Vascular dysfunction in a sucrose induced metabolic complications ameliorates with essential oil (Citronellol)

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Background: Changing life style has turned food habits towards Western diet rich in fat and sucrose. The metabolic complications like obesity, insulin resistance and cardiovascular complications are very common with sedentary life style. Dietary factors are playing major role in etiology of metabolic complications in human. Earlier essential oil mostly used in food and cosmetic industries, but now more emphasis is given on its medicinal uses. Various studies have well reported on beneficial effect of essential oils in metabolic and neurodegenerative disorders. Citronellol a major component of geranium oil and also it is found in essential oils of various spices and aromatic herbs (e.g., ginger, nutmeg, coriander, lemon, lemon-grass, orange, lavender, etc.). Citronellol a monoterpenne is known for potent anti-inflammatory, antihypertensive, hypoglycemic and antioxidant activity. Hence the present study aimed to explore the protective effect of citronellol over high fat sucrose diet induced vascular and metabolic complication.

Methods: Metabolic complications were induced in adult male Wistar rats by feeding diet containing 20% fat and 30% sucrose (HFS diet) for 12 weeks. After confirmation of hypercholesterolemia (total cholesterol >150 mg/dl) at the end of 6 weeks, different doses of citronellol (100, 200, 400 mg/kg p.o) were administered for next 6 weeks. At the end of study plasma glucose, glycosylated hemoglobin (HbA1C), insulin, OGTT, lipid profile, antioxidants levels, lipid peroxidation, serum NO level, NOS activity in aorta, ECG changes, mean arterial pressure and endothelial dependent and independent vascular function in aorta were assessed.

Results: Administration of citronellol in HFS diet fed rats exhibited a significant decline in glucose, insulin resistance, triglyceride, total cholesterol, LDL levels and increase in HDL levels. Decreased serum NO level and NOS activity, increased oxidative stress along with impaired glucose tolerance associated with HFS diet were restored significantly by citronellol in dose dependent manner. Also increased MAP and ECG changes were normalized and reduced acetylcholine-induced, endothelium-dependent relaxation was improved significantly in citronellol treated rats (90.16 0.27%).

Conclusions: Citronellol ameliorates endothelial dysfunction and metabolic complications in HFS diet fed rats by repressing insulin resistance, oxidative stress, lipid lowering effect with normalizing MAP, ECG changes & NO bioavailability.