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Short Communication

SCREENING FOR PHYTOCHEMICALS AND FTIR ANALYSIS OF *MYRISTICA DACTYLOIDS* FRUIT EXTRACTS

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ABSTRACT

Objective: The present investigation focus on screening of phytochemicals and FT-IR analysis of *Myristica dactyloids* fruit extracts. The fruit extracts were prepared using five different solvents.

Methods: The phytochemical analysis and FT-IR (Fourier transform infrared spectroscopy) analysis were performed using standard methods.

Results: The results reveals that the alkaloids, steroids, flavonoids, phenolic compounds, proteins, carbohydrates, cardio glycosides and saponins were present in methanolic extract when compared to other solvent extracts. FT-IR analysis shows the presence of different functional groups such as carboxylic acids, aromatics, alkanes, alcohols, phenols, aliphatic amines, alkenes and amine groups in the fruit extracts.

Conclusion: The study concluded that the methanolic extract (*M. dactyloides* fruit) has potential bioactive compounds.

Keywords: *Myristica dactyloids,* Methanol extract, Phytochemicals, Fourier transform infrared spectroscopy (FT-IR)

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Medicinal plants are a significant part of natural wealth. They serve as vital therapeutic agents as well as valuable raw materials for manufacturing numerous traditional and modern medicines [1]. Today a number of chemicals obtained from plants are used as vital drugs in more countries in the world [2]. Secondary metabolites from plants are referred to as phytochemicals which are naturally occurring and biologically active compounds that have the potential to prevent diseases. Evaluation of the phytochemical constituents of a medicinal plant is considered to be the main step in medicinal plant research [3]. Phytochemicals with adequate antibacterial activity are reported for the treatment of bacterial infections [4]. In current years, Indian medicinal plants have been investigated by researchers for pharmacological activity. *Myristica dactyloides* belongs to *Myristicaceae* family. The fruit contains oil-cells frequently with phenolic and myristicin. *Myristica dactyloides* fruits of the plant contains many volatile oil compounds (a-pinene, camphene, b-pinene, sabinene, myrcene, a-phellandrene, a-terpinene, limonene, 1, 8-cineole, y-terpinene, linalool, terpinen-4-ol, safrole, methyl eugenol and myristicin). These oil are used to treat diseases like flatulency, diarrhea, nausea, vomiting, chronic bowel complaints, spermatorrhoea, impotency, amenorrhoea, menorrhagia, dysmenorrheal, ulcers, splenic disorders, rheumatism, asthma, colic, flatulence and dyspepsia [5]. It has pharmacological measures such as aromatic, stimulant, sedative, antiemetic and spasmolytic. Traditionally *M. dactyloides* seed paste was used for treating dysentery [6].

As traditional medicine plays an important role in developing new plant based drugs and *M. dactyloides* is an important medicinal plant, the present study was aimed to analyse the phytochemicals and functional groups of *M. dactyloides* fruit extracts, which will be useful for characterization purpose of various phytoconstituents.

All the chemicals and solvents were purchased from Sigma-Aldrich, India. *M. dactyloides* fruits were collected from local markets of Tirupur district, Tamil Nadu, India (11.1800 ° N, 77.2500 ° E).

10 gram of fruits was taken in clean sterile soxhlet apparatus and extracted with gradient solvent system by aqueous (100 °C), petroleum ether (40 °C), ethyl acetate (77 °C), methanol (65 °C) and ethanol (78 °C) using hot soxhlet extraction method [7]. After extraction, the extracts were dried. From that extracts were made with suitable concentrations solvents for further analysis.

The screening was performed with some modifications from the method of Harborne [8].

A small quantity fruit extracts were mixed with KBr. The functional groups were analysed using Fourier-transform infrared (FT-IR) (Shimadzu) in the region 4000–400 cm^{-1}.

Table 1 shows the phytochemical screening of various fruit extracts. Steroids were present in all the extracts. Phenols and Flavonoids were present in ethanol and methanol extracts. Proteins were present in ethanol, methanol, ethyl acetate and aqueous extracts. Cardio glycosides were observed in all the extracts except aqueous extract. Alkaloids were present only in methanolic extracts. The similar results were obtained from *F. religiosa* and *F. bengalensis* [9].

Table 1: Phytochemical screening of *M. dactyloides* fruit (+: present; -: absent)

		Fruit extracts				
S. No.	**Phytochemicals**	**Ethanol**	**Methanol**	**Petroleum Ether**	**Ethyl Acetate**	**Aqueous**
1.	Alkaloids	-	+	-	-	-
2.	Flavonoids	+	+	-	-	-
3.	Steroids	+	+	+	+	+
4.	Phenol	+	+	-	-	-
5.	Proteins	+	+	-	+	+
6.	Carbohydrates	+	+	-	+	-
7.	Cardio glycosides	+	+	+	+	-
8.	Saponins	+	+	+	+	-

Fig. 1-5 shows the FTIR spectra of *M. dactyloides* fruit extracts. The peak at 3332.99 cm^{-1} revealed the presence the alcohols, phenols (O–H stretch, H–bonded). The peak at 2970.38 and 2885.51 cm^{-1} refers to the presence of alkanes (C–H stretch). The peak at 1759.08 and 1666.50 cm^{-1} corresponds the carboxylic acid group (C=O stretch). A peak at 1597.06 cm^{-1} denotes the 1 ° amines (N–H bend). A peak of 1327.03 cm^{-1} showed the presence of aromatic amines (C–N stretch). The peaks of 1273.02, 1087.85 and 1049.28 cm^{-1} indicate the alcohols, carboxylic acids, esters, ethers (C–O stretch). A peak of 879.54 cm^{-1} revealed the alkenes (=C–H bend). FTIR spectrum analysis by *Caralluma fimbriyata* was reported in earlier research and found the presence of phenols, alkanes, aromatic amines [10].

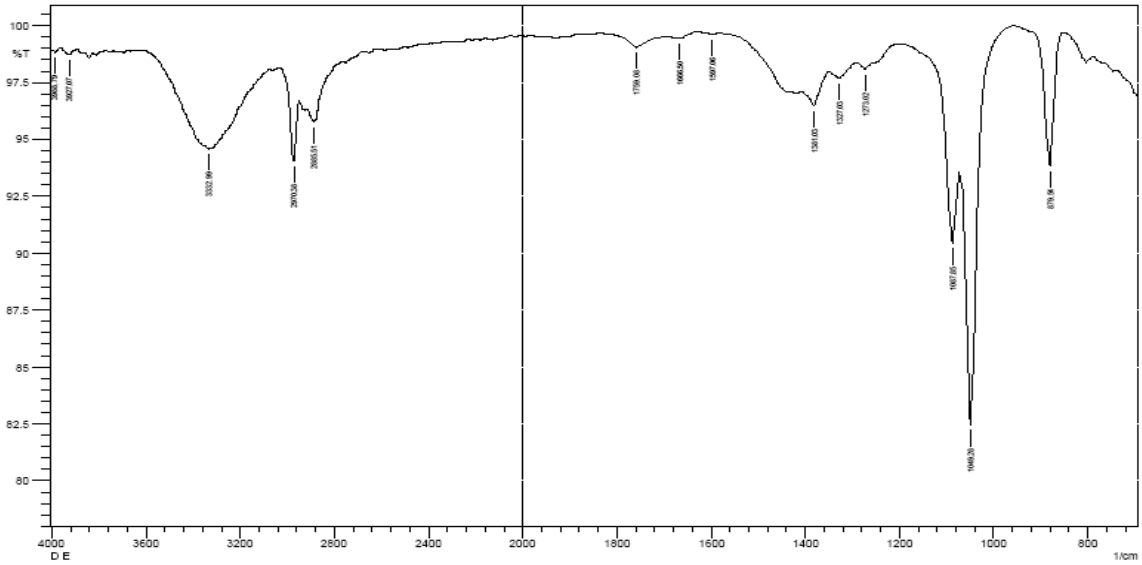

Fig. 1: FT-IR Spectra of *M. dactyloides* ethanolic fruit extract

The broad peaks at 2831.50, 1442.75, 1111.00 and 1026.13 cm^{-1} represents the presence of functional groups such as alcohols, phenols (O–H stretch, H–bonded), carboxylic acids (O–H stretch), aromatics (C–C stretch (in–ring), aliphatic amines (C–N stretch) and alcohols, carboxylic acids, esters, ethers (C–O stretch) (fig. 2). Similar results were obtained from an ethanolic extract of *Tylophora pauciflora* and observed the peak at 2800, 2862.36 and 2926.01 cm^{-1} which correspond to lipids, alkanes, and hydroxyl compounds and the peak at 1730, and 1708 cm^{-1} shows the presence of ester carbonyl and unsaturated carbonyl groups. The strong absorption bands at 2931 and 1458 cm^{-1} are due to CH and CH_2 groups respectively [11].

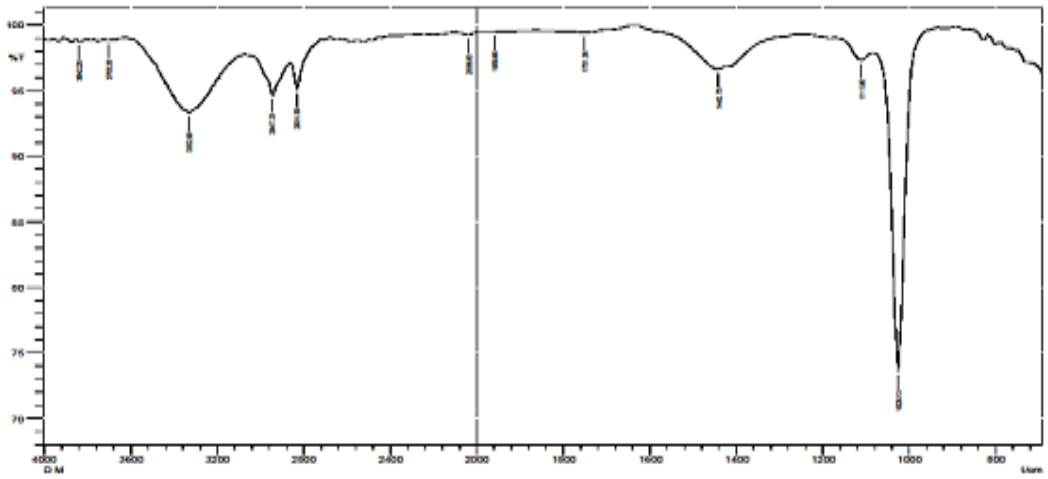

Fig. 2: FT-IR Spectra of *M. dactyloides* methanolic fruit extract

The peaks at 3170.97, 2954.95, 2924.09, 2870.08, 1759.08, 1658.78, 1604.77, 1458.18, 1242.16, 1056.99, 910.40, 864.11 and 732.95 cm^{-1} indicates the presence of functional groups such as carboxylic acids (O–H stretch), alkanes (C–H stretch), carboxylic acids (C=O stretch), alkenes (–C=C–stretch), 1 ° amines (N–H bend), aromatics (C–C stretch (in–ring), alcohols, carboxylic acids, esters, ethers (C–O stretch), carboxylic acids (O–H bend) and aromatics (C–H) (fig. 3). Ragavendran *et al.* analysed leaf extract of *Aerva lanata* by FTIR and reported that the functional groups of halogens, amines, sulphur derivatives, polysaccharides, organic hydrocarbons and carboxylic acids are present in the extract and also reported that the strong absorption band were observed around 3373–3422 cm^{-1} may be due to the presence of bonded N-H/C-H/O-H stretching of amines and amides [12].

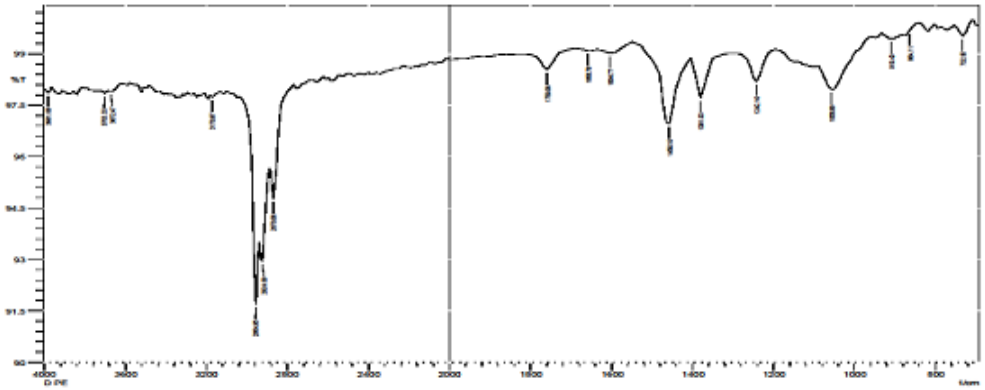

Fig. 3: FT-IR Spectra of *M. dactyloides* fruit (Petroleum ether extract)

FTIR spectroscopic analysis of ethyl acetate extract (*M. dactyloides* fruit**)** was shown in fig. 4. The peaks at 3155.54, 2985.81, 1743.65, 1442.75, 1242.16, 1049.28, 933.55, 848.68, 786.96 and 702.09 cm^{-1} corresponds to the functional groups such as carboxylic acids (O–H stretch), alkenes (C–H stretch), carboxylic acids (C=O stretch), aromatics (C–C stretch (in–ring), alcohols, carboxylic acids, esters, ethers (C–O stretch), aliphatic amines (C–N stretch), carboxylic acids (O–H bend) and 1 °, 2 ° amines (N–H wag). Similar research was carried out in FTIR spectral analysis of *Ampelocissus latifolia* extract and reported that the presence of functional groups such as metal carbonyl compounds, alkanes, amides and aliphatic fluoro compounds were responsible for potential medicinal properties [13].

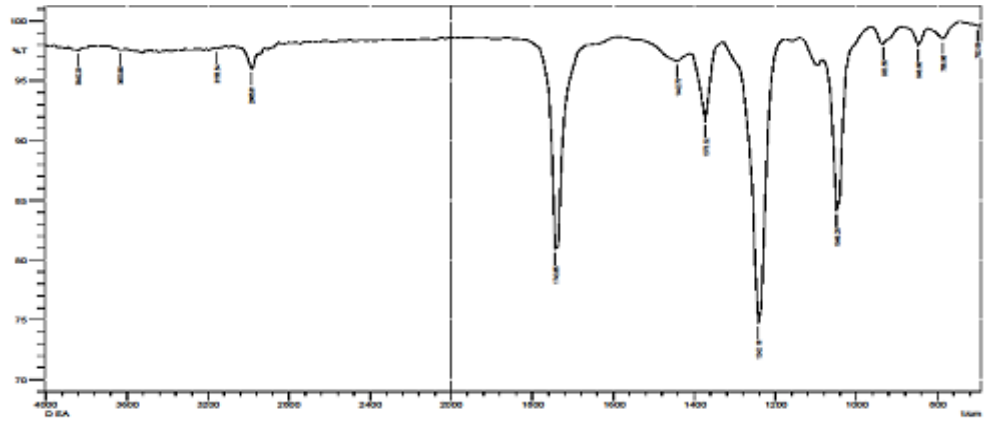

Fig. 4: FT-IR Spectra of *M. dactyloides* fruit (Ethyl acetate extract)

The peaks at 2723.49, 2245.14, 1743.65, 1689.64, 1651.07, 1527.62, 1404.18, 1273.02, 1126.43, 933.55, 833.25 and 740.67 cm^{-1} refers to the presence of functional group such as aldehydes (H–C=O: C–H stretch), nitriles (C≡N stretch), carboxylic acids (C=O stretch), carbonyls (general) (C=O stretch), alkenes (–C=C–stretch), nitro compounds (N–O asymmetric stretch), aromatics (C–C stretch (in–ring)), alcohols, carboxylic acids, esters, ethers (C–O stretch), carboxylic acids (O–H bend) and 1 °, 2 ° amines (N–H wag). Muruganantham *et al.* analyzed the FTIR spectral analysis of medicinal plants such as *Eclipta alba* and *Eclipta prostrate* and reported that the very strong absorption band appearing in the region 2933–2922 cm^{-1} for whole plant parts is due to N–H stretching and also reported the presence of functional groups like carboxylic acids, amines, polysaccharides, nitrates and carbohydrate [14].

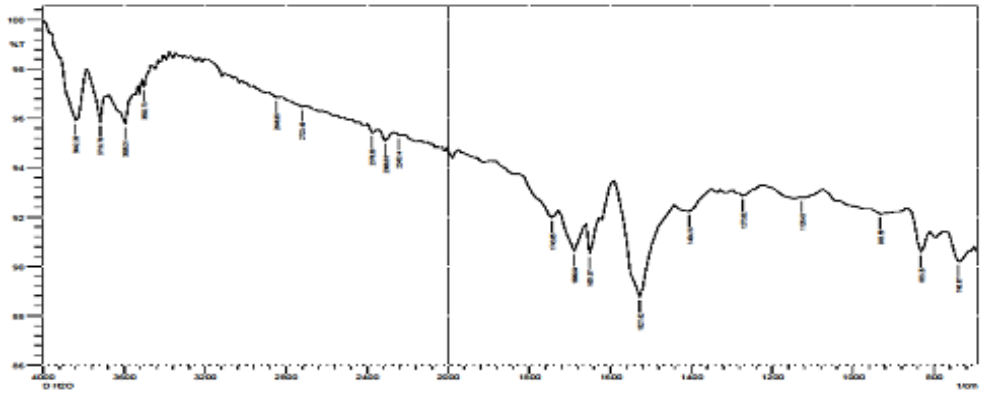

Fig. 5: FTIR analysis of *M. dactyloides* Aqueous fruit extract

The study concluded that the methanolic extract (*M. dactyloides* fruit) has potential bioactive compounds like alkaloids, glycosides, flavonoids, and tannins. FTIR spectra showed the presence of the functional group in all the extracts which have medicinal properties and can be used as antimicrobial and anticancer agents.

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CONFLICT OF INTERESTS

Declared none

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