SHORT COMMUNICATION

BIOCHEMICAL SCREENING OF DESMODIUM GANGETICUM LINN. ROOT BY GC-MS ANALYSIS

C. Beena*

All India Coordinated Research Project on Medicinal , Aromatic Plants & Betelvine , Kerala Agricultural University, KAU.P.O., Vellanikkara, Thrissur- 680 656, Kerala.
Email: beenac2@gmail.com

Received-06.11.2020, Revised-28.11.2020

Abstract: This study was carried out to analyse the active constituents from the roots of *Desmodium gangeticum* L. commonly called as Shalparni in Hindi and Orila in Malayalam using Gas-Chromatographic-Mass Spectrometric analysis and also to develop a specific TLC fingerprint for the plant root to authenticate the same quickly. The study revealed that the methanolic extract of *Desmodium gangeticum* root contains nine different chemical constituents. The major constituent is an ethanone derivative (10.55 %). A reference TLC fingerprint was developed which can be made useful to identify this plant root specifically from others. However, isolation of individual phytochemical constituents and testing it clinically for specific biological activity will be definitely giving fruitful results to support the medicinal properties of the plant root.

Keywords: *Desmodium gangeticum, TLC,* GC-MS analysis, Shalparni, Chemical components

INTRODUCTION

Kerala is a treasure house of medicinal plants. The medicinal value lies in the chemical compounds with specific biological action present in the plants. The increasing popularity of plant based therapeutic formulations and drugs leads to search for newer molecules in plant stores of our nature. *Desmodium gangeticum* Linn (also known as Orila in Malayalam and Shalparni in Hindi) belongs to Fabaceae family. It is one of the ten roots of famous"Dasamoola" formulation of Ayurveda (Dubey *et al*.,2004,Parnjpe, 2005,Suganthi *et al* .,2019).

Desmodium gangeticum root is thermogenic and nervine tonic possessing aphrodisiac, carminative, constipating, diuretic, febrifuge, cardiotonic, anti inflammatory and expectorant properties and used traditionally for treating inflammatory conditions, chronic fever, cough, diarrohea, dysentery, vomiting, piles, bronchitis, asthma, intestinal parasites, arthritis, rheumatism and post-delivery disorders. The decoction of leaves used to treat vomiting and constipation. The ayurvedic formulations in which Shalparni root is an ingredient are Shalaparnyadi kwatha, chyavanaprasha, dashamoolarishta, chitrakaharitaki, mahanarayana taila, brahachchhagaladya ghrita, dashamoola taila, mooshikadya taila, vayuchhaya surendra taila, vyaghri taila. etc (Sharma, 2004 and Niranjan *et al.* 2008).

In the present study, phytochemical investigations were carried out in the roots of *Desmodium gangeticum*. The methanol extract of root was subjected to GC-MS analysis for detection of various volatile compounds present. More over a specific reference TLC fingerprint was developed which can be made useful for the correct identification of the genuine root samples of this valuable medicinal plant.

MATERIALS AND METHODS

Healthy disease free, mature fresh roots of *Desmodium gangeticum* was collected from research field of Kerala Agricultural University, Vellanikkara Campus and authenticated by botanist. The samples were air dried and powdered using mixer grinder. 10 % hot methanol extract was prepared from dried powder of the root using standard procedure and used for GC-MS analysis and also for developing reference finger print by Thin Layer Chromatography(TLC).

For developing TLC fingerprints various mobile system combinations and spray reagents were tried (Wagner *et al*.,1996) and the best one was selected. Silica gel $_{60}$ F $_{254}$ sheets were used as solid phase. The chromatogram developed using Toluene: Ethyl acetate and acetic acid in the ratio 7.5:2.5:0.06, as mobile phase was found to be good with 4 specific bands under UV 365nm **.**

GC-MS analysis was carried out on a GC- MS equipment Model 7890A GC with 5975C with triple axis detector. Experimental conditions of GC-MS system were as follows: Column: DB 5 MS 30m X 0.250 mm Diameter X 0.25 micrometer thickness. Flow rate of mobile phase (carrier gas: He) was set at 1.0 ml / min. The temperature programme (oven temperature) was 40°C raised to 280°C at 5°C/min rate and injection volume was 3 µl, pressure 7.0699 psi, injection mode split. Results were compared by using NIST 08 spectral data library (Harborne, JB,2008).

*Corresponding Author

RESULTS AND DISCUSSION

Specific reference TLC chromatogram of the root was developed using toluene : ethyl acetate and acetic acid in the ratio 7.5:2.5:0.06 as mobile phase in solid phase Silica gel 60 F_{254} . When viewed under UV-365 nm it revealed 4 specific flourescent bands with different Rf values as 0.85,0.68,0.35,0.23 .All bands were flourescent blue coloured (Figure.1 and Table .1) which can be used for authentication of this root as a raw drug.

The plant root methanol extract when subjected to GC- MS analysis revealed the presence of 9 different phyto compounds (Table.2) which might be exerting their therapeutic effect in the plant. It supports the study done by Hemlal *et al* in 2012 who reported presence of eighteen different chemicals in Desmodium root. Prevailing compounds found in present study was an ethanone derivative (10.55%).

Table 1. Specific bands under TLC by *Desmodium gangeticum* root

Rf of band	Colour of band	Root
0.85	Flourescent blue	present
0.68	Flourescent blue	present
0.35	Flourescent blue	present
0.23	Flourescent blue	present

Figure: 1. Reference TLC fingerprint of *Desmodium gangeticum* root

Table 2. Phytocompounds detected in the methanol extract of *Desmodium gangeticum* root by GC-MS

Sl. NO:	**Compound detected**	**Retention time (RT)**	**Area%**
1	2,2-Dimethylpropanoic acid, 2,6-dimethylnon-1-en-3-yn-5-yl ester2-Dodecen-1-yl(-)succinic anhydrid 9-Undecenal, 2,10-dimethyl-	1.496	1.44
2	1H-Indole, 5-methyl-2-phenyl-2-Ethylacridine Tetrasiloxane, decamethyl-	51.917	1.21
3	4-Acetoxy-6',7-dimethyl-5',8'-dimethoxy-1,2'-binaphthalene-1',4',5,8-tetrone N-(2,7-Diethoxy-fluoren-9-ylidene) -N'-(4-nitro-phenyl)-hydrazine 7-Chloro-2,3-dihydro-3-(4-nitroben zylidene)-5-phenyl-1H-1,4-benzodia zepin-2-one		
4	Silane, 1,4-phenylenebis[trimethyl **Benzo[h]quinoline**, 2,4-dimethyl-2-Ethylacridine	55.439	0.13
5	Ethanone, 1-(4-phenoxyphenyl)-, -[1-(4-henoxyphenyl)ethylidene] hydrazone, [c(E)]- 2-(4-Iodo-phenyl)-6-pentyl-5,6,7,8 - tetrahydro-quinoline Cobalt, [[3,3'-(1,2-ethanediyldini trilo)bis[1-phenyl-1-butanonato]](2-)-N,N',O,O']-	59.839	10.55
6	2-Ethylacridine Benzo[h]quinoline, 2,4-dimethyl- Tetrasiloxane, decamethyl-	62.631	1.46
7	2-(Acetoxymethyl)-3-(methoxycarbonyl)biphenylene 2-EthylacridieBenzo[h]quinoliye, 2,4-dimethyl-	62.654	1.45

CONCLUSION

From these results, it could be concluded that methanol extract of *Desmodium gangeticum* root contains 9 different chemical volatile compounds which might be contributing to its efficacy as a herbal drug. The specific TLC fingerprint developed will be helpful for doing the correct identification of the genuine root samples as a herbal raw drug.

However, isolation of individual phytochemical constituents and testing clinically for specific biological activity will be definitely giving fruitful results and will open up a new area of investigation of individual components and their pharmacological potency for which further research is required.

ACKNOWLEDGEMENT

Author is grateful to the financial assistance extended from All India Coordinated Research Project on Medicinal, Aromatic Plants & Betelvine, DMAPR, Anand, Gujrath and to Kerala Agricultural University for providing the research facilities.

REFERENCES

Dubey, N.K., Rajesh, K. and Pramila, T. (2004). "Global promotion of herbal medicine: India's opportunity", Current Science, 86, pp. 36-46.

Harborne, J.B. (2008). "*Phytochemical methods*", London. Chapman and Hall, Ltd., pp. 49-188.

Hemlal, H. and Subban, R. (2012). GC-MS, HPTLC and Antimicrobial analysis of Root extracts of PseudarthriaviscidaWight and Arn and Desmodium gangeticum(Linn) DC. *International Research Journal of Biological Sciences* Vol.1(5),57-65.

Niranjan, A. and Tewari, S.K. (2008). Article Phytochemical composition and antioxidant potential of *Desmodium gangeticum* (Linn.) DC, An article in Indian Journal of Natural Products and Resources· Nutraceutical Chemistry National Botanical Research Institute Lucknow-226 001, Uttar Pradesh.

Paranjpe, P. (2005). Indian Medicinal Plants: Forgotten Healers; A Guide to Ayurvedic Herbal Medicine, Adhyaya salaparni, Chaukhambha Sanskrit Pratishthan, 2012, 231.

Sharma, P.V. (2004). Classical uses of Medicinal plants, Chapter 347 Salaparni, Chaukhmbha Visvabharati Varanasi, Vol.1,365.

Suganthi, S., Rajasekar, M. and Udhaya nandhini, D. (2019). Exotic medicinal plants used by trial population of Siruvani ,Coimbatore-An ethnobotanical survey. *Journal of Plant Development Sciences*.Vol.11(5): 295-298.

Wagner, R. and Bladt, S. (1996). Plant drug analysis, A thin layer Chromatography atlas 2nd Edition Springer ; Berlin.