

RESEARCH ARTICLE

Phytochemical Screening of *Punica granatum* Linn. Peel Extracts

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Abstract

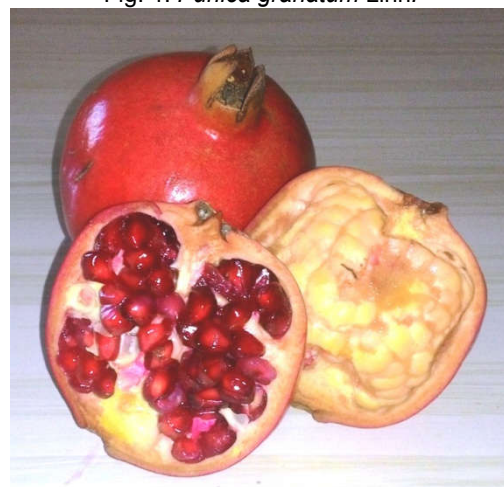
Preliminary phytochemical constituents of *Punica granatum* L. peel extracts were evaluated in the present study. The peel powder of *P. granatum* was extracted with respective solvents namely aqueous, ethanol, acetone, petroleum ether and chloroform. Qualitative phytochemical screening of *P. granatum* peel extracts were assessed by standard methods. All the phytochemical constituents tested were present in aqueous extract of *P. granatum* peel except glycosides and anthocyanin. It was noted that ethanolic peel extract of *P. granatum* showed the presence of all phytochemical constituents except tannins, glycosides and anthocyanin. The chloroform peel extract showed only presence of 6 phytochemical constituents out of 13. Petroleum ether extract of *P. granatum* peel showed the presence of saponins and phenols alone. All the phytochemical constituents tested were present in acetone extract of *P. granatum* peel except alkaloids, saponins and anthocyanin.

Keywords: Phytochemicals, *Punica granatum*, peel extracts, saponins, phenols, anthocyanin.

Introduction

Punica granatum Linn. (Pomegranate) is a plant belongs to Punicaceae family locally called as Anar, a fruit of great antiquity. This plant species have been cultivated in the Middle-East for more than 5,000 years ago and it is found in Iran, Egypt, India, Bangladesh, Sri Lanka, North Africa, California and Arizona (Akter *et al.*, 2013). Pomegranate peels are used as a popular remedy throughout the world and exploited in traditional medicine because of their strong mordancy properties (Nitave and Patel, 2014). Bark, leaves, immature fruits and fruit rind of different parts of pomegranate have valuable therapeutic potential. Several studies focused on prevention and treatment of cancer, cardiovascular disease, diabetes, dental conditions, erectile dysfunction and skin allergy investigations were carried out to determine antioxidant, anticarcinogenic and antiinflammatory properties of pomegranate constituents (Ahmed *et al.*, 2013). Singh *et al.* (2002) evaluated the constituents of *Punica granatum* which included gallo catechins, delphinidin, cyanidin, gallic acid and sitosterol, which had therapeutic properties. Numerous phytochemical constituents have been reported to be present in different parts of the pomegranate plant making it pharmacologically precious (Prakash and Prakash, 2011). Barzegarl *et al.* (2007) studied the peel extract of *P. granatum* and reported substantial amounts of polyphenols such as ellagic tannins, ellagic acid and gallic acid. Preliminary phytochemical screening of the aqueous extract of *P. granatum* peels gave positive tests for tannins, flavonoids, and alkaloids and showed that the aqueous extract of *P. granatum* peels may contain some biologically active principles that may be the basis for its traditional use (Qnais *et al.*, 2007).

Fig. 1. *Punica granatum* Linn.



Prakash and Prakash (2011) showed significant variations in organic acids, phenolic compounds, sugars, water-soluble vitamins and mineral composition of pomegranates in their study. Keeping the above facts in view, this study investigated phytochemical constituents of aqueous and solvent peel extracts of *Punica granatum*.

Materials and methods

Collection of plant material: Fresh fruits of *Punica granatum* were collected from local market of koyambedu, Chennai and transported to laboratory (Fig. 1). The fruits were washed with running tap water, rinsed well in distilled water and exposed to drying at room temperature for about 5 min in open air.

Table 1. Phytochemical screening of *Punica granatum* peel extracts.

Phytochemicals tested	Aqueous	Ethanol	Chloroform	Petroleum ether	Acetone
Tannins	+	-	+	-	+
Saponins	+	+	+	+	-
Quinones	+	+	+	-	+
Terpenoids	+	+	+	-	+
Steroids	+	+	+	-	+
Flavonoids	+	+	-	-	+
Phenols	+	+	+	+	+
Alkaloids	+	+	-	-	-
Glycosides	-	-	-	-	+
Cardiac glycosides	+	+	-	-	+
Coumarins	+	+	-	-	+
Anthocyanin	-	-	-	-	-
Betacyanin	+	+	-	-	+

'+' - Present; '-' - Absent.

The peel from the fruit was removed carefully by knife and allowed to dry. The dried material was properly ground into powder and kept in refrigerator for further analysis.

Preparation of aqueous and solvent peel extracts: The stored peel powder of *Punica granatum* (1 g) was extracted with 20 mL of respective solvents namely aqueous, ethanol, acetone, petroleum ether, chloroform. After the extraction process, the solvents were removed by air drying using vacuum in a rotary-evaporator at 40°C to obtain crude extract and stored at 18°C in refrigerator.

Phytochemical screening: Phytochemical screening of *Punica granatum* peel extracts were assessed by standard method as described by Savithamma *et al.* (2011) and Selvaraj *et al.* (2014).

Test for Tannins: One mL of the peel extract was added to 1 mL 5% ferric chloride. Formation of dark blue or greenish black indicates the presence of tannins.

Test for Saponins: One mL of the peel extract was added to 1 mL distilled water and shaken in graduated cylinder for 15 min; lengthwise formation of 1 cm layer of foam indicates the presence of saponins.

Test for Quinones: One mL of the peel extract was added to 1 mL conc. sulphuric acid. Formation of red color indicates the presence of quinones.

Test for Flavonoids: One mL of the peel extract was added to 1 mL 2N sodium hydroxide. Formation of yellow color indicates the presence of flavonoids.

Test for Alkaloids: One mL of the peel extract was added to 2 mL conc. HCl. Then, few drops of Mayer's reagent was added. Presence of green color or white precipitate indicates the presence of alkaloids.

Test for Glycosides: One mL of the peel extract was added to 3 mL chloroform and 10% ammonium solution. Formation of pink color indicates the presence of glycosides.

Test for Cardiac Glycosides: One mL of the peel extract was added to 2 mL glacial acetic acid and few drops of 5% FeCl₃. This was under layered with 1 mL of concentrated sulphuric acid. Formation of brown ring at interface indicates the presence of cardiac glycosides.

Test for Terpenoids: One mL of the peel extract was added to 2 mL chloroform along with conc. sulphuric acid. Formation of red brown color at the interface indicates the presence of terpenoids.

Test for Phenols: One mL of the peel extract was added to 2 mL distilled water followed by few drops of 10% ferric chloride. Formation of blue/green color indicates the presence of phenols.

Test for Steroids: One mL of the peel extract was added to 2 mL chloroform and 1 mL sulphuric acid. Formation of reddish brown ring at interface indicates the presence of steroids.

Test for Coumarins: One mL of the peel extract was added to 1 mL 10% NaOH. Formation of yellow color indicates the presence of coumarins.

Test for Anthocyanin and Betacyanin: One mL of the peel extract was added to 1 mL 2N sodium hydroxide and heated for 5 min at 100°C. Formation of bluish green color indicates the presence of anthocyanin and formation of yellow color indicates the presence of betacyanin.

Results and discussion

Secondary metabolites afford imperative pharmaceutical properties for human health (Raskin *et al.*, 2002). Compounds belonging to the terpenoids, alkaloids and flavonoids are used as drugs or as dietary supplements to heal or prevent various diseases and in particular some of these compounds seem to be competent in preventing and inhibiting various types of cancer (Ashok Kumar and Vijayalakshmi, 2013). Table 1 lists the phytochemical constituents of *Punica granatum* peel extracts.

All the phytochemical constituents tested were present in aqueous extract of *P. granatum* peel except glycosides and anthocyanin. It was noted that ethanolic peel extract of *Punica granatum* showed the presence of all phytochemical constituents except tannins, glycosides and anthocyanin. The chloroform peel extract showed only presence of 6 phytochemical constituents out of 13. Petroleum ether extract of *P. granatum* peel showed the presence of saponins and phenols alone. All the phytochemical constituents tested were present in acetone extract of *P. granatum* peel except alkaloids, saponins and anthocyanin.

Conclusion

The present study showed interesting preliminary phytochemical constituents in aqueous and solvent peel extracts of *Punica granatum*. Further characterization and quantitative assay may be carried out to test the peel extracts for various therapeutic and pharmacological activity.

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