



J. Chem. Pharm. Res., 2010, 2(4):371-377

ISSN No: 0975-7384
CODEN(USA): JCPRC5

Secondary metabolites investigation and its derivatives on *Cassia occidentalis*

Janaky Ranjithkumar^{*}, K.Sivasankari, T.Sekar

PG and Research Department of Botany, Pachayappas College, Chennai-30.

ABSTRACT

*The comparative studies of secondary metabolites investigation used in pharmacognostic drug research using qualitative test is been performed on *Cassia occidentalis* leaf as well as stem ; belongs to family *Cesalpinieaceae*. This plant is of high economic value due to the presence of antioxidant and antimicrobial activity. The samples extracted using various solvents like Ethanol, Methanol, Ethyl acetate and water to detect the presence of active components. The phytochemical screening revealed the presence of carbohydrate glycosides, alkaloids, phenols, flavanoid, aminoacid, coumarine and phytosterols. Since it contains high proportion of phenols and alkaloid, it is reliable to possess antioxidant and anticancer activity.*

Key words: *Cassia occidentalis*, wild plant, phytochemical screening.

INTRODUCTION

Medicinal plants are of great importance to the health of individuals and communities. The medicinal value of these plants lies in some chemical substances that produce a definite physiological action on the human body and these chemical substances are called phytochemicals. These are non-nutritive chemicals that have disease preventive property. The most important of these phytochemicals are alkaloids, flavonoids, tannins and phenolic compounds [1]. Many of these indigenous plants are used as spices and current research has shown that polyphenols contribute to the prevention of cardiovascular diseases, cancers, osteoporosis and antioxidant activity with potential health benefits [2]. They are known to have

beneficial effects on cardio vascular system [3] and have a role in the prevention of neurodegenerative diseases and diabetes mellitus [4]. *C.occidentalis* is a medicinal herb found to have many disease preventive properties [5]. This plant is widely consumed by animals and humans. However some toxicological effects of seed and leaf have been observed [6]. In this aspect, the present work is done on *C.occidentalis*.

EXPERIMENTAL SECTION

Sample Collection and Extraction:

Fresh or Dried plant material can be Used as a source for the extraction of plant secondary metabolites. Most scientists have opted to use dry material for several reasons.

Traditional healers frequently use dry plant material.

The time delay between collecting plant material and processing it makes it difficult with fresh material.

(i) Sample Collection and Processing:

C. occidentalis plants were collected from the local fields located around Chengalpattu, Tamil Nadu. Stem and Leaf of *C. occidentalis* were separated, washed carefully with tap water, rinsed with distilled water, air dried for 1 hour, stems were cut into small pieces and shade dried. They were ground in to powder and stored in room temperature. The extract of the samples were prepared by soaking 100gm of dried powder in 200ml of different selected solvents like ethanol, methanol, ethyl acetate and water for 12 hours. The extracts were filtered using Whatman filter paper No. 42.

(ii) Phytochemical screening of *C. occidentalis* extract:

The different qualitative chemical tests were performed [7, 8, 9] for establishing the profile of given extracts to detect various phytoconstituents present in them.

RESULTS AND DISCUSSION

C.occidentalis, the medicinal herb has found to have better antimicrobial, antifungal [10], anti-allergic, anti-oxidant [11] and hepatoprotective activity [12].The presence of phytochemicals like anthraquinone, carbohydrate, saponin, and phytosterols on methanolic and aqueous extract are also reported. In this study, the phytochemicals are screened using different solvents in order to test its potential activity. Phytochemicals, the non-nutrient plant chemicals that contain protective, disease preventing compounds. Plant produces these chemicals to protect themselves from bacteria and other predatorial invaders, but recent research has discovered that plants with phytochemical abilities may also protect humans from illness.

Phytoconstituents screening of *C.occidentalis* leaf has shown in the Table 1, 2, and 3. The presence of alkaloid has seen in methanolic, aqueous, ethylacetate extracts and absent in ethanolic extract. Alkaloids are one of the diverse groups of secondary metabolites found to have antimicrobial activity by inhibiting DNA topoisomerase [13]. Carbohydrate which constitute the major edible part of the plant is present in all the above four extracts. Glycoside is present only in methanol, aqueous and Cardiac glycoside has shown positive result for methanol, aqueous and ethyl acetate extracts.

Table 1: Qualitative analysis of Alkaloid, Carbohydrate, Glycoside on the leaf extracts of *C.occidentalis*

S.No	Phytochemical Test	Ethanol Extract	Methanol Extract	Ethyl acetate Extract	Aqueous Extract
I	Test For Alkaloids				
	Mayer's Tests	-	++	++	++
	Wagner's Test	-	++	++	++
	Hager's Test	-	++	++	++
	Dragendorff's Test	-	++	++	++
II	Test for carbohydrates				
	Molish's Test	++	++	++	++
	Fehling's Test	++	++	++	++
	Barfoed's Test	++	++	++	++
	Benedict's Test	++	++	++	++
III	Test for Glycosides				
	Glycosides test	-	++	-	++
	Cardiac glycoside	-	++	++	++

Strongly Present +++ Present ++ Weekly Present + Absent -

*The given results are statistically significant

Table 2: Qualitative analysis of Flavanoids, phenol, amino acid, Saponin and Tannin on the leaf extract of *C.occidentalis*

S.No	Phytochemical Test	Ethanol Extract	Methanol Extract	Ethyl acetate Extract	Aqueous Extract
I	Test For Flavanoid and Phenol				
	Alkaline Test	+	-	-	+++
	Ferric chloride Test	++	++	++	++
II	Test for Proteins and amino acids				
	Millon's Test	-	++	++	-
	Biuret's Test	-	++	++	-
	Ninhydrin Test	-	++	++	-
III	Test for Saponin				
	Foam test	++	-	-	-
IV	Test for Tannin				
	Ferric chloride Test	+++	+++	+++	++

Strongly Present +++ Present ++ Weekly Present + Absent -

*The given results are statistically significant

Flavanoids are also known as vitamin P or natural biological modifiers, mildly present in ethanolic extract and strongly present in aqueous where as phenol has shown positive result in all the four extracts. A direct relationship has been reported between the levels of phenolic compounds and antioxidant potential of plants [14]. Phenolic compounds exhibit their protective action through various mechanisms like preventing the generation of carcinogens from precursors by acting as blocking agents [15].

Table 3: Qualitative analysis of Quinone, Steroids, Coumarin on the leaf extract of *C.occidentalis*

S.No	Phytochemical Test	Ethanol Extract	Methanol Extract	Ethyl acetate Extract	Aqueous Extract
I	Test For Quinone				
	Quinone Test	+++	++	-	++
	AnthraQuinone Test	-	-	-	-
II	Test for Steroids				
	Terpenoids test	+++	++	-	++
	Triterpenoids test	+++	++	-	-
III	Test for Coumarin				
	Alkaline Test	++	++	++	++

Strongly Present +++ Present ++ Weekly Present + Absent -

*The given results are statistically significant

The compound which possess large amount of flavanoid has found to have inherent ability to modify the body reactions to allergens, viruses and carcinogens [16]. Amino acid has shown positive result in methanolic and ethylacetate extract and saponin, the foaming ability has seen only in ethanolic extract. The test for tannin has given positive result in all the four extracts.

Quinone is present in ethanol, methanol and aqueous extract and anthraquinone is completely absent in all. Coumarin has antifugicidal and anticancer activity shown positive result in all the four extracts. Coumarin increases the blood flow in the veins and decreases capillary permeability. Steroids which play a role like cholesterol in mammalian cell, present in ethanol and methanolic extract.

Phytoconstituents screening of *C.occidentalis* stem has shown in the Table 4, 5, and 6. Alkaloid has shown positive result in aqueous and ethyl acetate where as Carbohydrate is present in all the above four extracts. Glycoside and Cardiac glycoside are present in methanol, and ethyl acetate extract.

Table 4: Qualitative analysis of Alkaloid, Carbohydrate, and Glycoside on the stem extracts of *C.occidentalis*

S.No	Phytochemical Test	Ethanol Extract	Methanol Extract	Ethyl acetate Extract	Aqueous Extract
I	Test For Alkaloids				
	Mayer's Tests	-	-	++	++
	Wagner's Test	-	-	++	++
	Hager's Test	-	-	++	++
	Dragendorff's Test	-	-	++	++
II	Test for carbohydrates				
	Molish's Test	++	++	++	++
	Fehling's Test	++	++	++	++
	Barfoed's Test	++	++	++	++
	Benedict's Test	++	++	++	++
III	Test for Glycosides				
	Glycosides test	-	++	++	-
	Cardiac glycoside	-	++	++	-

Strongly Present +++ Present ++ Weekly Present + Absent -

*The given results are statistically significant

Table 5: Qualitative analysis of Flavanoids, phenol, amino acid, Saponin and Tannin on the stem extract of *C.occidentalis*

S.No	Phytochemical Test	Ethanol Extract	Methanol Extract	Ethyl acetate Extract	Aqueous Extract
I	Test For Flavanoid and Phenol				
	Alkaline Test	+++	+++	+++	+
	Ferric chloride Test	+	+	--	
II	Test for Proteins and amino acids				
	Millon's Test	-	-	-	-
	Biuret's Test	-	-	-	-
	Ninhydrin Test	-	-	-	-
III	Test for Saponin				
	Foam test	-	-	-	-
IV	Test for Tannin				
	Ferric chloride Test	+	++	++	-

Strongly Present +++ Present ++ Weekly Present + Absent -

*The given results are statistically significant

Table 6: Qualitative analysis of Quinone, Steroids, Coumarin on the stem extract of *C.occidentalis*

S.No	Phytochemical Test	Ethanol Extract	Methanol Extract	Ethyl acetate Extract	Aqueous Extract
I	Test For Quinone				
	Quinone Test	++	++	++	++
	AnthraQuinone Test	-	-	-	-
II	Test for Steroids				
	Terpenoids test	++	++	-	++
	Triterpenoids test	-	-	-	-
III	Test for Coumarin				
	Alkaline test	++	++	++	+

Strongly Present +++ Present ++ Weekly Present + Absent -

*The given results are statistically significant

Flavanoid is present almost in all the four extracts; amino acid and saponin are completely absent in all the extracts. The presence of tannin has seen in all the extracts except aqueous. High intake of tannin, the phenolpropyranoids showed reduce in the risk of coronary heart diseases. Quinone and terpenoid are present in almost all the extracts and anthraquinone and triterenoid are completely absent in all the extracts.

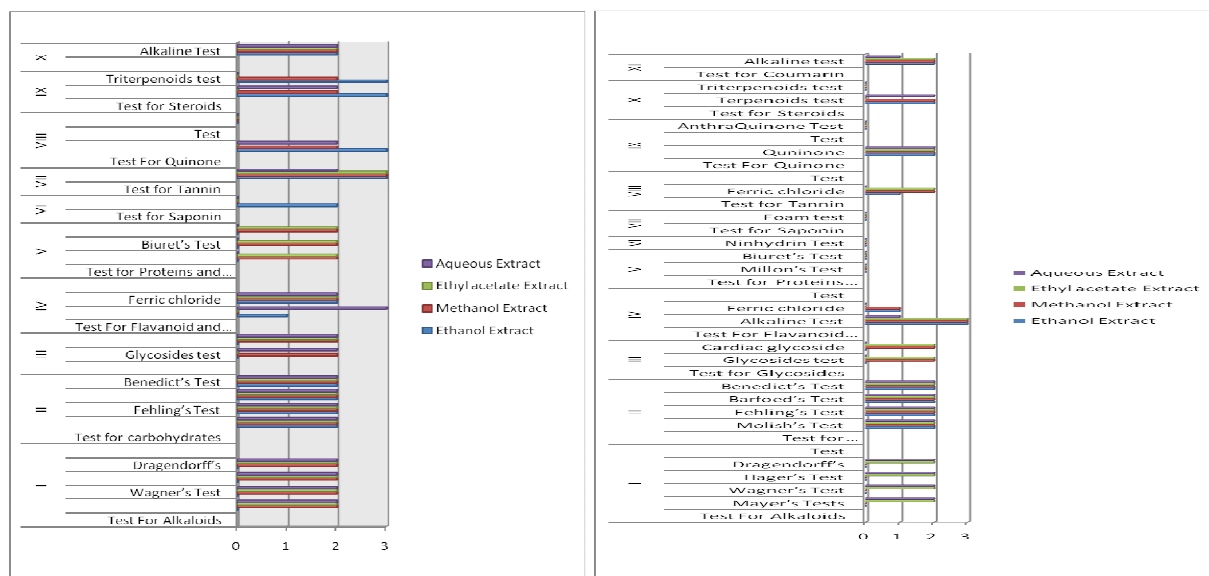
The results are correlated with Nuhu *et al*, 2008 where the aqueous extract of *C.occidentalis* had shown positive result for alkaloid, flavanoid and tannin and controversy towards the presence of saponin where it has given negative results for all the four extract in this study.

CONCLUSION

Secondary metabolite studies have shown that the presences of carbohydrate, flavanoid, alkaloid, tannin, coumarin, steroid, phenol are of great importance in the field of ayurvedic drug research. The compound rich in phenolic content can reduce the risk of heart disease by slowing the progression of atherosclerosis by acting as antioxidants towards LDL. All these studies will be of immense use in carrying out further research and revalidation of its use in Ayurvedic system of medicine.

From these studies, a conclusion can be drawn that *Cassia occidentalis* can have more beneficial effects with respect to the presence of many active secondary metabolites which may likely to combating diseases like cancer, cardio-vascular diseases and in general boost the immune system. Further studies have been carried out in order to isolate active component responsible for particular activity.

Graphical representation of secondary metabolites distribution in the leaf and stem of *C.occidentalis*



REFERENCES

- [1] Hill AF. Economic botany: a textbook of useful plants and plant products, McGraw-Hill Book Company Inc, New York, **1952**; 60-75.
- [2] Arts ICW and Hollman; *Am. J. Clinical Nutr.*, **2005**, 81, 317–325.
- [3] Keen CL, Holt RR, Oteiza PI, Fraga CG and Schmitz HH . *Am. J. Clin. Nutr.***2005**, 81, 298–303.
- [4] Scalbert A, Manach C, Morand C, *Critical Rev. Food Sci. Nutr.***2005**,45(4), 287-306.
- [5]Nadkarni AK. Indian Materia Medica. Popular publication, Bombay, **1976**; 289-293.
- [6] Martin BW, Terry MK, Bridges CH, Bailey CM. *Vet Hum Toxicol*, **1981**, 23,416–423.
- [7] Evans, W.C, Treasae & Evan pharmacognosy, 14th edition, Harcourt Brace company, Asia Pvt Ltd, Singapore, **1997**;343-346.
- [8] Mace M.E .*Phytochemistry* ,**1963**,16,915-925.
- [9]Trease G.E and Evans, W.C,Pharmacognosy, 13th edition, Bailliere tindall, London,**1989**;176-180.
- [10]Vedpriya Arya *et al* .*Life Sciences and Medicine research*.**2009**,2,260-271.
- [11]G.sreejith *et al.*, *Indian journal of experimental biology*.**2010**,8,494-498.
- [12]AA Nuhu,R.Aliyu .*Tropical Journal of Pharmaceutical research*,**2008**,7(4),1137-1142.
- [13] Bonjean K, De Pauw-Gillet M-C, *et al.*, *J. Ethnopharmacol* **1998**, 69, 241-246.
- [14] Robards K,Prenzler PD, Tucker G ,*Food Chem* ,**1999**,66,401-436.
- [15]Wattenberg L W, Lam L K T In: Radioprotectors and anticarcinogens.Academic Press, New York,**1983**;461-469.
- [16] Acharya,Deepak Indigenous Herbal Medicine;Tribal stimulation and traditional herbal practices,Aavishkar publishers,**2008**,440-445.