



EXTRACTION FROM POMEGRANATE (*PUNICA GRANATUM*) SEEDS

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Abstract: *Natural antioxidants products are widely distributed in food and medicinal plants. These natural antioxidants, especially polyphenols, exhibit a wide range of biological activities including anti-cancer, anti-inflammatory, and anti-atherosclerosis activities. Pomegranate (*Punica granatum L.*) is a rich source of polyphenolic components. The pomegranate (*Punica granatum L.*) belongs to the Punicaceae family and is a shrub or small tree up to 3 to 8 meters high, which is evergreen in the tropics and deciduous in subtropical and temperate zone areas. The name of the pomegranate derives from the Latin name of the fruit, *granatum*, which means grainy apple. The pomegranate fruit contains considerable amounts of phenolic compounds, including hydrolyzable tannins, flavonol glucosides, pro-cyanidins, phenolic acids, ellagic acid derivatives, and flavonoids. Fruit peel and roots of pomegranate have been commonly used in herbal remedies by local healers in many countries. Pomegranate peel has been used in traditional medicine for treating diarrhea and dysentery. Pomegranate fruit has pharmaceutical effects on human health, and because of this has been used in many communities as a drug to heal ailments. Punicalagin is the major antioxidant polyphenol ingredient in pomegranate juice.*

Keywords: **Punica granatum L.*; antioxidant, polyphenols, tannins, flavonol glucosides, pro-cyanidins, phenolic acids, ellagic acid*

INTRODUCTION

Pomegranate peel, seeds, juice, and arils are a rich source of several valuable bioactive compounds with considerable nutritional, antioxidant, and other beneficial properties [1–3]. Peel possesses a higher polyphenol content than seeds and juice [4]. These polyphenols include punicalagin, which exhibits high antioxidant activity. Pomegranate also contains other polyphenols, including anthocyanins (delphinidin, cyanidin, and pelargonidin 3-glucosides and 3,5-glucosides) as well as flavonols. Pomegranate peel is known for its healing properties with respect to inflammatory diseases, diabetes, atherosclerosis, oxidative stress, cancer, and microbial infections. Moreover, pomegranate fruit is used in the food industry such as dairy products, charcuterie and juice preparation, and conservation.

Pomegranate is composed of a rich variety of flavonoids, which comprise approximately 0.2% to 1.0% of the fruit. Approximately 30% of all anthocyanidins found in pomegranate are contained within the peel. The isoflavones genistein, diadzein, genistin, and diadzin as well as estrone, the metabolic derivative of estradiol, have been isolated from the seeds. The stems and roots of pomegranate contain alkaloids including isopelletierine, pseudopelletierine, and N-methylisopelletierine,



Anthocyanidins Pelargonidin, ellagotannins, Gallic acids and Ellagic acid. Extracts from the seeds of pomegranates are used in skincare products as they contain antioxidant compounds and are also included in beauty products for their exotic, sweet fragrance. Modern day research has revealed that pomegranates contain compounds that could contribute towards preventing conditions such as heart disease, diabetes, and cancer. However, further research is needed to support these findings.

Punica Granatum seeds have also been shown to contain the estrogenic compounds, estrone and estradiol. Furthermore, the dried pericarp and the juice of the fruit are considered beneficial for treatment of colic, colitis, menorrhagia, oxyuriasis, headache, diuretic, acne, piles, allergic dermatitis, and treatment of oral diseases. Recent studies have shown new scientific investigations for the traditional uses of PG. Pg contains chemical components in its different compartments, which may possess various pharmacological and toxicological activities. These components are summarized in Table 1. Antioxidant properties Oxidative stress (OS) produces toxic metabolites which can initiate and promote cancers. Consumption of polyphenols and flavonoids are beneficial for the prevention of cardiovascular, inflammatory, and other diseases by preventing OS that induces lipid peroxidation in arterial macrophages and in lipoproteins. The presence of antioxidants has been reported in Pg juice. Pg contains some species of flavonoids and anthocyanidins (delphinidin, cyaniding and pelargonidin) in its seed oil and juice and shows antioxidant activity three times greater than green tea extract. Pg fruit extracts exhibit scavenging activity against hydroxyl radicals and superoxide anions, which could be related to anthocyanidins. The antioxidant action of Pg is observed, not only through its scavenging reactions, but also by its ability to form metal chelates.

Some studies have found that components in pomegranate juice help inhibit the movement of cancer cells by weakening their attraction to a chemical signal that promotes the spread of cancer. Other studies have shown that pomegranate bark extract has anticancer properties and that pomegranate bark can be used for additional healing purposes.

The main classes of polyphenols identified in pomegranate are hydrolysable tannins including gallotannins, ellagitannins, gallagyl esters, hydroxycinnamic acids, and hydroxybenzoic acids. The major compound of ellagitannins is punicalagin (2,3-hexahydroxydiphenoyl-4,6 gallagylglucoside) which is mainly found in pericarp, bark, flowers, and seeds isolated by preparative HPLC. In addition to punicalagin and its isomers, pomegranate contains punicalin A and B and pedunculagin isomers identified by MS and/or NMR. Gallic acid, ellagic acid, caffeic acid, chlorogenic acid, p-coumaric acid, aglycone, and ferulic acid have also been isolated from pomegranate by HPLC and NMR methods.

Fruits are a rich source of vitamins, minerals, and biologically active compounds. However, they are often consumed without the peels although some fruit peels are rich



in polyphenolic compounds, flavonoids, ascorbic acid, and other biologically active compounds that have a positive effect on health.

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