MICROSCOPICAL, PHYSICOCHEMICAL AND PHYTOCHEMICAL SCREENING OF CITRUS MAXIMA PEEL

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ABSTRACT

Citrus maxima, belongs to family Rutaceae, is commonly known as pomelo or shaddock. The peel or skin of fruit is a leathery exocarp, containing numerous oil glands, has antibacterial, antifungal, antioxidant, larvicidal, hepatoprotective, anticancer, antiplatelet, antidiabetic activities. The present study deals with the microscopical, physicochemical and phytochemical screening of Citrus maxima peel. This work will provide referential information for the correct identification and standardization of the Citrus maxima peel.

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INTRODUCTION

Ever since birth of mankind there has been relationship between life, disease and plants. In the recent years, plant derived products are increasingly being sought out as medicinal products, nutraceuticals and cosmetics. So there has been a need to ensure the safety, efficacy and quality of herbal drugs and herbal products. Standardization of drug means confirmation of its identity and determination of its quality and purity [1]. Standardization of herbal drug comprises of preliminary phytochemical screening, conducting various preliminary physicochemical studies and quantification of the marker constituent by various modern analytical techniques. *Citrus maxima* (pomelo or shaddock) is edible fruit belonging to family *Rutaceae* [2]. It is native to South and Southeast Asia [3]. It has been used as a folk medicine in many countries as antibacterial, antifungal, antioxidant, larvicidal, hepatoprotective, anticancer, antiplatelet, antidiabetic, anti-inflammatory etc. [4-12]. The present work deals with the pharmacognostic evaluation of the *Citrus maxima* peel and establishment of its quality parameters.

MATERIALS AND METHODS

Collection and identification of plant material

*Citrus maxima* (pomelo) fruits were purchased from local market of Mumbai, India and botanical identity was confirmed by Prof. H. M. Pandit, Botanist, Guru Nanak Khalsa College, Mumbai. Peels were separated from fruits and dried in tray drier. Peel powder was stored in air tight container at room temperature.

Reagent and Chemicals

All chemical used for the testing were analytical grade purchased from SD Fine Chemicals, Mumbai, India.

Preparation of extract

25 g of powdered peel was extracted with methanol using soxhlet extractor till complete exhaustion. Extract was concentrated using rotary vacuum evaporator at 40 °C and stored in the vacuum desiccator.

Pharmacognostic studies

Macroscopic and Microscopic characteristics

The macroscopic characteristic of pomelo fruit peels were studied, such as color, odor, taste, shape, size, etc. and reported. Microscopic evaluation was carried out for pomelo peel and powder.

Physicochemical analysis

The physicochemical parameters like total ash value, loss on drying, water soluble ash value, acid insoluble ash value, alcohol and water soluble extractive values were determined according to the specification as per Indian Pharmacopoeia 2010 [13].

Preliminary Phytochemical analysis

The extract mentioned above, was subjected to various qualitative phytochemical tests for detection of phytoconstituents such as flavonoids (Shinoda test, Alkali test & test with zinc dust), alkaloids (Dragendorff’s, Mayer’s, Wagner’s & Hager’s reagents), Steroids (Liebermann Burchard test & Saikowski test), Tannins and Phenolic compounds (Tests with Ferrie chloride, Gelatin, Acetic acid, Nitric acid, Potassium dichromate, Iodine, Dilute ammonium hydroxide, Potassium ferricyanide & Dilute potassium permagnate), Saponins (Foam test), Anthraquinones glycosides (Borntrager’s test & Modified Borntrager’s test), Cardiac glycosides (Keller–Killani test, Liebermann Burchard test, Liebermann’s reaction & Legal’s test), Coumarin and Coumarin glycosides (Fluorescence test), Proteins (Biuret test & Millon’s test), amino acids (Ninhydrin test & tests for cysteine, tryptophan, tyrosine), carbohydrates (Molisch & Fehling’s test) and Fats and Oils (Saponification test) [14,15,16].

RESULTS AND DISCUSSION

Pharmacognostic studies

Macroscopic and Microscopic characteristics

*Citrus maxima* fruit is mature hesperidium fleshy indehiscent approximately 7.9 cm in diameter, spherical in shape. Outer surface of fresh peel is greenish yellow in color and turns to brownish yellow when dried. Inner surface of fresh peel is white and turns to brownish when dried. Fresh peel has strong aromatic odor while dried peel is less aromatic. Taste is sour and bitter. T.S. of peel shows layer of small epidermis with characteristic stomata (Figure 1 and 2). Next is a zone of parenchyma, composed of loosely packed thin-walled cells. These cells contain prismatic crystals of calcium oxalate (Figure 3). Scattered in parenchyma are large oil glands and xylem vessels with spiral thickening (Figure 4 and 5).
**Figure 1:** T.S. of *Citrus maxima* peel stained with a solution of sudan red

**Figure 2:** Stomata

**Figure 3:** Calcium Oxalate Crystal
Physicochemical analysis
The physical constant evaluation of the drugs is an important parameter in detecting adulteration or improper handling of drugs. Physicochemical characterization of peel powder of *Citrus maxima* is shown in Table 1.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total ash</td>
<td>3.17 % w/w</td>
</tr>
<tr>
<td>Acid insoluble ash</td>
<td>0.83 % w/w</td>
</tr>
<tr>
<td>Water soluble ash</td>
<td>0.67 % w/w</td>
</tr>
<tr>
<td>Alcohol soluble extractive</td>
<td>29.24 % w/w</td>
</tr>
<tr>
<td>Water soluble extractive</td>
<td>10.25 % w/w</td>
</tr>
</tbody>
</table>

Preliminary Phytochemical analysis
The results of qualitative phytochemical analysis of the methanolic extract of pomelo peel are shown in Table 2. Peel had maximum flavonoids and steroids while saponins and Tannis were in less amount.
Table 2: Qualitative phytochemical analysis of *Citrus maxima* peel

<table>
<thead>
<tr>
<th>Phytochemical</th>
<th>Methanolic extract</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flavonoids</td>
<td>+ ve</td>
</tr>
<tr>
<td>Alkaloids</td>
<td>+ ve</td>
</tr>
<tr>
<td>Steroids</td>
<td>+ ve</td>
</tr>
<tr>
<td>Tannins and Phenolic compounds</td>
<td>+ ve</td>
</tr>
<tr>
<td>Saponins</td>
<td>+ ve</td>
</tr>
<tr>
<td>Anthraquinones glycosides</td>
<td>- ve</td>
</tr>
<tr>
<td>Cardiac glycosides</td>
<td>+ ve</td>
</tr>
<tr>
<td>Coumarin and Coumarin glycosides</td>
<td>+ ve</td>
</tr>
<tr>
<td>Proteins</td>
<td>- ve</td>
</tr>
<tr>
<td>Amino acids</td>
<td>- ve</td>
</tr>
<tr>
<td>Carbohydrates</td>
<td>+ ve</td>
</tr>
<tr>
<td>Fats and Oils</td>
<td>+ ve</td>
</tr>
</tbody>
</table>

CONCLUSION

Standardization is a vital tool for herbal drugs to establish their identity, purity, safety and quality. In order to standardize a drug various macroscopic, microscopic, physicochemical and phytochemical analysis are done. The above study provides information with respect to identification, chemical constituents and physicochemical characters of *Citrus maxima* peels. The preliminary phytochemical screening of *Citrus maxima* peels indicated that the plant possesses medicinally important phytochemicals hence can be employed as herbal medicine for primary health care needs as the conventional chemical drugs have many side effects. This study could be useful to establish the authenticity of this medicinally useful plant.

REFERENCE

13. The Indian pharmacopoeia, 2nd ed. New Delhi, India: Govt. of India publication; 2010.

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**LIST OF ABBREVIATIONS**

T.S. : Transverse Section