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Research Article

Pharmacological Probing of Two Locally Available Shrubs Namely, *Cardiospermum halicacabum* (Mudakatthaan) and *Mentha spicata* (Pudina)

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Abstract

The study analysed the antibacterial property of fresh and dry leaf extracts obtained from *Cardiospermum Halicacabum* and Mentha spicata against few bacterial strains that include both gram positive and negative (*Escherichia coli, Bacillus subtilis, Pseudomonas aeuroginosa, Brucella, Pseudomonas fluroscens* and *Bacillus cereus*). The fresh and dry leaf extracts were made through different solvents like isopropanol, methanol, chloroform and aqueous extracts.

Presence of phytochemicals and flavonoids were determined by quality color tests and the functional groups of flavonoids and acids were confirmed by FT-IR. The isopropanol extracts of dry leaves in both the plants showed maximum antibacterial inhibition towards gram negative strain and the study confirms that the leaves of Mentha spicata and Cardiospermum halicacabum can be used as herbal remedy and against infectious conditions.

Keywords: *Cardiospermum halicacabum, Mentha spicata,* Anti Bacterial; Phyto-Chemical; Herbal

Introduction

Antibiotic resistance is surging severely and novel mechanism of resistance has spread globally and has led to difficulty in treatments [1]. The acceptance of herbal medicine for healthcare has made screening of the plants for active compounds vital as they serve as a novel antibiotic source. Cardiospermum Halicacabum, a climber about 2-4 m long locally spelled as Mudakathan keerai plays an important role in traditional medicine and is commonly used for treatment of cough, hyperthermia, arthritis, stiffness of limbs, snake bite, rheumatism [3]. Reports have revealed the presence of anxiolytic, antipyretic, antiarthritic, anti-ulcer, anti-hyperglycaemic activity in C. Halicacabum [2-5]. Mentha spicata, a 30-100 cm long plant commonly known as Mint (English) and Pudina (Tamil) hold a high dietary medical repute and used as a domestic herbal remedy. M. spicata is diuretic, stomachic, stimulant, antisemetic and used as a traditional treatment for cancer [4,5]. This study is an attempt to probe the pharmacological properties of Cardiospermum halicacabum and Mentha spicata as it is widely consumed as green leafy vegetable in all parts of Tamil Nadu.

Materials and Methods

The extracts were prepared by cold percolation method from the fresh and dry leaves of *Cardiospermum halicacabum* and *Mentha spicata* in different solvents such as ethanol, isopropanol, chloroform, methanol and aqueous water. The extracts were screened against few bacterial strains that include both gram positive and negative (*Escherichia coli, Bacillus subtilis, Pseudomonas aeuroginosa, Brucella, Pseudomonas fluroscens* and *Bacillus cereus*) by disc diffusion method [6]. The samples were subjected to phytochemical screening namely, tannin, saponin, flavonoids, steroids, proteins, carbohydrates, alkaloids, terpenoids, anthraquinone and glycoside [7]. The isopropanol extracts of fresh and dry leaves of *Cardiospermum halicacabum* and *Mentha spicata* were subjected to spectrometric measurement in the frequency range of 4000-450 cm-1 in FT-IR Perkin Elmer 2000 model (Thermo Fisher Scientific., Inc, USA) for identifying the functional groups.

Results and Discussion

The anti bacterial study showed that the dry leaves sample of *Cardiospermum halicacabum* and *Mentha spicata* are promising in inhibitory activity of the tested microorganisms. Isopropanol extract of dry leaves of Mentha spicata showed maximum activity against *Brucella* sp., *P. aeruginosa* and *Bacillus cereus*. The anti bacterial was comparatively minimal against gram negative bacteria. Isopropanol extracts of the dry and fresh leaves *Cardiospermum halicacabum* (27mm) and *Mentha spicata* (15mm) exhibited higher antibacterial activity. The antibacterial activity result of this study provides confirmation of the plant extracts against infections conditions. Plant origin antibiotics have proven effective against infectious diseases with simultaneous reduction of side effects which are often in association with synthetic antibiotics.

The phytochemical analysis showed that the isopropanol extracts of fresh leaves of *Cardiospermum halicacabum* and *Mentha spicata* showed the presence of steroids, saponin, carbohydrates, Alkaloids and Terpenoids. Anthraquinone and Glycosides were absent in all the extracts of *Cardiospermum halicacabum* and *Mentha spicata.* The extracts attributed the complex forming ability with extracellular, soluble proteins and cell walls of bacteria.

The FT-IR spectra for crude fresh leave extracts of *Cardiospermum halicacabum* (Figure 1) exhibited a peak of 3401 cm^{-1} for OH stretching vibrations. Peaks at 2979 cm^{-1} (for Alkane stretching), 2152 cm^{-1} (for Alkyne stretching), 1646 cm^{-1} (for Alkene stretching), 1459 cm^{-1} (for aromatic stretching). Figure 3 exhibited crude dry leave extracts of *Cardiospermum halicacabum* peaks at 1252 and 705 cm^{-1} (for Alkyl halide stretching), 1074 cm^{-1} (for C-O alcohol stretching) and 947 cm^{-1} (for Alkene bending) were also observed. The FT-IR spectra of the crude fresh leaves of *Mentha spicata*, (Figure 2) exhibited a strong and broad absorption peak at 3392 cm^{-1} for OH stretching and figure 4 showed significant peaks for dry leaf extracts of *Mentha spicata* at 2973, 2932, and 2888 cm^{-1} for CH stretching vibrations [8]. From the results obtained in the present study, it could be concluded that the fresh and dry leaf extracts of isopropanol solvents of *Cardiospermum halicacabum* and *Mentha spicata*. The various functional groups observed in the different extracts indicate the presence of carbohydrates, carotenoid, glycogen, amino acids, glycogen and cellulose. Among the functional groups observed in the extracts, OH group was found to be present uniformly only in the isopropanol extracts of both the leaves.

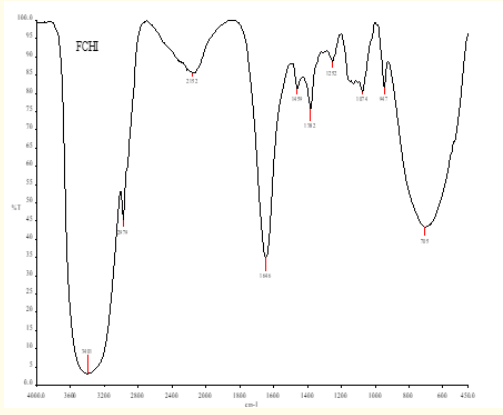

Figure 1: FT-IR spectra for crude fresh leave extracts of *Cardiospermum halicacabum.*

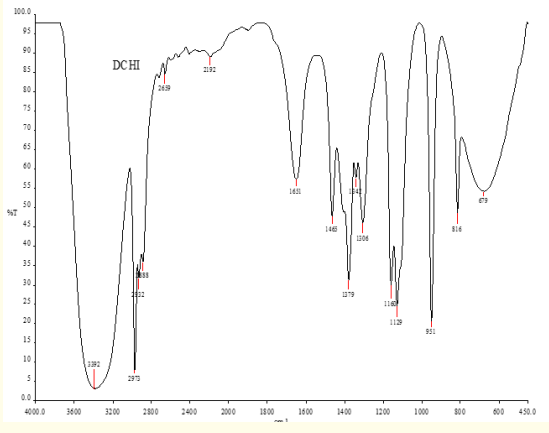

Figure 2: FT-IR spectra of the crude fresh leave extracts of *Mentha spicata.*

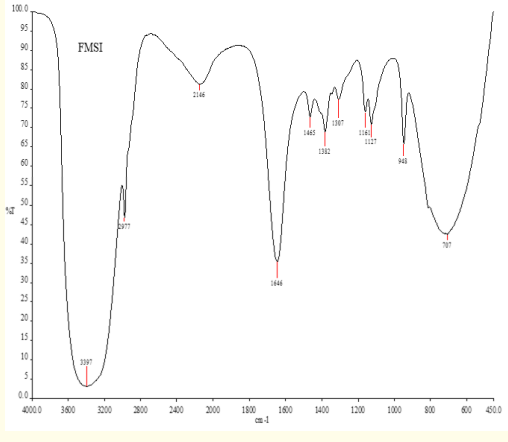

Figure 3: FT-IR spectra for crude dry leave extracts of *Cardiospermum halicacabum.*

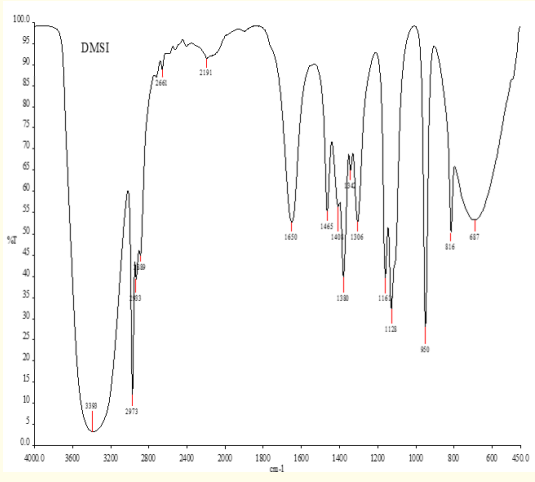

Figure 4: FT-IR spectra of the crude dry leave extracts of *Mentha spicata.*

Conclusion

Results from this study showed that isopropanol extracts of dry and fresh leaves of *Cardiospermum halicacabum* and *Mentha spicata* inhibited the growth of *Brucella* sp., *P. aeruginosa* and *Bacillus cereus* bacterial strains. The two plants are native of Tamil Nadu and conservation and effective use of this would prove to be a good herbal medicine and its functional groups could be exploited as lead molecule for drug discovery.

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Conflict of interest

Nil

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