Qualitative Phytochemical Screenings of Methanol Extract of *Parmentiera cereifera* Seem Fruits

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Abstract

Nature is the best source of medicines. Plants consisting of various types of organic substances, and they impart different biological activities. The numerous medicines are administered to our body through diets. These foods protect us from different types of diseases and disorders. Here we planned to conduct phytochemical screening of the methanol extracts of *Parmentiera cereifera* fruit. The outcomes of phytochemical screening of methanol extracts exhibited the presence of flavonoids, saponins, tannins, triterpenoids as well as steroids. These phytoconstituents are used in ailment of various diseases such as antipyretic, analgesic, diabetes, cardioprotective, lipid lowering activity, hepatoprotective, antidiabetics, antidiarrhoeal, anticancer, antiasthmatic activities, antimicrobial etc. These are only preliminary studies to isolate potential compounds which may be used as a lead compound for several biological activities.

1 Introduction

The phytochemicals are usually related to the organic substances present in the plants. Moreover, it also indicates the colour pigment of plants. Hence the fruits and vegetables having intense colour exhibit that it is a rich source of phytoconstituents. By eating these fruits it produces numerous medicines or nutrients to our body directly or indirectly. It has been documented that more than 900 different chemical constituents are present in plant foods. These protective plant compounds are an emerging area of nutrition and health, with new research reported every day. These chemical constituents are responsible to protect the body against disease. Research suggests that phytochemicals, working together with nutrients found in fruits, vegetables and nuts, may help slow the aging process and reduce the risk of many diseases including cancer, heart disease, stroke, high blood pressure, cataracts, osteoporosis, and urinary tract infections. They can have complementary and overlapping mechanisms of action in the body, including antioxidant effects, modulation of detoxification enzymes, stimulation of the immune

system, modulation of hormone metabolism, and antibacterial and antiviral effect^{1,2}.

P. cereifera belongs to family Bignoniaceae, and it is also known as Candle tree. It is a small tree with rough bark. The leaves are oblong and acuminate. The flowers are cauliflorous, nocturnal, white, slightly fragrant and calyx spathaceous. The fruits and seeds of this tree are berry pale yellow, pendent, candle-like, smooth, edible and used as a fodder source. The tree is inherent to Panama and cultivated for embellishing purposes in many tropical countries^{3,4}. As a part of our continuing studies on medicinal plants of Bangladesh, the organic soluble materials of leaf of *P. cereifera* were evaluated for determining phyto-constituents for the first time⁵.

2 Materials and Methods

2.1 Plant material

The fruits of *P. cereifera* were collected from Mirpur Botanical Garden, Dhaka, Bangladesh, in the month of November 2011. A voucher specimen for this plant has been maintained in Bangladesh National Herbarium, Dhaka, Bangladesh (Accession no.36569). The

fruit were picked and washed with water to remove all unwanted plant materials and sand, air dried under light exposure (27°C-30°C for 7 days), pulverized in a mill and stored in an airtight container for further study.

2.2 Preparation of extract

The air dried and powdered fruit (500 gm) of *P. cereifera* was macerated in 2.5 L of methanol for 7 days and then filtered through a cotton plug followed by Whatman filter paper number 1. The extract was concentrated with a rotary evaporator at low temperature (40-45 °C) and reduced pressure₆.

3 Phytochemical screening

The methanol extract was subjected to qualitative phytochemical screening. The various phytochemical screenings namely tannins, glycosides, flavonoids, alkaloids, saponins, and steroids were performed^{2,6}.

3.1 Anthraquinone (Borntrger's Test)

About 0.5 g of the extract was taken into a dry test tube and 5 mL of chloroform was added and shaken for 5 min. The extract was filtered, and the filtrate was shaken with equal volume of 10% ammonia solution. A pink violet or red color in the ammonical layer indicates presence of anthraquinone.

3.2 Tannins

Small quantity of extract was mixed with distilled water and heated on water bath. It was filtered and Ferric chloride was added to the filtrate. A dark-green color indicates presence of tannins.

5ml of extract and a few drops of 1% lead acetate were added. A yellow precipitate was formed, indicates the presence of tannins.

3.3 Flavonoids

About 0.2 g was dissolved in diluted NaOH and HCl was added. A yellow solution that turns colorless indicates the presence of flavonoids.

3.4 Saponins

About 0.2 g of plant extracts was taken, and 5 mL of distilled water was added and then boiled. Frothing persistence shows presence of saponins.

3.5 Steroids (Libermann-burchard reaction)

1ml plant material in 10 mL chloroform filtered. Two hundred milliliter of acetic anhydride were added to 2 mL filtrate with 2 mL H₂SO₄. The color changes from violet to blue or green in some samples indicating the presence of steroids. 1 ml of the extracts was dissolved in 10ml of chloroform and equal volume of concentrated

Ferdous *et al.* Qualitative Phytochemical Screening of *P. cereifera*

H₂SO₄ was added by sides of the test tube. The upper layer turns red and H₂SO₄ layer showed yellow with green fluorescence. This indicated the presence of steroids.

3.6 Phlobatanins

About 0.5 g of plant extracts was dissolved in distilled water and filtered. The filtrate was boiled with 2% HCl solution. Red precipitate shows the presence of phlobatanins.

3.7 Terpenoids (Salkowski method)

About 0.5 g of each extracts in 2 mL of chloroform filtered. Concentrated H₂SO₄ carefully added to form a layer. A reddish brown coloration of the interface was formed to show positive results for the presence of terpenoids.

3.8 Triterpenoids

10 mg of the extract was dissolved in 1 ml of chloroform; 1ml of acetic anhydride was added following the addition of 2 ml of conc. H₂SO₄. Formation of reddish violet colour indicates the presence of triterpenoids.

3.9 Cardiac glycoside

About 0.5g of each was treated with 2 mL of glacial acetic acid containing a drop of FeCl₃ solution. This was under layered with 1 mL of concentrated H₂SO₄. A brown ring obtained at the interface indicated the presence of de-oxy sugar characteristics of cardenolides.

4 Results and Discussion

The phytochemical screening was performed to investigate the nature of phytoconstituent present in fruit extracts. The chemical constituents may be a useful indicator of both efficacy and potential toxicity of plants. The phytochemical screening of fruit extracts of *P. cereifera* are displayed in table 1.

Table 1 exhibited the presence of tannins, flavonoids, saponin, steroids, terpenoids and tripterpenoids, while anthraquinone derivative, Phlobatanins and Phlobatanins were absent. The flavonoids, tannins and phenolic compound is known to be useful in the treatment of various diseases such as cancer, hepatotoxicity, ulcerated tissue, cardiovascular diseases, diabetes etc. Hence, the presence of these phytoconstituents in fruits of *P. cereifera*, may serve as a potential source of drug for traditional healers.

It has scientifically documented that the flavonoids play an important role in scavenging the reactive oxygen species or free radicals. There are numerous factors which produce free radical in the body; and one of the important factors is oxidative stress. These radicals are responsible for inception of numerous diseases and disorders. Some of them are necrosis to liver cells, cardiovascular diseases,

kidney failure, cancer, arthritis, gout, diabetes, hypertension etc. The antioxidant can neutralize the free present in the body, and protect body from the several diseases. The flavonoids, tannin and polyphenol are the chief constituents of antioxidant substance^{8,9}.

Table 1: Phytochemicals present in methanol extracts of *P. cereifera* fruits

Phytoconstituents	Color	Results
Anthraquinone	Pink violet or red color	-
Tannins	Dark-green color	+
Flavonoids	Yellow solution that turns colorless	+
Saponins	Frothing persistence	+
Steroids	The upper layer turns red and H ₂ SO ₄ layer showed yellow with green fluorescence	+
Phlobatanins	Red precipitate	-
Terpenoids	Formation of reddish violet colour	+
Triterpenoids	H ₂ SO ₄ Formation of reddish violet colour	+
Cardiac glycoside	Brown ring obtained	-

(+) = Present and (-) = Absent

The terpenoids are the secondary metabolite consisting of two or more isoprene units. Most of the monoterpenes are nonnutritive dietary components present in the citrus fruits. Terpenoids are applied for the ailment of the various diseases. It scientifically validated that the terpenoids can be used against cancer, malaria, inflammation and variety of infectious diseases. It has been reported that terpenoids cannot only prevent the formation of cancer, additionally it regress the existing malignant tumors. The mechanism of antitumor property of terpenoids is the induction of apoptosis and interference the protein prenylation of key regulatory proteins.

Above studies confirms that the pharmacological activities of the medicinal plant depend on the nature and quantities of phytoconstituents. The present studies suggested that this plant can be used in the treatment or prevention of disease.

5 Conclusions

Ferdous *et al.* Qualitative Phytochemical Screening of *P. cereifera*

In present studies, we found that most of the biologically active phytochemicals were present in the methanol extracts of *P. cereifera* fruits. This is only a preliminary study and to make final comment on the extract should thoroughly be investigated phytochemically and pharmacologically to exploit their medicinal and pharmaceutical potentialities.

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