RESEARCH PAPER

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Effect of *Majorana hortensis* leaves against lipid peroxidation

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Free radicals inducing oxidative damage of cellular lipids, nucleic acids and proteins are thought to be one of the major risks for diseases such as cancer, atherosclerosis, diabetes mellitus and various other degenerative diseases. Numerous natural free radical scavengers and antioxidants can protect biomolecules against the attack of free radicals and/or suppress the resultant injury. Three leaf extracts of candidate plant, *Majorana hortensis,* were prepared in methanol, chloroform and aqueous and subjected to test the extent of inhibition of *in vitro* lipid peroxidation by using different lipid membrane preparations, namely RBC ghosts, goat liver homogenate and goat liver slices. All the three extracts caused a substantial decline in the extent of LPO in all the three membrane preparations. The decrease in LPO was more pronounced in the liver homogenate. Among the three extracts used, the methanolic extract evinced a better protection in all three lipid preparations compared to the aqueous and chloroform extracts.

Key words : Free radicals, Reactive oxygen species (ROS), Lipid peroxidation, RBC ghosts, Membrane lipids

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INTRODUCTION

Free radicals are highly reactive atomic or molecular species that can damage vital cellular molecules like nucleic acids, lipids and proteins resulting in subsequent cell death (Pauwels *et al*., 2007). In the biological system, lipids are the immediate targets of oxidative moieties and DNA molecules are the ultimate targets (Balakrishna *et al*., 2009). Membrane lipids present in subcellular organelles are highly susceptible to free radical damage and cause peroxidation of polyunsaturated fatty acids in the membranes (Kim *et al*., 2005). When reactive oxygen species attack polyunsaturated fatty acids on the cell membrane of living organisms in the presence of molecular oxygen, a chemical cascade is triggered. This eventually leads to the disintegration of fatty acids and the formation of malondialdehyde (MDA) which is called as lipid peroxidation (LPO) (Cemek *et al*., 2006). MDA, the end product of lipid peroxidation, has also been demonstrated to be a mutagenic and genotoxic agent that can contribute to the development of human cancers (Ajith, 2010). The damage caused by LPO is highly detrimental to the functioning of the cell (Skrzydlewska *et al*., 2005). Antioxidants are compounds which have the ability to transform reactive oxygen species into stable and harmless compounds or to scavenge both reactive oxygen and nitrogen species with a redox-based mechanism (Niki, 2009). Several epidemiological studies suggest that plants rich in antioxidants play a protective role in health and against diseases, and their consumption lowers the lipid peroxidation (Muanda *et al*., 2009).

The present study was undertaken to test the extent of inhibition of *in vitro* lipid peroxidation by the extracts of *Majorana hortensis* using different membrane preparations. The candidate plant, *Majorana hortensis* (*M. hortensis*), is a perennial herb, belonging to family Lamiaceae (mint) and is an aromatic plant known to have many therapeutic remedies; it cures fever, digestive disorders and has antibacterial activities as well. It is commonly called majoram.

RESEARCH METHODOLOGY

The *in vitro* model systems used as an alternative to live animal models included, three different membrane model systems to analyze the extent of LPO and protection rendered by the leaf extracts. These different models were employed in order to ascertain whether the lipid