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Research Article

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# Phytochemical constituents of *Cadaba Trifoliata* Roxb. root extract

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## Abstract

*Cadaba trifoliata* Roxb is belongs to the family Capparaceae, important medicinal plant of Indian medicinal plants. The methanol, ethanol, ethyl acetate and aqueous extracts along with dry powder of root were screened for the presence of phytochemicals. The phytochemical constituents were analyzed by qualitative and GC-MS method. Preliminary studies showed that the presence of Tannins, Steroids, Alkaloids, Glycosides, Flavonoids and Phenolic compounds. In the GC-MS analysis, 17 bioactive phytochemical compounds were identified in the alcoholic extract. The identification of phytochemical compounds in very high peak area, 1, 2-Benzenedicarboxylic acid, diisooctyl ester ($C_{24}H_{38}O_4$) with RT 24.95 has peak area 51.86% and 1-Methyl-pyrrolidine-2-carboxylic acid ($C_6H_{11}NO_2$) with RT 6.89 has peak area 20.58%. The main important compound phytol ($C_{20}H_{40}O$) with RT 18.95 ranks with peak area 1.21%. A nature compound contains diterpene activity anti-cancer, anti-diabetic, anti-inflammatory, anti-oxidant activity and antimicrobial activity.

**Keywords:-** *Cadaba trifoliata*, phytochemical constituents, alcoholic root extracts.

## Introduction

Today natural products derived from plants are being tested for presence of new drugs with new modes of pharmacological action. A special feature of higher plants is their capacity to produce a large number of secondary metabolites [1]. Recent studies are involved in the identification and isolation of new therapeutic compounds of medicinal importance from higher plants for specific diseases [2,3]. Knowledge of the chemical constituents of plant is helpful in the discovery of therapeutic agent as well as new sources of economic materials like oil and gums. The most important bioactive constituents of these plants are alkaloids, tannins, flavonoids and phenolic compounds [4]. In India large number of plant species had been screened for their pharmacological properties but still a vast wealth of endangered species are unexplored. Medicinal plants are at interest to the field of biotechnology, as most of the drug industries depend in part on plants for the production of pharmaceutical compounds.

*Cadaba trifoliata* (Capparaceae) in the folk system of medicine (Fig.1). This family of flowering plants containing 28 genera and about 700 species of annual or perennial herbs, sub-shrubs, shrubs or trees. The plant is an unarmed branched shrub up to 3 m height. Leaves are palmately trifoliate and the leaflets are oblong or

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lanceolate [5]. It is locally called as *Purna* and *Viluthi* (in Tamil) and possesses anti-rheumatic, emmenagiague, anthelemintic and antibacterial properties [6,7]. Phytochemical analysis of the alcoholic extract indicated the presence of alkaloids, tannins, glycoside, steroids and flavonoids. Therefore, the global human population appears to be in the midst of an epidemic of diabetes. Reports from the World Health Organisation (WHO) indicate that diabetes mellitus is one of the major killers of our time, with people in Southeast Asia and Western Pacific being most at risk [8]. The reported to posses Stachydrine, 3-hydroxystashydrine from the stem, roots and codabine from leaves [9,10]. There is no report of chemical constituents isolated from this plant. The objective of this study was to evaluate the phytochemical compounds (quantitative method) using GC-MS analysis.

**Fig. 1. Habit of *Cadaba trifoliata***

## Materials and Methods

### Collection of Plant Material

Leaves of *C. trifoliata* were collected from Periyamallai hills, near Thuvarankurichi in Manappari Talak, Tiruchirappalli District and identified and a voucher specimen was deposited in the Rapinat Herbarium, ST. Joseph's college. Tiruchirappalli, Tamil Nadu, India.

### Preliminary phytochemical analysis

#### *Preparation of Plant Extract*

The root of *C.trifoliata* was air-dried and crushed to small piece and powdered 30 grams of powdered plant materials mixed with 300 ml of various solvents. The extracts preparations were done as described previously [11]. The extracts were prepared by using soxhlet apparatus collected and stored in vial for further studies.

A qualitative phytochemical test was used to detect the presence of alkaloid, tannin, saponin, flavonoid, glycoside and phenol they were carried out using standard Evans [3,4,12,14].

### Gas Chromatographs- Mass Spectrometry system

#### *Preparation of Plant Extract*

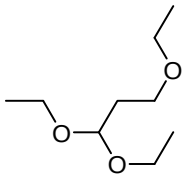
The root of *Cadaba trifoliata* was shade dried at room temperature, the root crushed powdered 10 gram sample is extracted with 30 ml ethanol overnight and filtered in ash less filter paper with sodium sulphate (2 g) and concentrated the extract to 1 ml of bubbling nitrogen into the solution. The extracted material is taken for GC-MS analysis.

The GC-MS analysis of the *C. trifoliata* was performed using a Clarus 500 Perkin Elmer gas chromatography equipped with an Elite-5 capillary column (5% Phenyl and 95% methyl polysaccharides siloxane) and mass detector turbomass gold of the company which was operated in EI mode. Elite wax (Polyethylene glycol) 30 nm × 0.25 mm × 1 μm df) is a polar column used in the estimation. An inert gas such as Hydrogen or nitrogen or Helium is used as a carrier gas at a flow rate 1 ml / min, split 10:1. The components of test sample is evaporated in the injection part of the GC equipment and segregated in the column by adsorption and desorption technique with suitable temperature programmed of the over controlled by software. Different components are eluted form based on the boiling point of the individual components. The GC column is heated in the oven between 60° to 270° C. The time at which each component eluted from the GC column in termed as

Retention Time (RT). The total GC running time at 36 min. The eluted component is detected in the mass detector. The spectrum of the unknown component is compared with the spectrum of the known components stored in the NIST library and ascertains the name, molecular weight and structure of the components of the test materials in GC-MS study. Identification of components were based on comparison of their mass spectra with those of Wiley and NIST Libraries and those described by Adams [15] as well as on comparison of their retention indices with literature.

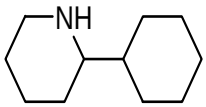
## Result and Discussion

The present study is carried out on the *C. trifoliata* the presence of medicinal bio active constituents. Phytochemical screening of the ethanolic root extract indicated the presence of alkaloids, tannins, glycosides, steroids and flavonoids. Phytochemical screening of the aqueous extract revealed the presence of glycosides, phenolic compounds, tannins and steroids. The qualitatively analyzed and the results are presented in Table-1. In the GC-MS analysis, 17 bioactive phytochemical compounds were identified in the ethanolic extract of plant. The identification of phytochemical compounds are based on the peak area, molecular weight and molecular formula. Namely Propane,1,1,3-triethoxy ($C_9H_{20}O_3$), 1-methyl-pyrrolidine-2-carboxylic acid ($C_6H_{11}NO_2$), Azulene, 1,4-dimethyl-7-(1-methylethyl) ($C_{15}H_{18}$), Benzene,(1-methylundecyl) ($C_{19}H_{32}$), Benzene,(1-ethylundecyl) ($C_{19}H_{32}$), 2-Cyclohexylpiperidine ($C_{11}H_{21}N$), Azulene, 1,4-dimethyl-7-(1-methylethyl) ($C_{15}H_{18}$), naphthalene, 1,6-dimethyl-4-(1- methylethyl) ($C_{15}H_{18}$), L-Serine, O-(phenylmethyl)-($C_{10}H_{13}NO_3$), n-Hexadecanoic acid ($C_{16}H_{32}O_2$), Hexadecanoic acid,ethyl ester($C_{18}H_{36}O_2$), Phytol ($C_{20}H_{40}O$), 9,12-Octadecadienoic acid (Z,Z) ($C_{18}H_{32}O_2$), Olic acid ($C_{18}H_{34}O_2$), Phenol, 2,4-bis(1-phenylethyl) ($C_{22}H_{22}O$), Methanone, [1,4-dimethyl-7-(1-methylethyl)-2-azulenyl]phenyl-($C_{22}H_{22}O$), 1,2-Benzenedicarboxylic acid, diisooctyl ester ($C_{24}H_{38}O_4$) The identification of phytochemical compounds in very high peak area, 1, 2-Benzenedicarboxylic acid, diisooctyl ester ($C_{24}H_{38}O_4$) with RT 24.95 has peak area 51.86% and 1-Methyl-pyrrolidine-2-carboxylic acid ($C_6H_{11}NO_2$) with RT 6.89 has peak area 20.58%. The main important compounds phytol ($C_{20}H_{40}O$) with RT 18.95 ranks with peak area 1.21%. The results are presented in Table-2 (Fig. 2 – 18). A total of 20 compounds were identified from the essential oils of the aerial parts of *Ornithogalum procerum*, the identified compounds represented 70.27% of the total essential oils [16]. In the GC-MS 26 bioactive phytochemical compounds were identified in the ethanolic extract of *Aloe vera* is reported to contain phyto are presented [17]. *C. fruticosa* is reported to contain terpenoids, flavones, sugar and proteins [18].



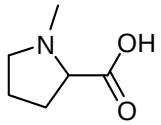

Propane, 1,1,3-triethoxy

**Fig- 2**



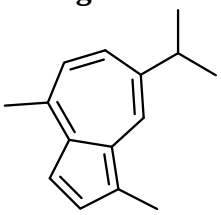

2-Cyclohexylpiperidine

**Fig- 3**



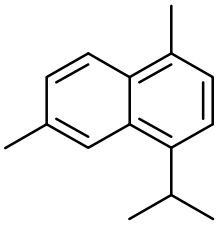

1-Methyl-pyrrolidine-2-carboxylic acid

**Fig- 4**



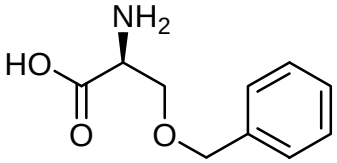
Azulene, 1,4-dimethyl-7-(1-methylethyl)

**Fig- 5**



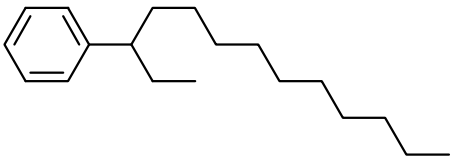
Naphthalene,1,6-dimethyl-4-(1-methylethyl)

**Fig- 6**



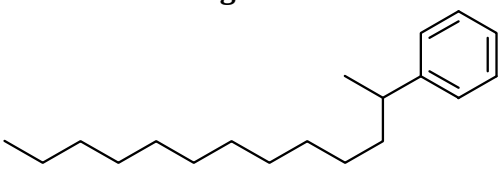
L-Serine,O-(Phenylmethyl)-

**Fig- 7**



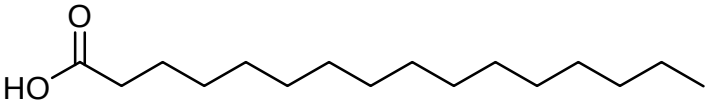
Benzene, (1-ethylundecyl)

**Fig- 8**



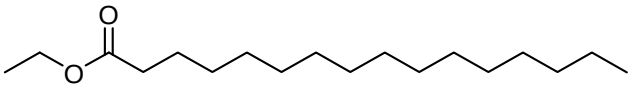
Benzene, (1-methyldodecyl)

**Fig- 9**



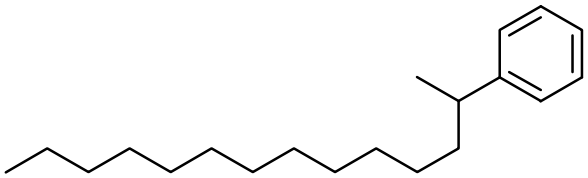
n-Hexadecanoic acid

**Fig- 10**



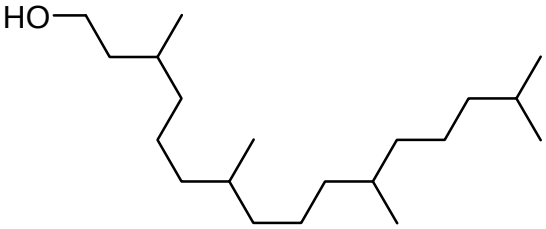
Hexadecanoic acid, ethyl ester

**Fig- 11**



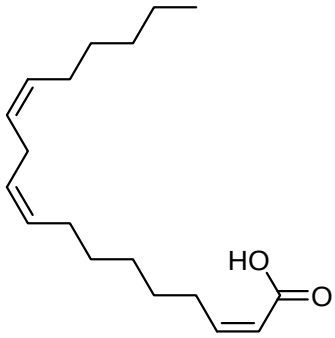
Benzene, (1-methyltridecyl)

**Fig- 12**



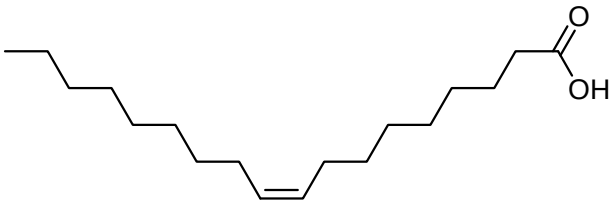
Phytol

**Fig- 13**



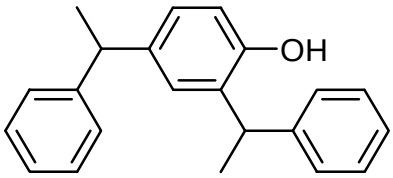
9,12-Octadecatrienoic acid (Z,Z,Z)

**Fig- 14**



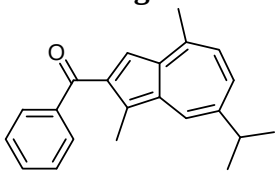
Oleic acid

**Fig- 15**



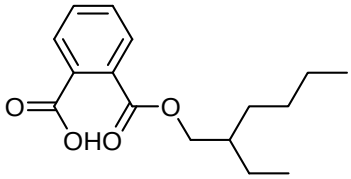

Phenol, 2,4-bis(1-phenylethyl)

**Fig-16**




Methanone, [1,4-dimethyl-7-(1-methylethyl)-2-azulenyl]phenyl

**Fig- 17**




1,2-Benzenedicarboxylic acid, mono(2-ethylhexyl) ester

**Fig- 18**

## Conclusion

This study has revealed the presence of many secondary metabolites in the root of *Cadaba trifoliata*. The results obtained were comparable with those of standard drug Ciprofloxacin. It has the further confirmed that the plant extract could be used for the treatment of purgative and phlogistee. Isolation, purification and characterization of the phytochemical responsible for the aforementioned activity are in progress. Further work on the profile and nature of chemical constituents of *C. trifoliata* roots will provide more information on the bioactive principles responsible for their pharmacological properties.

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