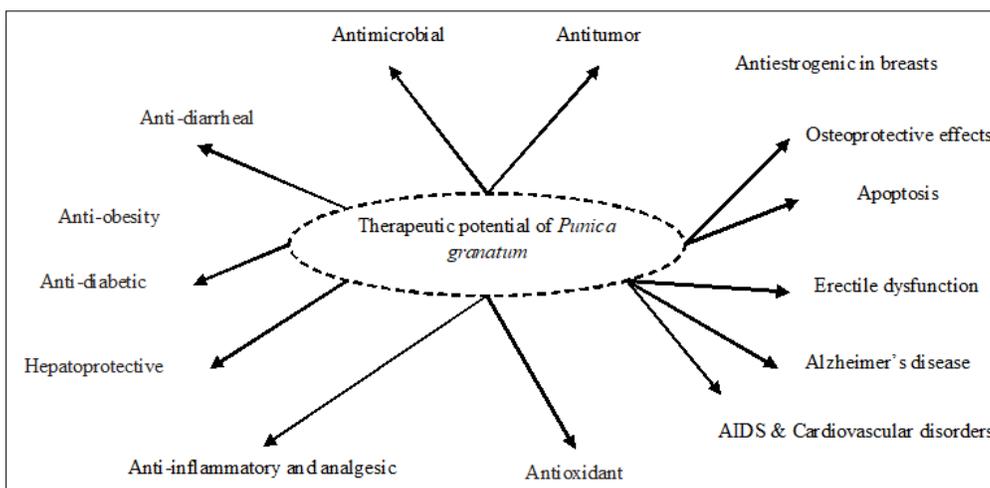


Figure 2. Therapeutic effect of Punica granatum.

## MEDICINAL POTENTIAL

The pharmacological actions of pomegranate have all the earmarks of being wide assortment. In this way, prompting an upgrade ubiquity as a characteristic mixes and useful sustenance since hundreds of years. The pomegranate polyphenols like punicalagin is known to have strong anticancer action in cervical, breast and lung cells. About all the parts of pomegranate are shows biological effects including calming, anticancer, hostile to diabetes, hepato defensive, anti-atherogenic and cancer prevention agent action [19].

The aqueous pomegranate peel extract (200 mg/kg) decreased the groupings of glucose in serum and Lactoperoxidase in cardiovascular, hepatic and renal tissues [14]. The treatment of alloxan-induced diabetic rodents for 10 days with 200 mg/pomegranate strip extract, rich in polyphenols, showed lower fasting serum glucose and higher insulin levels just as against lipid peroxidation impacts [20].

Afterward, it was discovered that pomegranate hydroalcoholic extract (500 mg/kg) decreased the substance of cardiovascular triglycerides (TGs) just as plasma TGs, absolute cholesterol and unsaturated fats in Zucker diabetic fatty (ZDF) rodents, which are viewed as a hereditary model of type 2 diabetes. Reverse transcriptase polymerase chain reaction examinations exhibited that pomegranate hydroalcoholic extract treatment in ZDF rodents upgraded the statement of cardiovascular peroxisome proliferator-activated receptor gamma (PPAR- $\gamma$ ) mRNA and reestablished mRNA articulation of the downregulated heart glucose transporter 4 [21].

Utilization of pomegranate seed oil, rich in linoleic acid, in a time of high-fat sustaining diminished weight gain and decreased the hazard for type 2 diabetes in wild type CD-1 mice by improving insulin affectability. Pomegranate juice contains numerous bioactive chemicals, fundamentally including phenolic acids, for example, caffeic acid, gallic acid chlorogenic acid, coumaric acids and ferulic acid. It additionally contains citrus acid, non-phenolic acids, succinic acid, oxalic acid, ascorbic acid and maleic acid. The taste and acidity of pomegranate juice are principally because of the essence of these acids [22].

Pomegranate squeeze likewise contains flavonoids, strong cancer prevention agents, including phloridzin, catechin and quercetin notwithstanding flavanols (a class like flavonoids), essentially including epicatechin, catechin and epigallocatechin [23]. The red shade of pomegranate juice is due to anthocyanins, which are basically present in 3, 5-O-glucoside structures and 3-O-glucoside [24].

The utilization of pomegranate juice sugar by diabetic mice for 10 days brought about a noteworthy lessening in the peritoneal macrophages all out peroxide level and an expansion in the cell Glutathione level. During atherogenesis

and under oxidative pressure conditions, the action of paraoxonase 2 in macrophages is expanded [25].

## CLINICAL PROPERTIES

Pomegranates are naturally remarkable and intense wellspring of huge numbers of the body's physiological variables affecting human wellbeing. Pomegranate natural product has been prescribed as a pharmaceutical and sustenance fixing in treatment of AIDS because of the improvement of bioflavonoid, hindrance of free radicals, just as lipooxygenases restraint (the catalysts that change arachidonic acid to leukotrienes). The pomegranate strips have customarily used to treat conventional the runs and looseness of the bowels. The focal point of future examinations is focused on delivering common anti-diarrheal cure from pomegranate strip for over-the-counter or medicine based meds. Pomegranate is recognized as an anti-parasitic natural product for the livestock. Flavonoids contained in the organic product have amazing cell reinforcement movement and oil act as potential dietary enhancement in upgrading life span just as keeping from coronary illness and malignancy. The separated oil of pomegranate can adequately deny the creation of prostaglandin or leukotrienes through hindrance of cyclooxygenase and lipooxygenases eicosanoid compounds with the goal that it might build the use of oil or its subsidiaries as inner or outside mitigating substances [26].

## ANTIMICROBIAL ACTIVITY OF POMEGRANATE

Evaluation of Antibacterial action of ethanolic pomegranate extricates uncovered that it adequately smothers microbial development of food contamination microscopic organisms (*B. cereus*, *S. aureus*, *E. coli*, *S. typhi* and *P. aeruginosa*) at concentration of 10 mg/ml. The inhibitory impact of *Punica granatum* extricate began at 2.5 mg/ml with restraint zones of 9.6 and 8.3 mm against *S. aureus* and *P. aeruginosa*. A few analysts have proposed that antimicrobial segments of the plant separates (terpenoid, alkaloid and phenolic mixes) communicate with chemicals and proteins of the microbial cell film making its interruption scatter a motion of protons towards cell outside which prompts cell passing or may hinder compounds essential for amino acids biosynthesis [27].

The antibacterial activity for punicalagin (250  $\mu\text{g}$  - disc diffusion method) managed a clear restraint zone of 20 mm for *Staphylococcus aureus* strains tried. The base inhibitory focus was built up as 61.5  $\mu\text{g mL}^{-1}$ . For a methicillin-resistant *S. aureus* colony, MIC estimation of 768  $\mu\text{g mL}^{-1}$  was built up. The ethyl acetic acid derivation concentrate of *Punica granatum* fruits was fractionated by chromatographic procedures to manage the cost of the ellagitannin punicalagin. The antibacterial examines which guided the separation of the tannin were led utilizing the circle dispersion technique [28].

The 80% methanolic concentrate of pomegranate strips was an intense inhibitor for *Listeria monocytogenes*, *S. aureus*, *Escherichia coli* and *Yersinia enterocolitica*. The minimum inhibitory concentration (MIC) of methanolic concentrate of pomegranate strips against *Salmonella enteritidis* was discovered most noteworthy (4 mg/ml). Phytochemical examinations uncovered the nearness of dynamic inhibitors in pomegranate strips, incorporate phenolics and flavonoids. The movement of pomegranate was identified with its higher substance (262.5 mg/g) of complete phenolics [29].

Pomegranate is significant as a rich wellspring of polyphenols. Normally polyphenols are spoken to by a superfamily of different phytochemicals (almost 4000) that are rich in our eating regimen. These mixes are isolated into flavonoids, stilbenes and lignans. A controlled transdermal utilization of certain polyphenols for treating skin conditions, typically are invaluable contrasted with that of oral or intravenous admission in following terms like amplification of nearby presentation, increment in the adequacy, improvement of the security, minimization of the managed portion, upgrade of the bioavailability at the focused on location and decrease of the foundational poisonous quality. The majority of the polyphenols goes about as productive skin photoprotectors. In fact, the general investigations performed in creature models and additionally in people show that these phytochemicals apply skin photoprotective properties, particularly through their cell reinforcement, mitigating and anti-tumoral exercises [30].

## CONCLUSION

A plethora of literature highlights the ethno-pharmacological and bioactive constituents of pomegranate. Pomegranate possesses a wide range of compounds, including alkaloids, Polyphenols, flavonoids, vitamins having potent free radical scavenging activity. A wide variety of pomegranate may possess different medicinal effects and hence an exhaustive study of different components of pomegranate needs to be done for future use and benefits.

## CONFLICT OF INTEREST

The author declares that there is no conflict of interest.

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