

Identification of a New Compound Hederacine - B from the Chloroform Extract of *Leonotis nepetifolia* Leaves

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ABSTRACT

Leonotis nepetifolia is one of the most common aromatic plants (Family Lamiaceae) traditionally used for its ethnomedicinal potential. The plant is known for its antibacterial, antifungal, antioxidant, antispasmodic and antiasthmatic potential. The FTIR, NMR and MS study of the chloroform extract of this plant showed the presence of hederacine- B. Hederacine- B is the first report from *Leonotis nepetifolia*. The availability of hederacine – B also indicates that the plant might be helpful in cancer treatment.

Keywords: Aromatic plant, Hederacine- B, *Leonotis nepetifolia*.

INTRODUCTION

Plant-based Herbal remedies are increasingly utilized to treat numerous disease conditions, like asthma, dermatitis, premenstrual disorder, rheumatoid joint inflammation, headache, menopausal indications, persistent weakness, etc. The World Health Organization assessed that about 80% of individuals across the globe rely on natural plant-based herbal medicines for their routine healthcare (Uday Prakash et al., 2013).

The genus *Leonotis* belongs to the angiospermic plant family Lamiaceae (mint family) and consists of approximately 100

species. *Leonotis nepetifolia* R.Br., also known as Lion's Ear in common and Deepmal in Marathi. It is widely distributed throughout tropical regions across the globe (Iwarsson & Harvey, 2003 & Vasuki et al., 2015). It is native to South Africa and Southern India and traditionally used in Caribbean folk medicine and Ayurvedic herbal medicine to treat a wide array of human diseases such as coughs, fever, stomachache, skin infections, rheumatism, bronchitis, and asthma (Iwarsson & Harvey, 2003; Watt & Breyer-Branwijk et al., 1963; Uday Prakash et al., 2013 & Vasuki et al., 2015).

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Pushpan et al. (2012) reviewed ethnomedicinal claims of *L. nepetifolia*. Tiwari (2019) reported that this plant is being used by Baiga tribe of Madhya Pradesh to cure jaundice and liver disorder. Thus, this plant has various medicinal uses. Therefore, the present work is planned to study the phytochemical composition of *L. nepetifolia*.

MATERIALS AND METHODS

The plant material of *L. nepetifolia* was collected from the agricultural waste-lands of Akola District (MS) India during winter 2019. After taxonomic identification of the plant, herbarium was prepared and a copy was deposited in the Department of Botany, Shri Dr. R. G. Rathod College, Murtizapur, District Akola (MS). The fresh leaves were shade dried for about eight days, powdered and then packed in airtight polythene until use. The leaf powder material of *L. nepetifolia* was extracted in chloroform and used for the FTIR, NMR and MS study. The FTIR, NMR and MS samples were analyzed at SAIF, CDRI, Lucknow.

The FTIR analysis was done on FTIR spectrophotometer IRAffinity 1S (Shimadzu Japan). NMR spectra were acquired on Bruker 400 AVANCE spectrometer (400 MHz for ¹H and 100 MHz for ¹³C). ESI MS spectra were recorded on Thermo Scientific – MSQ PLUS.

RESULT AND DISCUSSION

The FTIR, NMR and MS analysis of chloroform extract of *Leonotis nepetifolia* was done. The spectra are presented in figure 1-3 and the interpreted data is presented in table 1. The FTIR showed 3444 N-H Stretching, 2923 Aliphatic C-H stretching, 1723 C=O Stretching, 1457 C-N Stretching, 1168 C-O Stretching. In NMR spectra, the δ value of

peak obtained indicates δ 1.3 - 1.2 for CH₃ proton, δ 8.2 - 7.5 for Aromatic protons and δ 2.5 - δ 3.3 for 4 member ring proton. Further, the MS spectrum showed a molecular ion mass of about 276.37. These findings indicate that the compound found in chloroform extract of *L. nepetifolia* leaves with the above feature and values is an alkaloid, hederacine-B.

Takeda et al. (1998) identified two new iridoid glycoside from the stem extract of *L. nepetifolia*. Vasuki et al. (2015) has given the pharmacological profiling of the plant *L. nepetifolia*. Do et al. (2020) identified six different compounds loganin, loganic acid, shanzhiside methyl ester, sweroside and picconioside I, and benzenoid evofolin B from ethylacetate extract of *L. nepetifolia*. Deshmukh and Hiwase (2022) reported that GC-MS analysis of *L. nepetifolia* leaves showed the presence of Hematoporphyrin, Cyclodecasiloxane and Decanic acid. This indicates that the plant is rich in phytochemical composition. These phytochemicals present a variety of medicinal properties to this plant. Kadalmani et al. (2020) reported that the ethanolic extract of *L. nepetifolia* showed significant antifertility and antioxidant activity. de Oliveira et al. (2021) explored the phytochemicals of *L. nepetifolia* and reported that the plant has significant antimicrobial and antileishmanial properties. Tidke et al. (2021) reviewed and illustrated the chemical composition and biological activities of *L. nepetifolia*. As our study reports that the leaves of *L. nepetifolia* contain Hederacine-B, in concurrence with earlier work, it might possess the anticancer potential. It was earlier reported from the other members of family lamiaceae but this is the first report of hederacine-B from this plant.

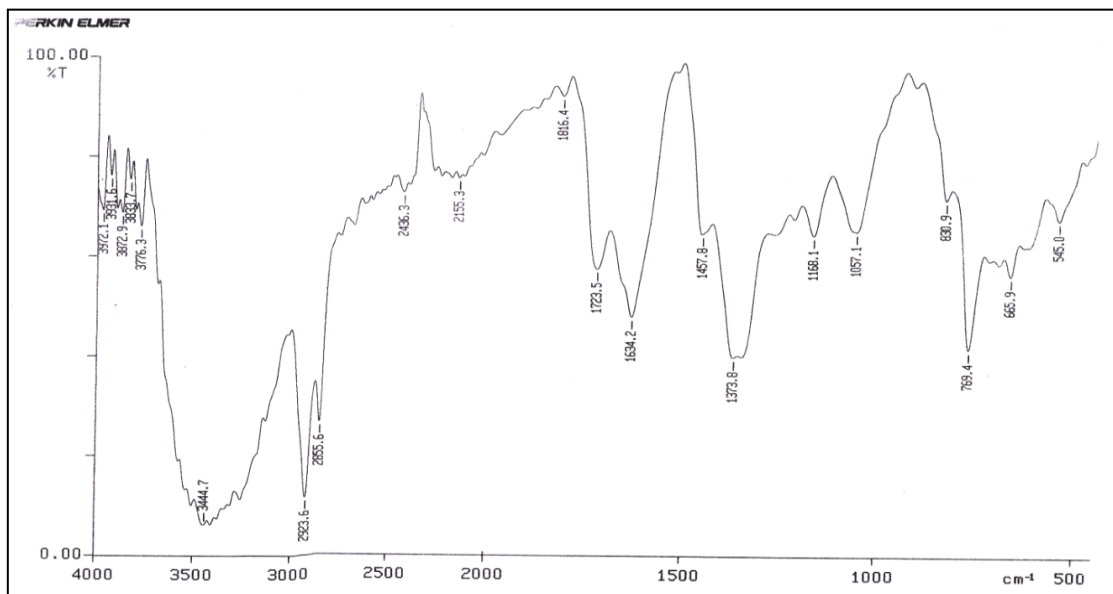


Fig. 1: FTIR spectra of Chloroform extract of *Leonotis nepetifolia* leaves

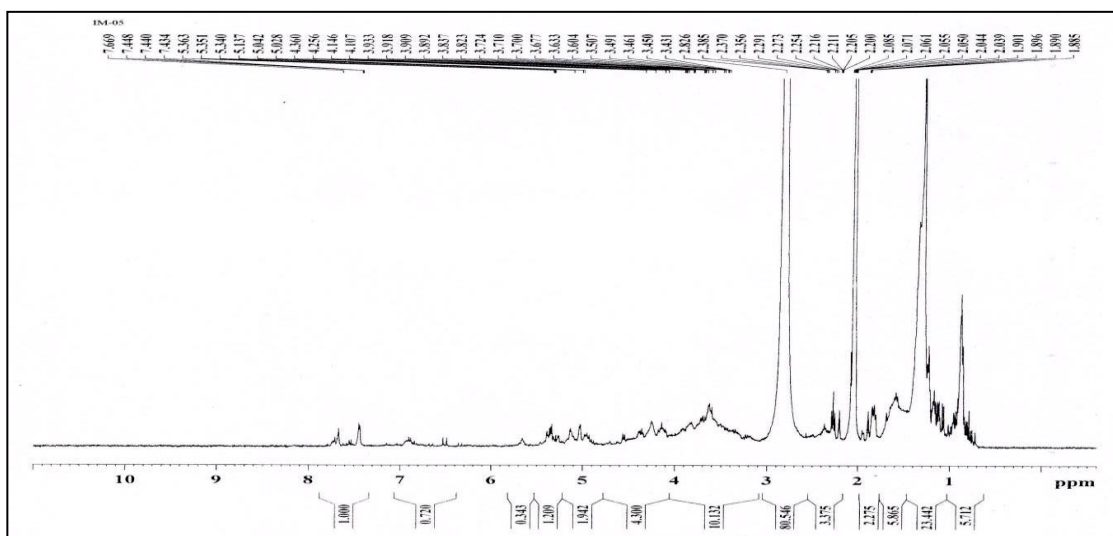


Fig. 2: NMR spectra of Chloroform extract of *Leonotis nepetifolia* leaves

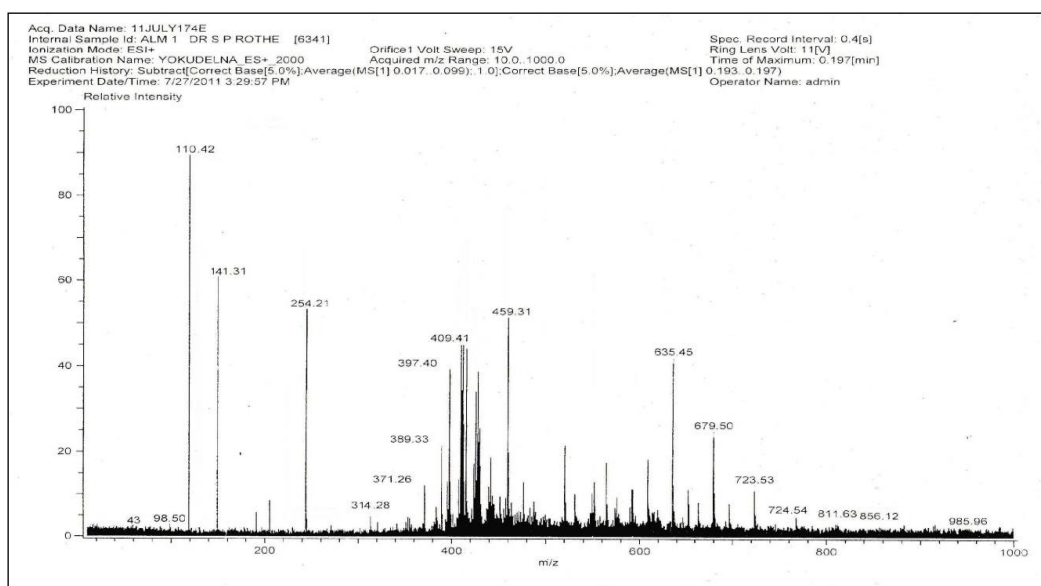
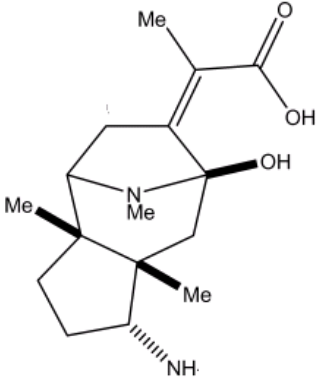


Fig. 3: Mass spectra of Chloroform extract of *Leonotis nepetifolia* leavesTable- 1: Interpretation of IR, NMR and MS spectra of Chloroform extract of *L. nepetifolia*.

Ft IR	Wave number (cm⁻¹)
	3444 N-H Stretching
	2923 Aliphatic C-H stretching
	1723 C=O Stretching
	1457 C-N Stretching
1168 C-O Stretching	
H1 NMR	Peak at following δ value
	δ 1.3 - 1.2 for CH ₃ proton
	δ 8.2 - 7.5 for Aromatic protons
	δ 2.5 - δ 3.3 for 4 member ring proton
Mass	Molecular ion mass 276.37
Chemical Structure	
Chemical formula	C ₁₆ H ₂₄ N ₂ O ₂

CONCLUSION

Leonotis nepetifolia is an aromatic plant with ethnomedicinal importance and is rich in phytochemicals. Identification of Hederacine-B is the first report of this compound from *L. nepetifolia*. As the compound hederacine- B has anticancer potential, the plant could be exploring as source for anticancer compounds. However, its medicinal potential must have to be validated using proper pharmacological testing and then the identified compound could be used as a drug candidate.

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Conflict of Interest: The author has no matter of conflict of interest.

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