**Abstract**

*Pergularia daemia* (Family: Asclepiadaceae), is a perennial herb growing widely along the road sides of India. Traditionally, the plant is utilized in many disease conditions. The studies in this dissertation were conducted to obtain experimental evidence on the therapeutic efficacy of *P. daemia* as an anti-inflammatory and a diuretic agent. The whole plant was extracted with 50% alcohol and fractioned with petroleum ether, ethyl acetate, n-butanol and water and subjected to phytochemical analysis. Anti-inflammatory activity was evaluated using different *in vivo* and *in vitro* animal models. Among the fractions, n-butanol and water fractions showed maximum activity in acute and chronic animal models. They were further evaluated for their mechanism of action. The present studies signify that anti-inflammatory activity of n-butanol fraction (100 and 200 mg/kg) is attributed to its ability to inhibit 5-Lipooxygenase and water fraction (100 and 200 mg/kg) via inhibition of Cyclooxygenase, apart from their antioxidative activity, immunosuppressant activity, inhibition of mediators like histamine, serotonin, bradykinin, protease and TNF-α and inhibition of chemotaxis. Diuretic activity of the plant was assessed in rats with furosemide as a standard drug using Lipschitz’s test. Between the fractions, petroleum ether fraction failed to produce diuresis, while n-butanol (200 and 400 mg/kg) and water (200 and 400 mg/kg) fractions were found to have significant activity. Administration of both fractions led to diuresis with increase in Na⁺ and K⁺ levels in urine without altering Na⁺/ K⁺ and Cl⁻/ Na⁺ + K⁺ ratio and slight decrease in pH of urine. Despite change in urinary excretion of electrolytes the plasma Na⁺, K⁺ level and hematocrit were not affected by two fractions. The n-butanol and water fraction did not appear to have renal toxicity or any adverse effect during the study period. Results also suggest that diuresis produces by both fractions is saluretic rather than aquaretic. Phytochemical analysis of n-butanol fraction showed presence of triterpenoids like α, β – amyrin, lupeol, ursolic acid, β-sitosterol and β-stigmasterol, while water fraction showed presence of flavonoids (2.03 mg of catechin equivalents/ g of dry extract) and phenolic compounds (15.62 mg of gallic acid/ g of dry extract). Thus, the present study has revealed that the n-butanol and water fraction of *P. daemia* exhibit significant anti-inflammatory and diuretic activity in the tested models and this supports the pharmacological credence to the folkloric and ethnomedical uses of *P. daemia*. 