



GCMS analysis and Pharmacognostic study of *Fernandoa Adenophylla* flower

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ABSTRACT

Several plants are used to treat variety of diseases by folk medicinal practitioners. This plant, *Haplophragma adenophylla* commonly known as *Fernandoa adenophylla* is a flowering plant belongs to Bignoniaceae family. It is widely present in the region of Delhi NCR, Jaipur, Vadodara and has tremendous medicinal uses. It is generally seen at gardens, parks, roadside. The flowers are large bell or trumpet shape, pale yellow in color with characteristic odor. The flowering time is March-April. The chemical constituents present in flowers shows analgesic, anti-inflammatory, anti-fibrotic effect and ulcerogenic effect. The most abundant phytoconstituent present in the hydroalcoholic extract (1:1) of flower is 9, 12- Octadecadienoic acid (20.31%) which can be used in biosynthesis of Prostaglandins and cell membranes.

KEYWORDS- Bignoniaceae, *Fernandoa adenophylla*, anti-fibrotic, Analgesic, biosynthesis of Prostaglandins.

INTRODUCTION

Haplophragma adenophyllum (Wall.) P. commonly known as *Fernandoa adenophylla* (Wall. ex G. Don) C.G.G.J. van Steenis. Belonging to family Bignoniaceae have diverse medicinal values. It is a 15-20 m deciduous tree is widely distributed in India, Malaysia, China, and other countries and as an ingredient in massage oils; to ease muscle pain. *Fernandoa adenophylla* (Wall. ex G. Don) Stennis about 15 species and is commonly known as Marodphali. The hydroalcoholic extract (1:1) of flower is prepared which gives significant effects such as analgesic, anti-inflammatory, anti-fibrotic and ulcerogenic. This whole plant is being used to treat snake bite, constipation, anti-inflammatory effect.

In view of the ethnomedicinal uses of the plant, it attracted the attention to do research on this plant part. It exhibits the selective phytoconstituents which contains various bioactive molecule.

MATERIALS AND METHODS

The macroscopic evaluation includes the evaluation by size, shape, color, odor, inflorescences. The microscopic evaluation of the fresh flower was done. Then, observed for the microscopic characteristic such as trichomes, vascular bundles, parenchymatous cells, upper epidermis, lower epidermis, mesophyll cells, vascular bundles, etc. Further GC-MS analysis was done to confirm the active phytoconstituents present in this plant part.

GCMS Analysis Procedure of flower extract

Procedure

The analysis of metabolites present in fruit and flower extracts were performed using GCMS instrument equipped with mass spectrophotometer) detector with an electron impact (EI) ion source. The analytes were separated on a DB-5MS capillary column coated with phenyl arylene polymer.

The oven temperature programme was as follows: 50°C initially for 2 min; increased the temperature from 50 to 150°C at a rate of 5°C/min; further increased from 150 to 250°C at 10°C/min and hold for 10 min. Total run time was 42 min with 3 min of solvent delay time for all samples. Then, 5 µl of each sample dissolved in hexane was injected in split mode with ratio of 5:1. High pure helium was used as a carrier gas with a constant flow of 1.0 mL/min.

The temperature for injection, auxiliary line for transfer, and ion source were all set at 250°C. The ion source (EI) was set to 70 eV and chromatographically separated compounds were scanned from 50 to 700 AMU in full scan mode.

MSD chemstation software was used to process data. Chromatographically separated metabolites present in the samples were identified by comparing the mass spectra of the metabolites with spectra of standards from the NIST libraries.

RESULT

Macroscopy of *F. adenophylla* flower

Parameter	Observation
Shape	Large bell or trumpet
Odour	Characteristic
Flower	Bisexual
Pedice	2.0–3.5 cm long pedicel
Androphore	Present
Aestivation	Valvate
Inflorescences	Terminal panicle, 20–40 cm long, covered with dense fine, short, soft hairs or densely tomentose.
Corolla	Stramineous (pale, dull straw coloured), broadly campanulate, 5.5–10.4 cm long, 5 cm across, broadly campanulate above at 1.1–1.4 cm neck, extreme base of tube enlarged to 1.3–1.8 cm long, lobes 5 sub-equal, 2–3 cm long, densely rusty-wooly tomentose outside, inside glabrous.
Calyx	Pentamerous, cupular-campanulate, yellowish-brown, 2.8–4.7 × 2.5–3.0 cm, bilabiate, lobes triangular, acute, outer surface covered with dark-brown rusty multicellular compactly branched hairs, inner surface glabrous.
Stamens	4 in no., didynamous, inserted, 2.5 cm above from the corolla tube; two longer filaments 4.5–6.0 cm long, two smaller filaments 3.5–5.0 cm long; anthers linear, oblong, divergent, 0.5–0.7 cm long, slightly pubescent near connective; staminode 1.5–2.0 cm long.

Stamen arrangement	Antipetalous or Alternisepalous
Anther lobes	Dithecous, Basifixed, 2- celled, longitudinal slits
Pistil	5.5–6.7 cm long
Ovary	0.7–1.0 cm long, cylindrical, densely covered with brownish stellate hairs
Stigma	Bilobed
Style	3.3–4.0 cm long, slightly curved, base of style

PARTS OF FLOWER

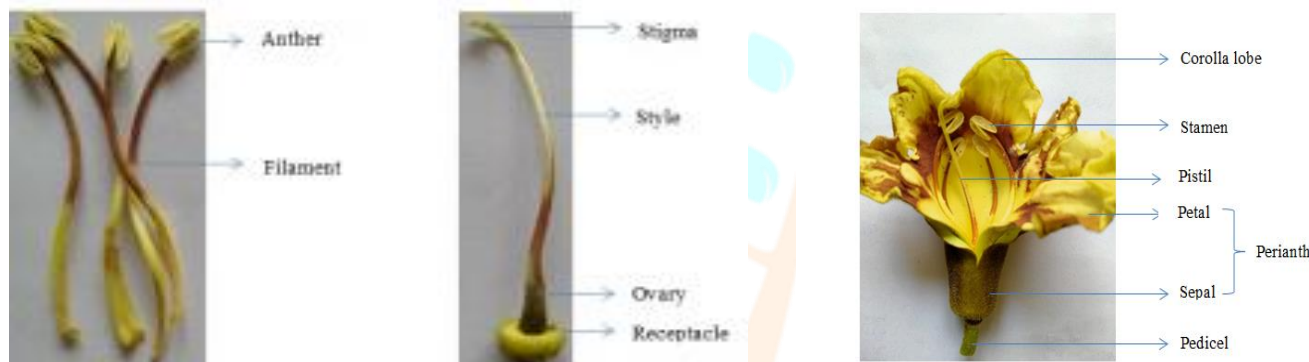


Figure 1: Flower morphology

Transverse section of flower

The T.S of petal consist of thin layer of cuticle, thin layer of epidermis covered with cuticle bearing numerous stellate trichome, parenchymatous mesophyll cells. Vascular bundles were also present. Mesophyll cells, lower epidermis as well as unicellular stellate trichome are also found.

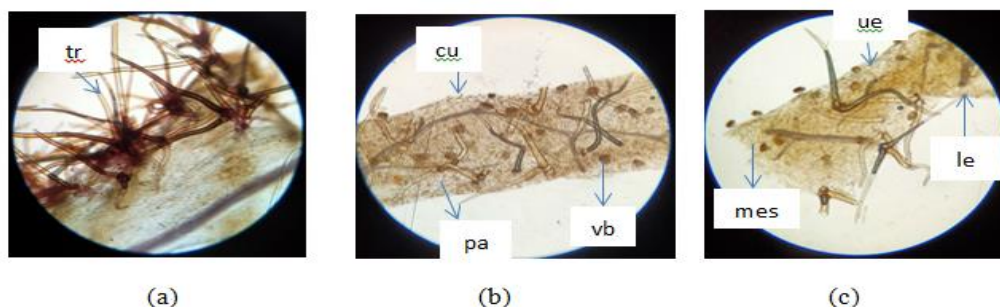


Fig 2: T.S. of petal of *F. adenophylla* (10X)

(a) Brown- stellate trichomes showing in surface view of petal(flower)

(b) Transverse section showed vascular bundles, cuticle and parenchyma cells

(c) Transverse section showing lower epidermis, mesophyll cells

Tr = Trichomes, Cu = cuticle, Ue = upper epidermis, Le = lower epidermis, Mes = mesophyll tissue, Pa = parenchyma cells, Vb = vascular bundles

Physio-chemical evaluation**Table 1: Analysis of Physicochemical parameters of *Fernandoa adenophylla* S. flower**

S.No.	Physicochemical Parameters	Flower
1.	Foreign matter	0.65%
2.	Total ash	6.90%
3.	Acid insoluble ash	1.38%
4.	Water soluble ash	4.14%
5.	Loss on drying	5.04%
5.	Moisture contents	4.60%
6.	Hydroalcoholic soluble extractive value	13.26%
7.	Methanol soluble extractive value	15.55%
8.	Aqueous soluble extractive value	10.50%
9.	Ethyl acetate soluble extractive value	9.25%
10.	Chloroform soluble extractive value	10.92%

Preliminary phytochemical screening**Table 2: Preliminary phytochemical screening of *Fernandoa adenophylla* S.**

Sr. No	Phytoconstituent	Test	Flowers
1	Carbohydrates	Fehling's test	-
		Barfoed's test	+
2	Protein	Millon's test	-
3	Alkaloids	Mayer's test	+
		Dragendorff's test	+
		Wagner's test	+
		Hager's test	+
4	Glycosides	Baljet test	+
		Keller-Kiliani test	+
		Borntrager's test	+
5	Flavonoid	Shinoda test	+
		Ammonia test	-
		Alkaline reagent test	+

S. No.	Rt	Percentage	Compounds
1.	3.570	3.25	2-Pentanol
2.	3.753	2.55	Butanoic acid
3.	5.020	2.41	Cyclopentanol
4.	20.572	8.34	Hexadecanoic acid, Methyl palmitate
5.	24.657	13.09	Linoleic acid

6.	24.804	20.05	Elaidic acid
7.	25.360	3.54	Methyl stearate, Kemester
8.	26.246	20.31	9,12-Octadecadienoic acid
9.	26.803	2.32	Methyl linoleate
10.	32.323	5.00	9,17-Octadecadienal
11.	32.821	2.05	13-Docosenoic acid
12.	33.327	4.48	Palmitin

CONCLUSION

T.S of flower petal consist of thin layer of cuticle, followed by a layer of upper epidermis, parenchymatous cells. Vascular bundles were also present. Mesophyll cells, lower epidermis as well as unicellular stellate trichomes are also found. The most abundant phytoconstituent present in the hydroalcoholic extract (1:1) of flower is 9, 12- Octadecadienoic acid (20.31%), which can be used in biosynthesis of Prostaglandins and cell membranes. Preliminary phytochemical screening of hydroalcoholic extract (1:1) of flower of *Fernandoa adenophylla* S. shows the presence of alkaloid, glycoside, sterol and saponins are present. This study was performed to investigate the active constituent present in flower part which shows analgesic, anti-inflammatory, anti-fibrotic and ulcerogenic effects.

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