

ABSTRACT

The present study deals with the phytochemical analyses and determination of antimicrobial, anthelmintic, antidiabetic and anticancer potential of *in vitro* plant tissue and callus culture extracts of *Cichorium intybus* L., *Peganum harmala* L. and *Withania somnifera* (L.) Dun. Maximum seed germination was observed in *P. harmala* seeds. Explants such as hypocotyl and cotyledon from *in vitro* seedlings were cultured on MS medium supplemented with different combinations and concentrations of plant growth regulators for callus induction. The most successful culture media were 0.05 TDZ + 0.5 NAA mg/L, 0.05 TDZ + 0.5 IBA mg/L and 0.05 TDZ + 0.5 BAP mg/L for callus induction of *C. intybus*, *P. harmala* and *W. somnifera* two for each respectively. Four different solvents depending upon polarity were used for extraction of explant tissues and callus cultures. Maximum percentage yield was recorded in chloroform extract of cotyledon callus cultures of *C. intybus* followed by chloroform extract of hypocotyl callus of *P. harmala* and cotyledon callus of *W. somnifera* respectively. Phytochemical analyses of extracts indicated the presence of valuable phytochemicals such as alkaloids, flavonoids, phenols, saponins, tannins, reducing sugars and terpenoids. Antimicrobial potential was tested against pathogenic bacteria (*Bacillus subtilis*, *Staphylococcus aureus*, *Escherichia coli* and *Pseudomonas aeruginosa*) and fungi (*Aspergillus niger* and *Fusarium solani*). Maximum inhibition zones were recorded in methanol extracts of *P. harmala* and *C. intybus* hypocotyl callus culture against *B. subtilis* and *E. coli* respectively followed by chloroform and methanol extracts. Anthelmintic test showed that methanol extract of cotyledon callus culture of *P. harmala* exhibited considerable anthelmintic potential. Antidiabetic potential of methanol extracts of callus cultures was evaluated by using rabbits as experimental organisms. The extract of *C. intybus* hypocotyl callus culture showed maximum decrease in blood sugar level followed by the *W. somnifera* cotyledon callus culture in streptozotocin induced diabetic rabbits. Anticancer activity was conducted through HTC116 human colon cancer cell lines cultured in Dulbecco's Modified Eagle Medium. Methanol extract of *P. harmala* hypocotyl callus cultures showed highest anticancer potential followed by chloroform extract of hypocotyl callus culture of *C. intybus*. It can be concluded that callus cultures of the plants selected for study hold auspicious ethno-pharmacological effectiveness and *in vitro* biomass production may be helpful for biodiversity conservation.