International Journal of Scientific Engineering and Technology Research

ISSN 2319-8885
Vol.04,Issue.30,
August-2015,
Pages:5766-5770

www.ijsetr.com

Preliminary Phytochemical Analysis and Antioxidant Activities of Prosopis Juliflora and Mimosa Pudica Leaves

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Abstract: Plants and their bioactive principles have a long history of use in modern medicine and in certain systems of traditional medicine. Plant derived compounds are the basis for pharmaceutical drugs and phytotherapy. Prosopis juliflora, commonly called as mesquite and Mimosa pudica, also known as touch me not plant or sensitive plant are used in this study. Flavonoids, steroids, phenolic compounds, glycosides, alkaloids, carbohydrates and proteins were revealed in the preliminary phytochemical analysis. The antioxidant studies were done by DPPH scavenging method with the ethanolic and aqueous extracts of Prosopis julifolra and Mimosa pudica leaves. At different concentrations, ethanolic extracts of Prosopis juliflora leaves exhibited significant antioxidant activity but in Mimosa pudica, the aqueous leaf extracts exhibited significant antioxidant activity. Overall the experimental result suggests that the presence of flavonoids, phenolic compounds, alkaloids and other secondary metabolites are responsible for the antioxidant activity. And therefore, the plants play a vital role in maintenance of the human health and wellbeing.

Keywords: Prosopis Juliflora, Mimosa Pudica, Antioxidant Activity, Phytochemical Analysis, Secondary Metabolites.

I. INTRODUCTION

Plants have played a significant role in maintaining human health and improving quality of human life for thousands of years and have served humans (Lubna Azmi et al, 2011). Herbalism is a traditional medicine or folk medicine practice based on the use of plants and plant extracts (Acharya et.al, 2008). Herbal medicine is based on the premise that plants contain natural substances that can promote health and alleviate illness. (Rajan, 2011). The most important biologically active constituents of plants are alkaloids, flavonoids, tannins and phenolic compounds (Kiruba ,2011). Antioxidants from plant materials terminate the action of free radicals thereby protecting the body from various diseases (Lai et al, 2001). The antioxidant activities of medicinal plants may be due to the presence of phenolic compounds, containing the hydroxyl groups that confers the hydrogen donating ability (Nithya Narayanaswamy and Balakrishnan, 2011). Prosopis juliflora and Mimosa pudica belong to the family Fabaceae and the Mimosoideae subfamily. Prosopis juliflora, also known as Mesquite (Azhar, 1998) has been used to treat eye problems, open wounds, dermatological ailments and digestive problems. It has soothing, astringent, and antiseptic properties (Kirtikar. and Basu., 1935; Davidow, 1999). Mesquite has antibiotic activity and its aqueous extracts are antibacterial.

The leaves also make good eyewashes that can be used to treat pink eye and also used to treat headaches, painful gums and bladder infection. Leaves can serve as an emetic or system cleanser. It has antibacterial and antifungal properties (Kay, 1996). Leaf extracts are richest source of secondary metabolites like alkaloids, phenolic compounds, flavonoids, glycosides, steroids, tannins and triterpenoids. And the phytochemicals may help in protection against chronic diseases (Shachi Singh, 2012). Mimosa pudica is also called as touch me not or sensitive plant,it majorly possesses antibacterial, antivenom, antifertility, anticonvulsant, antidepressant and various other pharmacological activities. It also has antidiabetic, antihepatotoxin, antioxidant and wound healing activities. And is reported to contain alkaloid, glycoside, flavonoids and tannins (Baby Joseph et al., 2013). It has been used in the treatment of urogenital disorders, piles, dysentery, sinus and wounds (Hafsa Ahmad et al., 2012). It is very useful in diarrhea, amoebic dysentery, bleeding piles and urinary infections (Chauhan, 2009). As there is growing interest on the untapped reservoir of medicinal plants, the aim of the present study is to screen the phytochemicals and analyse the antioxidant activity of the ethanolic and aqueous leaf extracts of Prosopis juliflora and Mimosa pudica.

II. MATERIALS AND METHODS

A. Collection Of Plant Material

The leaves of Prosopis juliflora and Mimosa pudica were collected from Thirukalikundram, Kanchipuram District.The plants were identified by Dr.Sasikala Ethirajulu, Research Officer (Pharmacognosy) and Dr.S.Jega Jothi Pandian, Research Officer Incharge, Siddha Central Research Institute, Arignar Anna Govt.Hospital campus,Arumbakkam,Chennai-600106(Central Council for Research in Siddha, Department

of AYUSH, Ministry of Health &family welfare, Govt.of India). The harvested plant samples were washed thoroughly with fresh water and extraneous matter such as mud and sand particles were removed and shade dried at room temperature. The shade dried leaves were powdered.

B. Preparation of Aqueous & Ethanolic Leaf Extracts

The powdered leaves were soaked in distilled water and ethanol respectively for 24 hours in a closed container and were filtered using Whatmann filter paper. The filtrate obtained was dried and they were stored in refrigerator for further use. Three varying concentrations of 1mg/ml, 25mg/ml and 50mg/ml aqueous and ethanolic leaf extracts were taken respectively.

C. Preliminary Screening Of Phytochemicals

Qualitative phytochemical screening of the leaf extracts of Prosopis juliflora and Mimosa pudica was done according to the standard methods (Harbone, 1973 and Trease GE, Evans WC, 1989). The extracts were screened for flavonoids, steroids, phenolic compounds, tannins, saponins, glycosides, alkaloids, carbohydrates and proteins.

D. Determination Of Invitro Antioxidant Activity Using Dpph Scavenging Activity

The invitro antioxidant activity was done by DPPH radical scavenging activity (Blois MS, 1958). DPPH (1, 1 diphenyl 1-2-picric hydrazine) scavenging activity is one of the widely used methods for screening of anti-oxidant activity of plant drugs. DPPH assay method is based on the reduction of absorbance of ethanol solution of DPPH by free radical scavengers. And was measured by the colorimetric method. A stock solution of 25mg of DPPH was prepared in 100ml of ethanol. In the control tube(C), 0.1ml of ethanol was taken and in the tube (T), 0.1ml of aqueous and ethanolic extracts of leaves of Prosopis juliflora as well as Mimosa pudica were added in respective tubes. And 0.1ml of ascorbic acid was taken as standard in the tube (S). 1.9ml of DPPH was added to test, control and standard tubes. 2.0ml of ethanol alone serves as blank for aqueous and ethanolic leaf extracts. The test, control and standard tubes were incubated for 20 minutes in dark and then were read at 517nm. The percentage of inhibition was calculated using the following formula and expressed as percent scavenging of DPPH radical. Tests were repeated three times.

$$\%\text{DPPH inhibition} = \frac{\text{O.D of control-O.D of test}}{\text{O.D of control}} \times 100 \quad \textbf{(1)}$$

Statistical Analysis: The samples were analyzed in triplicates and the results were expressed as Mean ± SD.

III. RESULTS AND DISCUSSION

A. Phytochemical Analysis

The phytochemical analysis showed the presence of flavonoids, phenolic compounds, glycosides, alkaloids, carbohydrates & proteins in ethanolic and aqueous leaf extracts of Prosopis juliflora and also in Mimosa pudica. Steroids were present in the ethanolic leaf extracts of Prosopis juliflora and Mimosa pudica. But tannins and saponins were present only in the aqueous leaf extracts of Prosopis juliflora and Mimosa pudica. It is suggested strongly that the alkaloidal fraction isolated from Prosopis juliflora was found to possess significant antibacterial activity (Aqeel Ahmad, 1991). It is reported in a study that preliminary phytochemical screening of Prosopis juliflora leaves revealed the presence of tannins, glycosides, flavonoids and alkaloids (Sathiya.M and Muthuchelian, 2008). Also a study supports that Prosopis juliflora possesses an unusual amount of the flavonoid-mesquitol in its heartwood (Peter Sirmah et.al, 2009). Phytochemical analysis of the extracts revealed the presence of tannins, phenolics, flavonoids, alkaloids, terpenes and steroids in most parts of P. juliflora (Shachi Singh, 2012). It is revealed in a study that phytochemical screening of the Prosopis juliflora leaf extract showed the presence of alkaloids, flavonoids, steroids, phenolics and tannins (Senbagarani Renganathan et al, 2015).

Earlier studies support that the preliminary phytochemical screening of Mimosa pudica extract showed the presence of bioactive components like terpenoids, flavonoids, glycosides, alkaloids, quinines, phenols, tannins, saponins and coumarin (Gandhiraja. et al, 2009) .In a study it is suggested that the preliminary phytochemical screening revealed the presence of phytoconstituents such as steroids,flavonoids, glycosides, alkaloids and phenolic compounds in the chloroform extract of Mimosa pudica leaves (Rekha Rajendran et al, 2010). It was also reported in a study that the phytochemical constituents like alkaloids, steroids, carbohydrates and flavonoids were present in the ethanolic extracts of Mimosa pudica leaves (Tamilarasi and Ananthi , 2011).Previous studies report that the phytochemical analysis of the Mimosa pudica leaves showed the presence of tannins,proteins and steroids (Ranjeet Kumar Ranjan et al, 2013).

B. Antioxidant Activity by DPPH Radical Scavenging Method

The antioxidant activity of varying concentrations of ethanolic extracts of Prosopis juliflora leaves exhibited significantly higher values than its aqueous extracts. But aqueous extracts of leaves of Mimosa pudica exhibited significantly higher values than its ethanolic extracts. May be the presence of the phenolic compounds, flavonoids and alkaloids contributed antioxidant activity. Studies suggest that the DPPH scavenging effect of the phenolic extracts of Prosopis juliflora leaves increased with the increasing concentration (Mani sathiya and Krishnaswamy Muthuchelian., 2010).Previous studies support that Prosopis juliflora contained flavanols and the heartwood contained -(-)mesquitol which is responsible for the strong antioxidant activities of crude extracts obtained with solvents of different polarities(Sirmah et al, 2011).Also it was reported in a study that the antioxidant activities of methanolic leaf extracts of Prosopis juliflora (Swartz) DC showed significant results (Abdul Aziz Napar et al, 2012). According to a study ,it was indicated that methanolic bark extract of Prosopis juliflora have a lot of chemical compounds with antioxidant properties which can inhibit the oxidative effect of free radicals (Amir Siahpoosh and Mina Mehrpeyma., 2014).

It was reported that the methanol crude extract of the aerial parts of Mimosa pudica showed moderate antioxidant activity compared to ascorbic acid using the DPPH free radical scavenging assay, which may be due to the antioxidant principles in the extract (Sadia Afreen

Chowdhury et al., 2008). The results of the previous studies revealed that the chloroform extract of Mimosa pudica Linn. showed a significant antioxidant activity against free radical scavenging by DPPH.And the invitro antioxidant activity is due to the presence of phenolic compounds and flavonoids (Rajendran Rekha et al, 2010). In a study it was found that the whole plant, stems, leaves, and seeds of M. pudica Linn. showed strong antioxidant capacity, and leaf extracts were the strongest and stem extracts were the weakest.And it was suggested that the antioxidant activity of M. pudica Linn. in vitro could be related to the high concentration of flavonoids and phenolics (Jing Zhang et al, 2011) .It was reported that the methanolic crude extracts showed moderate antioxidant activity(Kamanashis Das et al., 2014).

TABLE I: Phytochemical Analysis

SL.NO	PHYTOCHEMICALS	PROSOPIS JULIFLORA		MIMOSA PUDICA	
		ETHANOLIC LEAF EXTRACT	AQUEOUS LEAF EXTRACT	ETHANOLIC LEAF EXTRACT	AQUEOUS LEAF EXTRACT
1	FLAVONOIDS	+	+	+	+
2	STEROIDS	+	-	+	-
3	PHENOLIC COMPOUNDS	+	+	+	+
4	TANNINS	-	+	-	+
5	SAPONINS	-	+	-	+
6	GLYCOSIDES	+	+	+	+
7	ALKALOIDS	+	+	+	+
8	CARBOHYDRATES	+	+	+	+
9	PROTEINS	+	+	+	+

+→PRESENT -→ABSENT

TABLE II: Antioxidant Activity of Leaf Extracts of Prosopis Juliflora and Mimosa Pudica (1mg/Ml Concentration) By DPPH Radical Scavenging Activity

EXTRACTS	PROSOPIS JULIFLORA	MIMOSA PUDICA
ETHANOLIC LEAF EXTRACT	22.3±3.21	12.6±6.4
AQUEOUS LEAF EXTRACT	20±7.54	24.3±7.09

TABLE III: Antioxidant Activity of Leaf Extracts of Prosopis Juliflora and Mimosa Pudica (25mg/Ml Concentration) By DPPH Radical Scavenging Activity

EXTRACTS	PROSOPIS JULIFLORA	MIMOSA PUDICA
ETHANOLIC LEAF EXTRACT	23.6±7.8	68.1±26.7
AQUEOUS LEAF EXTRACT	16.1±0.4	79.4±4.0

TABLE IV: Antioxidant Activity of Leaf Extracts of Prosopis Juliflora and Mimosa Pudica (50mg/Ml Concentration) By DPPH Radical Scavenging Activity

EXTRACTS	PROSOPIS JULIFLORA	MIMOSA PUDICA
ETHANOLIC LEAF EXTRACT	98.1±0.8	30±13.8
AQUEOUS LEAF EXTRACT	6.1±4.1	92.4±21.6

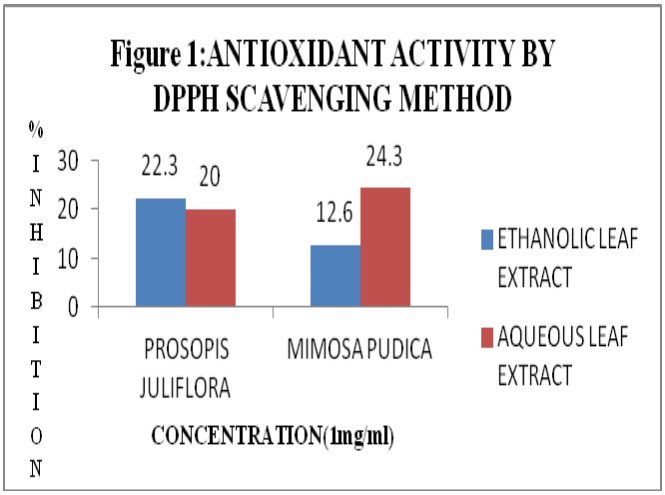

Fig.1.

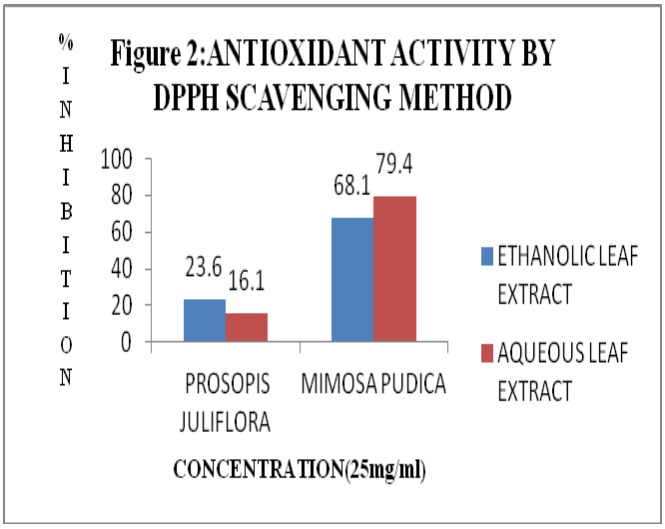

Fig.2.

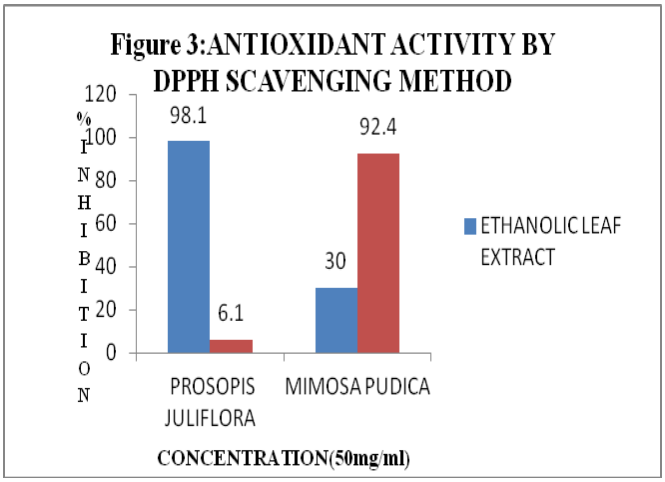

Fig.3.

IV. CONCLUSION

Many drug developing companies rely mainly on plant research as plant derived antioxidants reduce the risk of chronic diseases like cancer and heart problems. In this study, the phytochemical constituents like flavonoids, phenolic compounds, alkaloids and other secondary metabolites were present in the leaf extracts of Prosopis juliflora and Mimosa pudica. May be due to the presence of these phytochemical

constituents, the leaf extracts of Prosopis juliflora and Mimosa pudica exhibited antioxidant activity. It was found that ethanolic leaf extracts of Prosopis juliflora at varying concentrations exhibited significant activity and the aqueous leaf extracts of Mimosa pudica exhibited significant activity at different concentrations. The present investigation suggests that the bioactive principles which confer the antioxidant activity can be isolated and used in developing a drug for the diseases associated with oxidative stress.

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