Plants are the largest reservoir of secondary metabolites which contribute in combating different diseases from ancient times. Hence, the present investigation was carried out to study the bioactive potential of stem and leaf of *Bacolepis nervosa*. The pharmacognostic evaluations like macroscopical, microscopical, physicochemical constants, fluorescent analysis and preliminary phytochemical analysis of the herbal drug of *Bacolepis nervosa* have been carried out.

The analytical results for total ash of stem and leaf were found to be 7.0% and 7.7% respectively. The present study showed that various extracts of leaf contain greater proportion by mass of the extractive values than the various extracts of stem. In stem and leaf extracts, water soluble extractive values were higher followed by alcohol and chloroform soluble extractive values while the least amount of extractive value was observed in petroleum ether extract. Fluorescence studies of stem and leaf powder revealed the presence of fluorescent green with some reagents under UV light of shorter wavelength.

The presence of alkaloid, flavonoid, glycoside, saponin, steroid and terpenoids has been confirmed in methanol extracts of stem and leaf by HPTLC analysis. In the present study, total phenol, flavonoid and tannin content were higher in methanol extract and more in leaf than stem of *B. nervosa*. Thirty and thirty one compounds were identified in ethanol extracts of stem and leaf of *B. nervosa*. The major constituents recorded were thymol, eugenol and piperine in both stem and leaf of the plant. The functional groups of stem and leaf of *B. nervosa* were identified and confirmed by FT-IR analysis.
In the present study, ethanol extract of stem and leaf showed high DPPH radical scavenging activity and superoxide radical scavenging activity while ethyl acetate extract showed high hydroxyl radical scavenging activity and ABTS cation radical scavenging activity. The outcome of the present investigation undoubtedly indicate that the treatment with *B. nervosa* was effective an inhibiting the tumor progression in *in vivo* models. The ethanol extracts of *B. nervosa* stem and leaf exhibited significant antidiabetic activity in alloxan induced diabetic rats. The histopathological findings revealed that the phytochemicals like flavonoids and tannin which are present in the plant extracts showed excellent protection to liver architecture almost to the level of the silymarin treated groups, showing its potent hepatoprotective effects in animal model.

The present investigations validate the use of stem and leaf of *B. nervosa* as a herbal drug and confirming their antioxidant, anticancer, antidiabetic, hepatoprotective, antifertility, antiinflammatory and antibacterial activities. Here, the information collected was useful for further pharmacological and therapeutic evaluation along with the standardization of plant material. Further it was planned to identify more precisely the lead component responsible for different activities and to unveil the molecular mechanism behind its therapeutic action.