KSN 2022
SEOUL, KOREA MAY 26 - 29

Abstract Submission No. : 1340

Cardio and reno-protective potential of ethanolic extract of Madhuca longifolia leaves in a rat model of nitric oxide deficiency

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Objectives: Madhuca longifolia leaves has been used as a traditional medicine for a long history in developing countries and showed significant free radical-scavenging activities, antioxidant activities and anti-leukemia effects in experimental rats. This study aimed at investigating the role of ethanolic extract of Madhuca longifolia leaves extract (MLLE) in preventing the development of hypertension, cardiac damage, oxidative stress and hyperlipidemia in a rat model of nitric oxide deficiency.

Methods: Female Wistar rats were divided into groups and were given different treatments for 4 weeks.
Animals were co-treated with Nω-Nitro L-arginine methyl ester (L-NAME) (40 mg/kg) and ethanolic extracts of MLLE (100, 200 ,400 mg/kg body weight) for 4 weeks. Twenty-hour urine samples were collected weekly during the study. At the end of the study serum, heart and kidneys were harvested for biochemical and histopathological analysis. Blood pressure and serum nitric oxide were measured at weeks 0, and 4. At necropsy, cardiac and aortic thiobarbituric acid reactive substances (TBARS), 4-hydroxynonenal (HNE) contents, cardiac angiotensin-converting enzyme (ACE) activity, and serum level of serum angiotensin II were measured.

Results: The higher dose (400 mg/kg) of the MLLE extract was more effective in preventing increase in systolic and diastolic ($p<0.05$) blood pressure. Creatinine clearance, proteinuria and glomerular filtration rate were lower in the L-NAME control group compared to all MLLE treatment groups. MLLE dose dependent treatment prevented L-NAME-induced decrease in serum angiotensin II concentration, serum nitric oxide levels, significantly decreased TBARS and HNE concentration in serum ($p<0.05$), heart ($p<0.001$), and kidneys ($p<0.05$). MLLE significantly ($p<0.001$) decreased low-density lipoprotein concentration while increasing the concentration of high-density lipoprotein cholesterol and cardiac ACE activity.

Conclusions: These findings demonstrate cardio- and reno-protective potential of MLLE in protecting rats from cardiac damage, developing hypertension, hyperlipidemia and oxidative stress induced by l-NAME.