Abstract

The use of medicinal plants for the treatment of various ailments has been documented in history of all civilizations. Traditional systems of medicine continue to be widely practiced on many accounts. With the onset of scientific research in herbals, it is becoming dearer that the medicinal herbs have a potential in today’s synthetic era. The herbal products today symbolize safety in contrast to the synthetics. So, medicinal plants find application in pharmaceutical, cosmetic and food industries.

Side effects of several synthetic drugs and development of resistance to currently used drugs for infectious diseases have led to increased emphasis on the use of plant materials as a source of medicine for a wide variety of human ailments. Restrictions on the use of synthetic antioxidants has led to an upsurge of interest in the therapeutic potentials of medicinal plants as antioxidants in reducing free radical induced tissue injury. Management of diabetes without any side effects is still a challenge in the medical field. Since the existing drugs for the treatment of diabetes do not satisfy our need completely, the search for new drugs especially from plant source is gaining importance. Traditional plant remedies might offer a natural key to unlock diabetic complications. Ancient knowledge coupled with scientific principles can come to the forefront and provide us with powerful remedies to eradicate the diseases.

Our study aimed at identifying the antimicrobial, antioxidant and antidiabetic activities of herbs. From the literature review it was found that *Andrographis paniculata*, *Tinospora cordifolia* and *Trigonella foenum-graecum* are used widely in Ayurveda and other traditional systems of medicine for treating various ailments. Majority of the studies done on these plants are mainly on their seeds in *T. foenum-graecum*, stem and roots in *T. cordifolia* and aerial parts in *A. paniculata*. So, we were keen to study the activity of their leaves, as they are used in various formulations in traditional medicine.

Antimicrobial studies were carried out by using clinical isolates of bacteria and fungi. Disc diffusion and broth dilution methods were used for antibacterial studies and mycelial dry weight method was used for antifungal studies. From the
results obtained, it was found that ethanol leaf extracts of *A. paniculata* and *T. foenum-graecum* possessed significant antibacterial and antifungal activities. Among the bacteria tested, *Pseudomonas aeruginosa* and *Staphylococcus aureus* were the most susceptible ones. Among the two dermatophytes, *Epidermophyton floccosum* was found to be more susceptible. Phytochemical analysis of the ethanol leaf extracts indicated the presence of phenols and flavonoids in all the three plants.

Antioxidant studies were carried out by using various *in vitro* methods *viz.*, Ferrous reducing antioxidant power assay, Total reducing power, 1,1-Diphenyl-2-picrylhydrazyl scavenging method, Lipid peroxidation inhibitory method and Superoxide scavenging method. The results from the antioxidant studies showed that ethanol leaf extracts of all the three plants possessed significant antioxidant activity. Among the plants tested, *A. paniculata* was more potent in inhibiting lipid peroxidation and also scavenging superoxide radicals.

Antidiabetic studies were carried out in diabetic rats. Ethanol leaf extract of all the three plants were investigated for their efficacy and safety in rats. The activity of the extracts was compared with the reference standard glibenclamide for various biochemical parameters like blood glucose, urea, creatinine and antioxidant enzyme levels. Histopathological studies of the islet cells of pancreas were also carried out. From the results obtained, it was found that ethanol leaf extracts of *A. paniculata* and *T. foenum-graecum* possessed significant antidiabetic and antioxidant activities in diabetic rats. In addition to this, the extracts were found to be non-toxic. Histopathological studies showed the restoration of normal morphology of islet cells in the diabetic treated rats.

Present investigation encompasses successful attempts in proving the antimicrobial, antioxidant and antidiabetic activities of *A. paniculata*, *T. cordifolia* and *T. foenum-graecum* leaves. These aspects, which I believe has commercial applications for design and development of new generation drugs. The presence of active phytochemical substances also provide substantial basis for the use of these plants in ethnomedicine.