

## Hepatoprotective and Immunostimulative Properties of Medicinal Plants against Tuberculosis

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**Abstract :** Tuberculosis (TB) is a disease caused by the bacterial pathogen *Mycobacterium tuberculosis*. It is associated with high mortality rates in both developing and developed countries. Many higher plants are found that are medicinally associated with tuberculosis infection. Plants belonging to thirteen families were selected, based on their traditional usage for tuberculosis and its associated symptoms. Eight plants showed the best antimycobacterial activities (MIC-value  $\leq 500.0$   $\mu\text{g/ml}$ ) against *M. tuberculosis* H37Rv. LS was found to have a minimum inhibitory concentration (MIC) of 125  $\mu\text{g/ml}$  whereas, *Tulbaghia violacea*, *Heteromorpha arborescens*, *Sutherlandia frutescens*, *Eucalyptus deglupta*, and *Plectranthus neochilus* were found to have a MIC value of 250  $\mu\text{g/ml}$  against *M. tuberculosis* H37Rv. Cytotoxicity values on U937 and HepG2 cells were obtained and the IC50 values ranged between  $40 \pm 4.30$  and  $> 400$   $\mu\text{g/ml}$  for the U937 cell line and  $72.4 \pm 1.50$  and  $> 400$   $\mu\text{g/ml}$  for the HepG2 cell line. *Heteromorpha arborescens* had the lowest IC50 value in both cell lines and therefore showed moderate levels of toxicity. Of the 19 samples that underwent the 2, 2'-diphenyl-1-picrylhydrazyl (DPPH) antioxidant assay, *Eucalyptus deglupta* and *Melanthus major* showed significant free radical scavenging activities with concentrations of 1.33 and 1.32  $\mu\text{g/ml}$  respectively for the inhibition of DPPH. Hepatotoxicity induced by acetaminophen identified *Searsia lancea* with hepatoprotective activity of 59.37% at a  $\frac{1}{4}$  IC50 concentration. Out of the 7 samples that were investigated for their immunomodulatory capabilities, *Eucalyptus deglupta* produced the most IL-12 with *Sutherlandia frutescens* also showing positive results for IL-12 production. In the present study, *Eucalyptus deglupta* showed the most promising results with good activity against *M. tuberculosis* with an MIC-value of 250  $\mu\text{g/ml}$ . It also has potent antioxidant activity with an IC50 value of 1.33  $\mu\text{g/ml}$ . This sample also stimulated high production of the cytokine, IL-12. *Searsia lancea* showed moderate antimycobacterial activity with an MIC-value of 500  $\mu\text{g/ml}$ . The antioxidant potential also showed promising results with an IC50 value of 4.50  $\mu\text{g/ml}$ . The hepatoprotective capability of *Searsia lancea* was 59.34% at a  $\frac{1}{4}$  IC50 concentration. Another sample *Sutherlandia frutescens* showed effective antimycobacterial activity with an MIC-value of 250  $\mu\text{g/ml}$ . It also stimulated production of IL-12 with 13.43 pg/ml produced. These three samples can be considered for further studies for the consideration as adjuvants for current tuberculosis treatment.

**Keywords :** adjuvant, hepatoprotection, immunomodulation, tuberculosis

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