RESEARCH ARTICLE | International Journal of Plant Sciences, Vol. 4 Issue 1 : 198-201 (January to June, 2009)

Radical scavenging activity of different parts of *Withania somnifera*

S. SUMATHI AND P.R. PADMA

Accepted : November, 2008

SUMMARY

Oxidative stress can arise from an imbalance between the generation and elimination of reactive oxygen species (ROS), leading to excess ROS levels, inflicting indiscriminate damage to virtually all biomolecules, leading, in turn, to various diseases and cell death. It has recently become apparent that ROS are not always harmful metabolic by products as generally believed. The use of traditional medicine is widespread and plants are still a large source of natural antioxidants that might serve as leads for the development of novel drugs. One such popularly known plant that is reported to have anti-tumour, radiosensitizer, antistressor, immunomodulatory, anti-inflammatory and anti-bacterial effects is *Withania somnifera* Dunal, which is commonly known as 'Ashwagandha'. In the present study we attempted to evaluate the radical scavenging effects of the extracts using a variety of free radicals and oxidants namely OH·, DPPH, SO· and NO. These studies revealed that *W. somnifera* is a rich source of antioxidant as well as scavenger of free radicals.

Key words : Free radicals, Oxidative stress, Oxidants, *Withania somnifera*, Reactive oxygen species.

Herbal medicines have been used for many years (Kaleru *et al.*, 2007). Even today, this area holds much more hidden treasure as almost 80 per cent of the human population in developing countries is dependent on plant resources for healthcare (Uniyal *et al.*, 2006). Aerobic cells are inevitably exposed to Reactive Oxygen Species (ROS) formed as metabolites (Hsu and Guo, 2002). To counter the harmful effects of free radicals like ROS and RNS, an antioxidant defense mechanism operates to detoxify or scavenge these ROS and RNS (Nair, 2003). Antioxidants are substances at the molecular and cellular level that are thought to be effective in helping to deactivate free radicals and prevent cancer, heart disease and stroke (Konodo *et al.*, 2001). Man has sought healing powers from the natural resources, especially from plants. Many drugs used today are based on folk remedies and subsequent ethnopharmacological studies (Koul *et al.*, 2005). *Withania somnifera*, also known as Indian ginseng, is widely used in Ayurvedic medicine. It is an ingredient in many formulations prescribed for a variety of musculoskeletal conditions and as a general health tonic for elderly persons and lactating mothers (Khajuria *et al.*, 2004). All these medicinal preparations and polyherbal formulations, it is the dry tubers of the plant that is being employed. Eventhough the leaves possess medicinal properties, not many studies have been reported regarding their antioxidative properties. Hence, in the present study, attempt has been made to study the radical scavenging properties of leaves, fresh and dry tubers.

Correspondence to:
S. SUMATHI, Department of Biochemistry, Biotechnology and Bioinformatics, Avinashilingam University for Women, COIMBATORE (T.N.) INDIA
Authors' affiliations:
P.R. PADMA, Department of Biochemistry, Biotechnology and Bioinformatics, Avinashilingam University for Women, COIMBATORE (T.N.) INDIA

MATERIALS AND METHODS

The saplings were obtained from the Centre for Indian Medical Heritage and grown as pot cultures. The roots, stem, leaves and fresh tubers were collected from fresh plants for the estimation of each parameter. The dry tubers were procured from local markets. The parts of the plants used for the assay were collected, washed thoroughly in running tap water and gently blotted dry between folds of filter paper and used for the assays. In order to understand the specificity of this action, the effect of the extracts were tested on a battery of free radical and non-radical oxidants.

The leaves, fresh and dry tubers of *Withania somnifera* were serially extracted with solvents of increasing polarity namely petroleum ether, benzene, ethylacetate, methanol and water using a Soxhlet apparatus. The solvents were evaporated and the yield of the extract was calculated. The extracts were redissolved in specific volumes of the respective solvents and used to assess the scavenging ability on superoxide and nitric oxide. Crude water extract was also prepared and used for the assay. The superoxide scavenging ability of the extracts was assessed by the method of Winterbourn *et al.* (1975). The extent of inhibition of nitric oxide radical generation *in vitro* was followed as per the method reported by Green *et al.* (1982). The extent of hydroxyl radical scavenging from Fenton reaction was quantified using 2'-deoxyribose oxidative degradation as described by Elizabeth and Rao (1990). The ability of plant