Research Article

Phytochemical Analysis of Various Extracts of *Pongamia glabra*

***Sharmila D, Shameema Banu**
Department of Industrial Biotechnology, Bharath University, Selaiyur, Chennai, India.
***Corresponding author's E-mail:** sharmibiotechnology@gmail.com

Accepted on: 18-12-2014; **Finalized on:** 28-02-2015.

ABSTRACT

Plants are rich sources of medicines and the treatment of diseases through medicinal plants range from common cold to cancer. In the Indian traditional medical systems of Ayurveda, Sidha and Unani the use of medicinal plants is common. Extraction of the bioactive plant constituents has always been a challenging task for the researchers to know the efficacy of the phytochemicals. In the present study, phytochemical analysis of acetone and choloroform extracts of *Pongamia glabra* was undertaken. The results indicated that flavonoids, tannins and cardiac glycosides were present in acetone extract while alkaloids and saponons were present in the chloroform extracts of the medicinal plant *Pongamia glabra.* Amino acids, proteins, terpenoids, reducing sugars, anthroquinones and steroid were absent in both the extracts.

Keywords: Medicinal plants, Phytochemical, Acetone, Chloroform, *Pongamia glabra.*

INTRODUCTION

From the time immemorial, plants have been widely used as curative agents for variety of ailments.[1, 2] Concentrated fruits or seeds extract can be found in various herbal preparations which are widely available in market today.

The plant, *Pongamia glabra* Linn. (Papilionaceae) (Synonym, *Pongamia pinnata or Milletia pinnata*), is a large tree found in tropical region and coastal forests of India, North Australia, Southeast Asia and Malaysia. Preferred habitats include coastal and riverine habitats, primarily in humid tropical and subtropical areas (500–2500 mm rainfall per annum). *Pongamia* tolerates a wide range of soils, including saline soils.

Pongamia glabra. (showing stem and leaves)

In the traditional system of medicines, such as Ayurveda and Unani, the *Pongamia pinnata* plant is used for anti-inflammatory, anti-plasmodial, anti-noniceptive, anti-hyperglycamic, anti-lipidperoxidative, anti-diarrhoeal, anti-ulcer, anti-hyperammonic, antioxidant, anticancer activity, fungicidal, antibacterial and cardioprtective activities.[3-9]

The seed and seed oil have been used for treating various inflammatory and infectious diseases such as leucoderma, leprosy, lumbago, articular rheumatism and muscular. Extracts of roots, leaves and seeds of the *Pongamia glabra* have been reported to have anti-inflammatory and anti diarrheal activities. The ethanol extract of *Pongamia glabra* leaf gall was found to be anti-inflammatory and analgesic in rodents.[10] The leaves are hot, digestive, laxative, anthelmintic, cure piles, wounds and other inflammations. A hot infusion of leaves is used as a medicated bath for relieving rheumatic pains and for cleaning ulcers in gonorrhea and scrofulous enlargement. In addition, the phytochemical examinations of this plant have indicated the presence of furanoflaovones, furanoflavonols, chromenoflavones, flavones, furanodiketones and glucosides.[11-14]

The seeds of *Pongamia* are rich in oil, which is being considered as a new source of 'biofuel'. The seed oil is used in epoxy coating.[15] It also produces large numbers of water-dispersed seeds. Its leaves and seeds are *toxic to herbivores.*

The phytochemical screening and vitamin content of certain plant species has been evaluated to design pharmaceutics of plant origin.[16] In the present study the acetone and chloroform extracts of leaves of Pongamia glabra were studied for the presence of various phytochemicals.

© Copyright protected. Unauthorised republication, reproduction, distribution, dissemination and copying of this document in whole or in part is strictly prohibited.

MATERIALS AND METHODS

Collection of samples

The leaves of *Pongamia glabra* were used for the experiment. The plant leaves were collected from nearby areas of Bharath University, Chennai, TamilNadu.

Preparation of extracts

500 grams of plant leaves of *Pongamia glabra* was packed in separate round bottom flask for sample extraction. The extraction process was conducted by 750 ml of the solvent mixture for a period of 48 hours. At the end of the extraction the respective solvents were concentrated under reduced pressure and the crude extracts were stored in refrigerator, for further use.

Phytochemicals analysis

The extracts prepared were analyzed for the presence of alkaloids, saponins, tannins, steroids, flavonoids, anthraquinones, cardiac glycosides and reducing sugars based on the protocols available in the literature.[17-19]

Test for alkaloids

The extract of the crude dry leaf powder of each solvent was evaporated to dryness in water bath. The residues were dissolved in 2 N Hydrochloric acids. The mixture was filtered and the filtrate was divided into three equal portions. One portion was treated with a few drops of Mayer's reagent, one portion was treated with equal amount of Dragondorff's reagent and the third portion was treated with equal amount of Wagner's reagent respectively. The appearance of creamish precipitate, the orange precipitate and brown precipitate indicated the presence of respective alkaloids.[20]

Test for saponins

About 2 ml of plant leaves and extract was vigorously shaken with water in a test tube and then heated to boil. Frothing was observed which was taken as a preliminary evidence for the presence of the saponins.

Test for tannins

About 2 ml of plant leaves extract was added was in 10 ml of water in a test tube and filtered. A few drops of 0.1% ferric chloride was added and observed for brownish green or blue-black coloration.[21]

Test for steroids

2 ml of acetic anhydride was added to 2 ml of plant leaf extract of each sample along with 2 ml sulphuric acid. The colour changed from violet to blue or green in some samples indicating the presence of steroids.

Test for flavonoids

2 ml of extract solution was treated with 1.5 ml of 50% methanol solution. The solution was warmed and metal magnesium was added. To this solution few drops of conc. Hydrochloric acid was added and the red colour was observed for flavonoids and orange colour for flavones. [22]

Test for anthraquinones

About 2 ml of extract was taken in a dry test tube and 5 ml of chloroform was added and shaken for 5 min. The extract was filtered and the filtrate shaken with equal volume of 10% of ammonia solution. A pink violet or red colour in the ammonical layer indicates the presence of anthraquinones.[22]

Test for cardiac glycosides

2 ml of extract was dissolved in 1 ml of glacial acetic acid containing 1 drop of ferric chloride solution. This was then under layered with 1ml of concentrated sulphuric acid. A brown ring obtained at the interface indicated the presence of a deoxysugar characteristic of cardioids. [22]

Test for Proteins

To 2ml of extract 1ml of 40% NaOH solution and 1 to 2 drops of 1% $CuSO_4$ solution was added. A violet colour indicated the presence of peptide linkage of the molecule. [22]

Test for Amino Acids

To 2 ml of sample was added to 2 ml of Ninhydrin reagent and kept in water bath for 20 minutes. Appearance of purple colour indicated the presence of amino acids in the sample. [22]

Test for Tri-Terpenoids

5ml of each extract was added to 2ml of chloroform and 3ml of con. H_2SO_4 to form a monolayer of reddish brown coloration of the interface was showed to form positive result for the tri-terpenoids. [22]

Test for Reducing Sugar

To 2 ml of extract, 2 drops of Molisch's reagent was added and shaken well. 2ml of conc. H_2SO_4 was added on the sides of the test tube. A reddish violet ring appeared at the junction of two layers immediately indicated the presence of carbohydrates. [22]

RESULTS AND DISCUSSION

Table 1 Shows that the phytochemical constituents of Acetone, and chloroform extracts of *Pongamia glabra.* The phytochemical screening of the crude extracts revealed the presence of Flavonoids, alkaloids, saponins, tannins, and anthroquinones.

Saponins were present in chloroform extract whereas, the acetone extract showed negative result for saponins. In the case of flavonoids, acetone extract showed positive results. Both the extracts showed the absence of proteins. The terpenoids were absent in both the extracts. The reducing sugar were also absent in chloroform extract and the acetone extract shows negative. The cardiac glycosides present in acetone extract and amino acids were absent in all extract .The acetone extract shows the positive result of tannins. In the case of alkaloids the chloroform extract shows positive whereas the acetone extracts shows negative. All

© Copyright protected. Unauthorised republication, reproduction, distribution, dissemination and copying of this document in whole or in part is strictly prohibited.

extracts showed negative results for amino acid test. Arote et al, 2009 have reported the presence of carbohydrates, alkaloids, flavonoids, glycosides, steroids, saponins and tannins in the ether, choloroform, ethyl acetate and methanolic extracts of leaves of *Pongamia pinnata*.[7] The results obtained in the present study also showed similar results except for few exceptions.

Table 1: The Phytochemical constituents of Acetone, and Chloroform extracts of leaves of *Pongamia glabra*.

Phytochemicals	Acetone Extract	Chloroform Extract
Flavonoids	+	-
Alkaloids	-	+
Saponins	-	+
Tannins	+	-
Amino acids	-	-
Proteins	-	-
Terpenoids	-	-
Reducing sugar	-	-
Cardiac glycosides	+	-
Anthroquinones	-	-
Steroids	-	-

"+"= Positive. "-" = Negative

CONCLUSION

The Phytochemical screening carried out with the acetone and chloroform extracts of *Pongamia glabra* leaf revealed the presence of many secondary metabolites such as tannins, flavonoids, saponins etc. These phytochemicals contribute to the pharmacological activities of the plant.

REFERENCES

1. Rastogi RP and Melhotra BN. Compedium on medicinal plants. Central Drug Research Institute Lucknow and National Instuitue Science Communications, New Delhi, India. 2001, 522-523.
2. Kirtikar KR and Basu BD. Illustrated Indian Medicinal plants III, Revised and enlarged Edition, 3, 2000, 997-999.
3. Chopade VV, Tankar AN, Pande VV, Tekade AR, Gowekar NM, Bhandari SR, Khandake SN. Phytochemical constituents, traditional uses and pharmacological properties: a review. Int. J Green Pharma, 2, 2008, 72-75.
4. Pandey A., Vaibhavi Jakhetia, Sonu Sharma Antiulcer activity of *pongamia pinnata* in rats. Journal of Drug Delivery & Therapeutics, 3(3), 2013, 85-89
5. Arulvasu C, Supriya S V, Babu G. Anticancer activity of Pongamia glabra seed oil extracts against selected human cancer cell lines. Int. Res J of Pharmacy, 3(8), 2012, 131-134.
6. More DR and Mirza Vaseem Baig M. Fungitoxic properties of *pongamia pinnata* (L) pierre extracts against pathogenic fungi, International Journal of Advanced Biotechnology and Research, 4(4), 2013, 560-567.
7. Arote S R, Dahikar S B and Yeole PG. Phytochemical screening and antibacterial properties of leaves of *Pongamia pinnata* Linn.(Fabaceae) from India. African J of Biotech, 8(22), 2009, 6393-6396.
8. Niranjan K, Sathiyaseelan V, Jeyaseelan E C. Screening of anti-microbial and phytochemical properties of different solvent extracts of leafs of *Pongamia pinnata,* International Journal of Scientific and Research Publications, (1), 2013, 2250-3153.
9. Saiprasanna Behera, S. Manohar Babu, Y. Roja Ramani, Prasanta Kumar Choudhury, Rajeshree Panigrahi. Protective Effect of Pongamia pinnata On Isoproterenol-Induced Hepatotoxicity in Rats. Life Sciences Feed, 1, 2012, 8-15
10. Ganesh M, Vasudevan M, Kamalakannan K, Kumar AS, Vinoba M, Ganguly S, Sivakumar T. Anti-inflammatory and analgesic effects of *Pongamia glabra* leaf gall extract. Pharmacology online, 1,2008, 497-512.
11. Ahemd G, Yadav PP, Maurya R. Furano flavonoid glycosides from *Pungamia pinnata* fruits. Phytochemistry, 65, 2004, 921-924.
12. Yadav PP, Ahmed G, Maurya R. Furano flavonoids from *Pungamia pinnata* fruits. Phytocehmistry, 65, 2004, 439-443.
13. Tanaka T, Linuma M, Yuki K, Fujii Y, Mizuno M. Flavoinoids in root bark of *Pongamia pinnata*. Phytochem, 192, 31, 993-998.
14. Chauhan D, Chauhan JS. Flavonoid, glycosides from *Pongamia pinnata*. Farm Biol, 40, 2002, 171-174.
15. Sharmin E, Ashraf S M and Ahmed S. Synthesis, characterization, antibacterial and corrosion preotective properties of epoxies, epoxy-polyols and epoxy-polyurethene coatings from linseed and *Pongamia glabra* seed oils. Int. J. of Biological Macromaolecules, (40), 2006, 407-422
16. Pandith JI, Singh BG. Evaluation of the Vitamin Content and Phytochemical Analysis of Plant Species from Northern India, International Journal of Research in Chemistry and Environment, 2 (2), 2012, 2248- 2249.
17. Adetuyi AO, Popoola AV. Extraction and Dye ability potential studies of colourantin, zanthoxylum, zanthosxyloides plant on cotton fabric, J. Sci. Eng.Tech, 8 (2), 2001, 3291-3299.
18. Trease, G.E. and W.C. Evans, 1989. Pharmacognosy. 13th (ed). ELBS/Bailliere Tindall, London, 345-6, 535-6, 772-3.
19. Sofowora A (1982), Medicinal Plants and Traditional Medicine in West Arica, John Wily and Sons. New York. 1982, 256.
20. Salehi-Surmaghi MH, Aynehchi Y, Amin GH , Mahhmoodi Z.Survey of Iranian plants for saponins ,alkaloids, flavonoides and tannins. 2, 1992, IV, DARU, 1-11.
21. Segelman AB, Fransworth NR, Quimbi MD. (1969) False negative saponins test results induced by the presence of tannins. J Biol Chem, 32, 1969, 52-58.
22. Siddiqui AA, Ali M. Practical pharmaceutical chemistry. Ist edition. CBS Publishers and Distributors, New Delhi, 1997, 126-131.

Source of Support: Nil, **Conflict of Interest:** None.

© Copyright protected. Unauthorised republication, reproduction, distribution, dissemination and copying of this document in whole or in part is strictly prohibited.