Pharmacognostic and Physicochemical study of *Punica granatum* L. leaf

Manisha Bapodara, Krunal Nagani and Sumitra Chanda*

Saurashtra University, Rajkot 360 005, Gujarat, India.

ABSTRACT

Punica granatum L. (Punicaceae) is a shrub, usually with multiple stems, that commonly grows 1.8-4.6m tall. The deciduous leaves are shiny and about 1-5 cm long. Almost all parts of this plant are used in traditional medicine for the treatment of various ailments. Hence, the present work was undertaken to establish the requisite pharmacognostic standards for evaluating the plant material. The present study includes examination of macroscopic and microscopic characters, powder analysis and physiochemical properties of *Punica granatum* L. leaf. The macro and microscopical studies indicated presence of simple leaf, opposite arrangement and prism and cluster crystals of calcium oxalate present throughout the transverse section. Chemomicroscopic characters present included starch and calcium oxalate crystals. The results of the study could be useful in setting some diagnostic indices for the identification and preparation of a monograph of the plant.

Key words: *Punica granatum* L., chemomicroscopic, pharmacognostic, physicochemical, crystals

INTRODUCTION

Plants have been the basis of many traditional medicine systems throughout the world for thousand of years and continue to provide mankind with new remedies. India is represented by rich culture, traditional and natural biodiversity offers a unique opportunity for drug discovery researchers.[1] According to World Health Organization (WHO) the macroscopic and microscopic description of a medicinal plant is the first step towards establishing its identity and purity and should be carried out before any tests are undertaken.[2,3]

Pharmacognosy has multidisciplinary characters i.e. to identify the drugs, its origin, morphology and microscopic studies, to determine the quality of the drug, its chemical compositions, therapeutic effects, etc.[4] Pharmacognosy studies help in identification and authentication of the plant material. The process of standardization can be achieved by stepwise pharmacognostic studies.[5] The standardization of a crude drug is integral part of establishing its correct identity. Before any crude drug can be in an herbal pharmacopoeia, pharmacognostic parameters and standards must be established.[6] Therapeutic efficacies of medicinal plants depend upon the quality and quantity of chemical constituents. It has been established that chemical constituents of a plant species vary with regard to climate and seasons.[7]

Punica granatum L. (Punicaceae) is a small tree with potential human health benefits, is grown mainly in Iran, India, China, Japan, Russia and USA as well as in most near and far east countries. The pericarp of pomegranate as well as its roots, bark and juice are used in the treatment of colic, colitis-diarrhia, dysentery, leucorrhea, menorrhagia, oxyariasis, paralysis, rectocele and headaches in traditional medicine.[8] The different parts of the tree (leaves, fruits, flowers and bark skin) have been used traditionally for their medicinal properties. The fruit is reported for antioxidant.[9] and cancer prevention.[10] The stem is reported for antibacterial activity.[11] Nair and Chanda.[12,13] reported anticandidal activity and antibacterial activity of *P. granatum* leaf. Hepatoprotective role of flowers of *P. granatum* has been reported by Celik et al.[14]

The aim of the present study was to evaluate various pharmacognostic parameters like macroscopic and microscopic characters, powder characteristics and physicochemical properties of *Punica granatum* L. leaf.

***Address for correspondence:**
E-mail: svchanda@gmail.com

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MATERIAL AND METHODS

Collection and extraction of plant material

The fresh leaf of *Punica granatum L.* was collected from Jamjodhpur, Gujarat in the month of August 2009. The plant was compared with voucher specimen (voucher specimen No. PSN311) deposited at Department of Biosciences, Saurashtra University, Rajkot, Gujarat, India. The leaf was washed under tap water, air dried, homogenized to fine powder and stored in airtight bottles. Ten grams of dried powder was extracted by sequential method using different solvents. The solvent was evaporated to dryness and the dried crude extract was stored in air tight bottle at 4°C. The acetone extract was used for the solubility study.

Pharmacognostic studies

Macroscopic characteristics

For morphological observations, fresh leaves (approx. 2-3 cm in length) were used. The macromorphological features of the plant parts (leaf) were observed under magnifying lens.[15]

Microscopic characteristics

Free hand section of leaf was taken and stained by well known reagent like safranine to confirm its lignification. Powder microscopy was also carried out and their specific diagnostic characters were drawn and recorded separately.[16]

Physicochemical parameters

Determination of physicochemical parameters as per guidelines of WHO[2] were also performed like total ash value, loss on drying, water soluble ash, acid insoluble ash, solubility, pH analysis, petroleum ether, acetone, methanol and water soluble extractive values, etc.

RESULTS AND DISCUSSION

Macroscopic characteristics

Macroscopically, the leaf was simple in composition, opposite, decussate, oblong-lanceolate or oblong-elliptic, glabrous, subsessile and exstipulate.The average leaf size was 2 to 3 cm (length) and 1 cm (width). The fresh leaf was green in color (Figure 1).

Microscopic characteristics

The transverse section of leaf of *Punica granatum L.* showed presence of upper and lower epidermis. The anomocytic and anisocytic stomata were present in epidermis. Unicellular trichomes were present in lamina but less in number. Xylem was lignified, phloem was non lignified, vascular bundles were arc shaped. Prismatic and cluster type of crystals of calcium oxalate were found. Spiral and annular types of xylem vessels were found in transverse section of leaf (Figures 2, 3).

The salient diagnostic characteristics of leaf were arc shaped vascular bundle, animocytic and anisocytic stomata, reticulate, annular and spiral types of xylem vessels and prism type of calcium oxalate crystal. These characters can be used for standardization of drugs and also used for preparation of plant monographs. Similar study is reported in other plants like *Manilkara hexandra,*[3] *Mitracarpus scaber* Zucc,[6] *Polyalthia longifolia* var. pendula,[17] *Tricosanthes cucumerina* L.,[18] *Ricinus communis* L.,[19] *Ficus racemosa* Linn.,[20] *Anisomeles indica* Linn.,[21]

Powder study

The crude powder of *Punica granatum* L. leaf was light green in color with characteristic odour and astringent test. The

Figure 1: Macroscopic characteristic of *Punica granatum* L. leaf

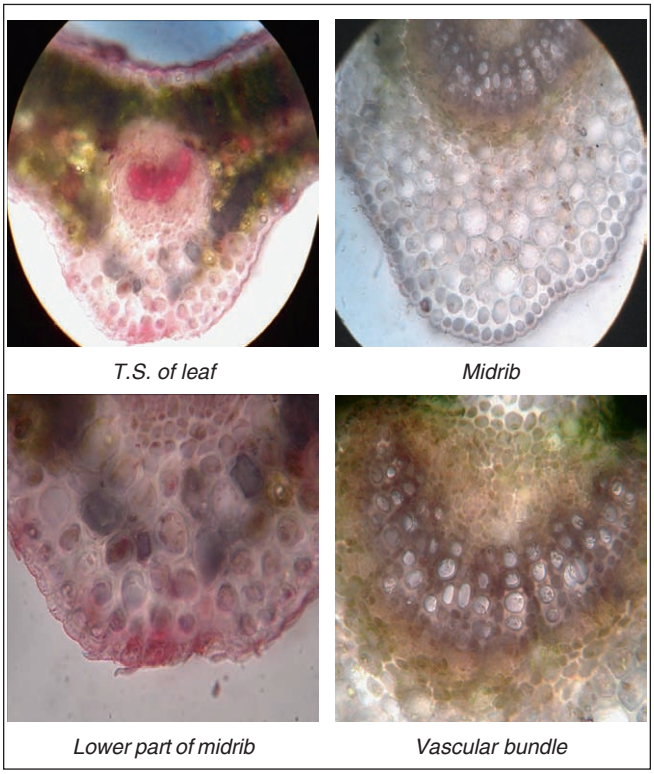

Figure 2: Microscopic characteristic of *Punica granatum* L. leaf