Pharmacological importance and phytochemical screening of Bombax *ceiba* L flowers.

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ABSTRACT

Bombax ceiba is the important medicinal plant of the family Malvaceae commonly called as Semal and silk cotton is widely spread in tropical, subtropical India and East Asia, Since Ancient times *Bombax ceiba* is well known for its wide therapeutic applications and potential medicinal usage among various tribal communities around the world. Hence present experimental work, phytochemical analysis of hexane, ethyl acetate and methanol extracts obtained from the flowers of *Bombax ceiba* were evaluated. Phytochemical screening have been carried out by different methods for evaluating various phyto-constituents. Various secondary metabolites have been identified from the different flower extracts of *Bombax ceiba* such as alkaloids, glycosides, tannins, essential oils, flavanoids, saponins, phenolic compounds, triterpenoids and steroids. The phyto chemical compounds from this plant possess pharmacological properties including anti diabetic, anti-inflammatory, anti-cancer, antibacterial, antifungal, antioxidant, immunomodulatory, antineoplastic, hypotensive, hypolipidemic.

KEYWORDS: *Bombax ceiba*, Malvaceae, phyto-constituents, alkaloids, glycosides and anti-oxidant.

INTRODUCTION:

Indian herbal medicine system is the ancient, most culturally diverse and well acknowledged all over the World. The evidence of herbal medicine usage in India recorded in Rigveda, Traditional healers believed "every herb can be a curative" in Indian culture, vivid collection of trees, herbs or plants were widely used by in herbal medicine. At present, around 80 percent of population in Indian still confide on herbal medicine for maintaining the basic health care[1, 2]. The studies of traditional systems like ayurveda, siddha and unani explored a large volumes of evidence that showed immense potential usage of medicinal plants in treating various ailments of human beings[3].

Bombax ceiba belongs to order malvales and family malvaceae commonly called as semal, Silk cotton tree widely found in India, Sri Lanka, Pakistan, Bangladesh, Myanmar, Malaysia, Java and Sumatra[4]. Every part of *Bombax ceiba* tree viz. Flower, leaves, seeds, gums and roots have potential medicinal properties which is proved by ethno botanists in many surveys and in the traditional medicine system. It is a fast-growing tree and also s light demander (Figure 1). Especially it flourish in valleys, sandy loams with annual rainfall of 50 to 460cm[5]. Bombax ceiba is a tall deciduous tree with characteristic woody thorns on the bark. This tree produces huge, crimson, ornithophilous flowers[6]. The flowers are red numerous, appearing when the tree is bare of leaves, stamens many arranged in five bundles of 9-12 each and an inner bundle of 15(Figure 3). Flowers have firm perianth with rigid filaments and well protected ovaries[7]. Bark has hard-sharp conicles and grey-brown or silver-grey coloured (Figure 2). The leaves are large, spreading, glabrous, leaflets lanceolate, 3-7, and margin entire [8]. The seeds of plant is irregularly shaped obovoid, shiny, black or brown, oily. Gum of tree is also called as semul gum [9].

Stem, root, flower, fruit, and leaves of *B. ceiba* imbibed with secondary metabolites such as glycosides, alkaloids, phytosterols, and triterpenoids, proteins, phenolic compounds and tannins[10]. Which possess medicinal properties like anti diabetic, anti-inflammatory, anti-cancer, antibacterial, antifungal, antioxidant,

immunomodulatory, antineoplastic, hypotensive, hypolipidemic. Flowers of *Bceiba* contain β-D-glucoside of β-sitosterol, free β-sitosterol, hetriacontane, hetriacontanol, kaempferol, quercetin [11], palmitic corrosive, ethyl palmitate, β- sitosterol, bombasin and bombasin 4-o-β-glucoside and a novel Dgulono-γ- lactone subsidiary bombalin, Dihydrodehydro di-coniferyl liquor 4-o- β-d-glucopyranoside, trans-3-(p-coumaroyl) quinic corrosive and neochlorogenic corrosive, Quercetagetin, pelargonidin-5-β-glucopyranoside and cyaniding-7-methyl ether 3-β-glucopyranoside[12]. Flowers are used to cure polyuria, spermatorrhea, leucorrhea, menorrhagia, skin problems, splenomegaly and haemorrhoids[13]. The roots of *Bombax ceiba* are cooling, sweet, stimulant, tonic, demulcent and are used in dysentery, to treat stomach agony and gonorrhea[14, 15].The gum has the property of cooling, aphrodisiac, astringent, demulcent and to treat looseness of the bowels [16, 17]. The bark has the property of demulcent and emetic, and it also has the power of healing. Leaves are used for skin eruptions. Seeds are said to be useful in treating gonorrhea and chronic cystitis[18]. *Bombax ceiba* calyx and flower chemical composition was studied with ether extract, presence of protein, phosphorous, magnesium and calcium content were found[19] (Table 1).

MATERIALS AND METHODS

Collection of Plant material

Bombax ceiba flowers were collected from gamparai village, Pedabayalu mandal, Paderu, Eastern Ghats, Visakhapatnam, Andhra pradesh, India. In the month of January flowers were collected and authenticated them with the help of a Botanist, Department of Botany, Andhra University, Visakhapatnam, Andhra pradesh, India.

2.1 Preparation of plant material

Collected flowers are water washed, then dried in the shade, flowers were further grinded in to powder. The dried flower powder was placed in soxhlet apparatus and subjected to successive extraction using hexane, ethyl acetate, methanol solvents and macerated to form an aqueous extract. Consequently, extract is collected and filtered. The filtrate was evaporated to get the residue using vacuum evaporator (superfit, India) maintaining pressure at ≤ 50° C temperature. The crude extract obtained after evaporation was stored for further phyto chemical evaluation.

Preliminary Phytochemical Analysis

Phytochemical screening of plant extracts[20, 21] was done following the standard procedure [22,23,24]the prepared flower were subjected to preliminary phytochemical screening for the presence of glycosides, alkaloids, tannins, essential oils, flavanoids, saponins, phenolic compounds, triterpenoids, steroids.

Tests for Alkaloids

For detection of Alkaloids around 50 mg of solvent free extract was mixed with dilute hydrochloric acid little quantity and filtered. The filtrate subjected to various alkaloidal reagents and tested carefully as follows.

Wagner's test

Plant extract 2 ml and dilute hydrochloric acid 0.2 ml were subjected in a test tube. After that 1 ml of iodine solution (Wagner's reagent) was added. Brown/reddish precipitate Formation indicates the presence of alkaloids.

Mayer's test

Plant extract 2 ml and dilute hydrochloric acid 0.2 ml were subjected in a test tube. Then 1ml of Mayer's reagent was added to it. Yellow colored precipitate Formation indicates the presence of alkaloids.

Picric acid test

Plant extract 2 ml and dilute hydrochloric acid 0.2 ml were subjected in a test tube. Then 3-4 drops of 2% picric acid solution is added. Orange color formation indicates the presence of alkaloids.

Detection of Glycosides

For identification of glycosides, around 50 mg of plant extract was hydrolyzed with concentrated hydrochloric acid for about 2 hours on a water bath and further filtered and the hydrolysate was subjected to the following tests.

Legal's Test

Plant extract 50 mg was dissolved in pyridine. Sodium nitroprusside solution was added and made alkaline using 10% sodium hydroxide solution. Characteristic pink color indicates the Presence of glycoside.

Detection of Flavonoids

Alkaline Test:

Plant extract 5 ml added to 5ml of 95% ethanol and few drops of concentrated hydrochloric acid and 0.5 gm magnesium turnings. Characteristic Pink color indicates the presence of flavonoids.

Detection of Saponins

Foam or Froth test

Plant extract 1 ml was added in a graduated cylinder and with distilled water it is diluted to 20 ml and gently shaken for about 15 min. Foam formation indicates the presence of saponin glycosides.

Detection of Tannins and Phenolic Compounds

Ferric Chloride Test:

Plant extract 5 ml was placed in a test tube and then 1 ml of 5% Ferric chloride solution was added to it. The presence of tannins and phenolic compounds were confirmed by Characteristic Deep blue color.

Detection of Triterpenoids and Phytosterols

Libermann – Burchard's test:

Plant extract was dissolved in acetic anhydride, subjected to heating and boiling after cooling off along the side of the test tube 1 ml of concentrated sulphuric acid was added. The presence of steroids / triterpenoids and their glycosides were characterized by Red, pink or violet color at the junction.

Salkowoski test:

Plant extract and few drops of concentrated sulphuric acid was added, shaken, the presence of steroids characterized on standing red color in the lower layer. The presence of triterpenoids characterized by formation of golden yellow color.

Detection of volatile oils

Volatile oil test:

To the plant extract few drops of alcoholic solution of Sudan red III was added, the presence volatile oils were characterized by formation of Red color.

Figure 1: ***Bombax ceiba*** **tree**

Figure 2: ***Bombax ceiba*** **Bark**

Figure 3: *Bombax ceiba* Flower

RESULTS AND DISCUSSION

Preliminary phytochemical analysis of *Bombax ceiba* flowers exhibited the presence of various phytochemicals, such as alkaloids, glycosides, flavonoids, tannins, steroids, Triterpenoids and volatile oils showed on (Table 2). In the present study *bombax ceiba* Methanol extracts was found rich in alkaloids, moreover moderate amount of glycosides, flavonoids, Tannins, steroids, Triterpenoids and volatile oil was also observed, saponins are absent in methanol extract . On the other hand Ethyl Acetate extract of *bombax ceiba* flower contain flavonoids, steroids, Triterpenoids and volatile oils are present the major secondary metabolites alkaloids, glycosides and saponins were absent in ethyl acetate extract.

Interestingly, in Hexane extract of *bombax ceiba* flower showed the presence of tannins, triterpenoids and alkaloids. Hexane extract showed the absence of glycosides, flavonoids, steroids and volatile oil. Comparing all the three extracts methanol, ethyl acetate and hexane extracts for the phyto chemical composition, methanol extract exhibited maximum secondary metabolites it is rich in phyto chemicals followed ethyl acetate extract and hexane extract respectively(Table 2). Thus, the study revealed that the *Bombax ceiba* flower extracts containing different phyto chemicals exhibit pharmacological properties and possess potential cure for many diseases.

Table 1: Chemical composition of flower buds and calyces

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COMPOSITION	CALYCES	FLOWER
Moisture %	85.14	85.66
Protein%	1.56	1.38
Carbohydrates%	13.87	11.95
Ash%	1.00	1.09
Calcium(mg/100g)	95.00	92.25
Magnesium (mg/100g)	64.00	54.24
Phosphorous(mg/100g)	41.00	49.00

Table.2 Preliminary Phytochemical Screening of *Bombax Ceiba* Flower Extract

Test for Phytochemicals	BC Methanol extract	BC Ethyl acetate extract	BC Hexane extract
Alkaloids			
Wagner's	+	-	+
Meyer's	+	-	-
Picric Acid	-	-	-
Glycosides			
Legal's	+	-	-
Baljet's	+	-	-
Flavanoids			
Alkaline	+	+	-
Saponins			
Foam	-	-	-
Tannins			
Ferric chloride	+	-	+
Steroids			
Libermann-Burchard	+	+	-
Triterpenoids			
Salkowski	+	+	+
Volatile oils			
Sudan red III	+	+	-

CONCLUSION

Bombax ceiba is a flowering plant from arid zone area which is widely spread. It grows independently and does not requires any maintenance and nourishment care. Less awareness of its medicinal importance and health benefits is there among the people. We aimed to conduct phyto chemical screening of *Bombax ceiba* flower and emphasise the presence of biological compounds to make aware of the health benefits, medicinal

importance and bioactive potential of *Bombax ceiba*. The plant have abundant phytochemicals such as alkaloids, glycosides, flavonoids, steroids, saponins, tannins, triterpenoids, volatile oils which helps in mitigating various diseases and disorders. Thus, medicinal plant *bombax ceiba* is a boon for human kind.

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