



GC-MS analysis of phytochemicals in the methanolic extract of *Emblica officinalis* Gaertn (Indian Gooseberry)

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ABSTRACT

Emblica officinalis Gaertn is a medicinal plant commonly called as Amla or Indian Gooseberry belongs to Euphorbiaceae family. Its leaves and fruits are traditionally used for fever, hemorrhage, diarrhea, dysentery and inflammatory treatments. The present study was carried out to identify the phytochemicals present in the methanolic extract of the leaves of *Emblica officinalis* by GC-MS analysis. From the GC-MS results four compounds were identified as major constituents, they are 1, 2, 3-benzenetriol (synonym: Pyrogallol), 2-Furancarboxaldehyde, 5-(hydroxymethyl) - (synonym: 5-hydroxymethylfurfural), 2-Acetyl-5-methylfuran (synonym: 5-methyl-2-furylmethyl ketone), Benzoic acid, 3, 4, 5-trihydroxy- (synonym: Gallic-acid).

Keywords: *Emblica officinalis* Gaertn; Leaves; Euphorbiaceae; Phytochemicals; GC-MS.

INTRODUCTION

Emblica officinalis Gaertn. (*Phyllanthus emblica* Linn. Amla, Indian Gooseberry) belongs to the Euphorbiaceae family. *Emblica officinalis* is widely used for medicinal purpose, usually from this plant, fresh or dried fruits are used. Amla fruits are astringent, cooling, refrigerant, diuretic and laxative. The raw fruits are aperients; while the dried fruits are useful in inflammation, hemorrhage, diarrhea and dysentery, and in combination with iron, used for jaundice, anemia and dyspepsia. *Emblica officinalis* fruits contains very rich source of ascorbic acid [1] and also bears fats and minerals like phosphorus, iron, and calcium [2]. Vitamin C, tannins and flavonoids present in amla have effective antioxidant, immunomodulatory and anticancer activities. Extracts from the leaves of *Emblica officinalis* have been shown to possess anti-inflammatory activity [3]. The present communication deals with the GC-MS analysis of phytochemicals in the methanolic extract of the leaves of *Emblica officinalis*.

EXPERIMENTAL SECTION

Collection of the plant material

The leaves of *Emblica officinalis* Gaertn were collected from GKVK, University of Agricultural Sciences, Bangalore-65, India.

Extraction of Plant Material

Plant material (leaves, 20 Gms) was extracted with 250 mL of methanol at 60°C for 8hrs in Soxhlet extractor. The methanolic extracts were filtered through Whatmann No. 1 filter paper. The filtrate was evaporated to dryness at 80°C and stored until further analysis.

Preparation of stock solution

The extracts were reconstituted in methanol. Methanolic extracts (1 μ l) were injected for GC-MS analysis.

Gas Chromatography-Mass Spectrometry

The methanolic extract of the leaves of *Emblica officinalis* Gaertn was subjected to GC-MS analysis on a GC-MS Clarus 500 Perkin Elmer system comprising a AOC- 20i autosampler and gas chromatograph interfaced to a mass spectrometer (GC-MS) instrument employing the following conditions: Restek Rtx^R- 5, (30 meter X 0.25 mm) (5% diphenyl / 95% dimethyl polysiloxane), running in electron impact mode at 70 eV; helium (99.999%) was used as carrier gas at a constant flow of 1ml/min and an injection volume of 1.0 μ l was employed (split ratio of 10:1); injector temperature 280 °C. The oven temperature was programmed from 40°C (isothermal for 5 min.), with an increase of 6 °C / min to 280 °C, then ending with a isothermal for 15min at 280°C. Mass spectra were taken at 70 eV; a 0.5 seconds of scan interval and fragments from 40 to 550 Da. Total GC running time was 60 minutes.

Identification of Compounds

Interpretation on mass spectrum GC-MS was conducted using the database of National Institute of Standard and Technology (NIST). The mass spectrum of the unknown components was compared with the spectrum of the known components that stored in the NIST library.

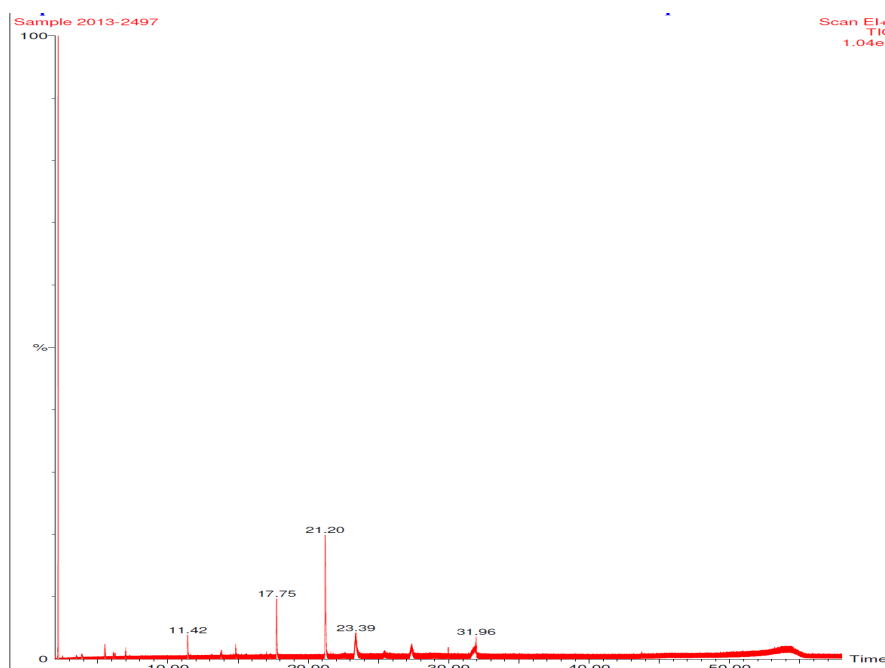


Fig. 1. GC- MS chromatogram of the methanolic extract of the leaves of *Emblica officinalis*

RESULTS AND DISCUSSION**GC-MS analysis**

GC-MS chromatogram of the leaves of methanolic extract of *Emblica officinalis* showed four major peaks (Figure-1) and have been identified after comparison of the mass spectra with NIST library (Table-1), indicating the presence of four phytochemicals and its medicinal properties. From the results, it was observed that presence of 1, 2, 3-benzenetriol (synonym: Pyrogallol), 2- Furancarboxaldehyde, 5-(hydroxymethyl) - (synonym: 5-hydroxymethylfurfural), 2-Acetyl-5-methylfuran (synonym: 5-methyl-2-furylmethylketone), Benzoic acid, 3, 4, 5-trihydroxy- (synonym: Gallic-acid) were the major components in the extract. The phytochemicals that contribute to the medicinal property of the plant leaves is listed in (Table-1). Pyrogallol is a polyphenol is known for its fungicidal and fungi static properties [4]. Pyrogallol is reported to be an effective antimicrobial agent and its toxicity is attributed to the three hydroxyl groups present in its structure. [5, 6]. In addition, pyrogallol has also shown antitumor, antiviral, antibacterial, cardioprotective, prooxidant and anti-mutagenic activities [7, 8]. The gallic acid and its derivatives were reported to have a wide spectrum of biological activities like antimicrobial [9], anticancer [10], antiviral [11], anti-inflammatory [12], analgesic [13] and anti-HIV activities [14].

Table 1. Chemical constituents and its Activity of some of the phytoconstituents identified in the methanolic extracts of the Leaves of *Emblica officinalis* by GC-MS

Retention Time	Compounds	Molecular Formula	Molecular Weight	Activity**
21.20	1,2,3-Benzenetriol	C ₆ H ₆ O ₃	126.11004	Antioxidant, Antiseptic, Antibacterial, Antidermatitic, Fungicide, Pesticide, Antimutagenic Dye, Candidicide
17.75	2-Furancarboxaldehyde, 5-(hydroxymethyl)-	C ₆ H ₆ O ₃	126.11004	Not Reported
17.75	2-Acetyl-5-methylfuran	C ₇ H ₈ O ₂	124.13722	Not Reported
31.96	Benzoic acid,3,4,5-trihydroxy-	C ₇ H ₆ O ₅	170.11954	Analgesic, Antibacterial, Antibronchitic, Anticancer, Anti-inflammatory, Antioxidant, Antiseptic,

**Source: Dr. Duke's phytochemical and ethnobotanical database (online database)

Acknowledgements

We wish to acknowledge Dr. P. Shridhar Reddy, Department of Life Sciences, REVA University and Skanda Lifesciences Pvt. Limited, Bangalore for their support.

CONCLUSION

The presence of various biologically active compounds in leaves of *Emblica officinalis* justifies the uses of plant for various ailments by local population. However, if individual phytochemical constituents are isolated from the plant and subjecting it to pharmacological activity will definitely give fruitful results.

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