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# ANALYSIS OF THE CHEMISTRY OF Acacia pycnantha FOR ITS DIURETIC ACTIVITY

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**ABSTRACT**

Diuretics play an important role in pulmonary disease and in HTN. Diuretics are determined based on the water output. The mostly used diuretic drugs are thiazides, mannitol, furosemide, ethacrinic acid. These drugs are used in CHD, pregnant toxemia, HTN, diarrhea, menstrual problem and nephritis and also inflammation of the muscles. Different number of plants as traditional medicine performs diuretic activity on animals which are used to treat diuresis. In our study, no lethality was observed at least for the dose and duration used. However, advanced toxicological studies remain to be performed in mice and rats. On basis of the above results, we can conclude that MEAP treatment produced a marked diuresis when rats were acutely treated.

**Keywords**: *Acacia pycnantha.* Diuresis, kidney function.

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## INTRODUCTION

Acacia pycnantha is also known as golden wattle tree from the family fabaceae. It grows in the height of 8cms. It has phyllodes. Alternative leaves are seen with petioles, blade ovate and sickle shaped of 18 cm long, unequal base. Flowers are yellowish, and contains long seed pods of 3cm broad and borned in small terminals. This plant is used as diuretic. But there is no clinical study or pharmacological study are tested on this plant to perform diuretic activity. The present study was performed on rats to evaluate diuretic activity of acacia pycnantha.

Diuretics play an important role in pulmonary disease and in HTN. Diuretics are determined based on the water output. The mostly used diuretic drugs are thiazides, mannitol, furosemide, ethacrinic acid. These drugs are used in CHD, pregnant toxemia, HTN, diarrhea, menstrual problem and nephritis and also inflammation of the muscles. This may show toxic effects in some cases. The synthetic diuretics inhibiting secretion of potassium to obtain potassium retention. The new diuretic agents are identified from the plants of biological activity. Different number of plants as traditional medicine performs diuretic activity on animals which are used to treat diuresis.

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## MATERIALS

The leafs of *Acacia pycnantha.* was collected from Tirupati, Andhra Pradesh, India. The whole plant were dried under shade, powdered and stored in an air tight container. The collected leafs was dried at room temperature, pulverized by a mechanical grinder, sieved through 40mesh. About 120g of powdered materials were extracted with Methanol (60°-80°C) using soxhlet apparatus. The extraction was carried out until the extractive becomes colourless. The extracts is then concentrated and dried under reduced pressure. The solvent free semisolid mass thus obtained is dissolved in normal saline and used for the experiment. The percentage yield of prepared extract was around 8.3%w/w.

**Animals**

Wister albino rats weighing between 150-200gm each were used for this experiment.. The animals were kept under standard condition in an animal house approved by committee for the purpose of control and supervision of experiments on animals (CPCSEA). They were housed in polypropylene cages and maintained at 27±2$^{o}$C; The animals were given standard diet. Ethical committee clearance was obtained from IAEC (Institutional Animal Ethics Committee) of CPCSEA.

**ACTIVITY**

The methods of Lipschitz *et al.,* (1943), Mukherjee *et al.,* (1996) and Murugesan *et al.,* (2000) [9-11] were followed for the evaluation of diuretic activity. The animals were divided into four groups. Group-I was received only with saline solution. i.e., Normal control. Group-II was received furosemide at a dose of 500 mg/kg, p.o. and it was considered as positive control group. Group-III & Group-IV received the MEAP, at doses of 250 and 500mg/kg, (p.o) respectively. Twenty–four hours prior to the experiment, the test animals were placed into metabolic cages with total withdrawal of food and water. After oral administration of MEAP, the urinary output of each group was recorded at different time intervals from the graduated urine chamber at metabolic cage. Urine samples were analyzed for $Na^+$ and $K^+$ concentration by flame photometric method.

**Statistical analysis**

The data were expressed as Mean ± S.E.M. and statistically analyzed using one way ANOVA followed by Tukey-Kramer's Multiple comparison test, $p<0.05$ was considered significant.

**RESULTS**

The diuretic activities of the extracts were significant ($P < 0.05$) when as compared to control. The graded doses of the MEAP in normal saline showed a very significant increase in diuresis, natriuresis, kaliuresis, GFR (Table 1). All the extracts cause increase urine elimination and increase in Na+, K+ and Cl+ excretion as compared to normal saline. There was an increase in the ratio of concentration of excreted sodium and potassium ions after MEAP treatment. This indicates that the extract increases sodium excretion to larger extent than potassium, which is a very quality of diuretic with lesser hyperkalaemic side effect. The *Acacia pycnantha.* extract exerted its diuretic activity possibly by inhibiting tubular reabsorption of water and accompanying anions, as such action has been hypothesized for some other plant species [13]. Therefore *Acacia pycnantha.* extract significantly increased the GFR due to (a) A detergent like interaction with structural components of glomeruluar membranes. (b) A decrease in renal perfusion pressure, attributable to decrease in the resistance of the afferent arteriole and/or an increase in the resistance of the efferent arteriole and/or. (c) The direct effect on the arteriole wall affecting glomerular blood flow [14]. MEAP caused diuresis by a mechanism quantitatively similar to that of furosemide and more than one mechanism seems to be involved. The MEAP did not affect plasma urea levels, urine pH, plasma osmolarity and hematocrite indicating that the rapid physiological regulation of these important parameters was not altered after RR infusion.

**Table 1. Effect of *Acacia pycnantha* on the Urine parameters**

| Group | Treatment | Mean urine volume (ml) | Electrolyte $Na^+$ | $Na^+ / K^+$ ratio | amountof (m eq/l) $K^+$ | Diuretic index | Lipschitz value |
|---|---|---|---|---|---|---|---|
| I | Normal saline (5 ml/kg, p.o) | 7.63±0.45 | 75.76± 0.53 | 17.47 | 517.34 ± 0.34 | --- | --- |
| II | Furosemide (5mg/kg, p.o) | 11.39 ±0.6** | 176.24±0.36** | 22.63 | 879 ± 4.69** | 2.91 | --- |
| III | MEAP (250mg/kg, p.o) | 9.24± 0.17* | 84.69± 0.74* | 18.98 | 543.71 ± 3.82 | 3.40 | 0.80 |
| IV | MEAP (500mg/kg, p.o) | 11.39± 0.5** | 107.42 ± 0.17** | 19.54 | 649.83 ±2.99** | 2.83 | 1.06 |

**CONCLUSION**

On basis of the above results, we can conclude that MEAP treatment produced a marked diuresis when rats were acutely treated. In our study, no lethality was observed at least for the dose and duration used. However, advanced toxicological studies remain to be performed in mice and rats. It remains necessary to study eventual adverse effect(s) of this plant such as alteration of some neural, metabolic and hormonal parameters, which are undetermined in this study, before its recommendation to clinical use. The precise site(s) and the molecular and cellular mechanism(s) of MEAP action remain to be elucidated in further studies.

**CONFLICT OF INTEREST**

Authors declare no conflict of interest.

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**REFERENCES**

1. Butler J, Forman DE, Abraham WT, *et al.*, relationship between heart failure treatment and development of worsening renal function among hospitalized patients. *Am Heart J.*, 2004, 147, 331-338.
2. Ellison DH. the physiological basis of diuretic synergism: its role in treating diuretic resistance. *Ann Intern Med.*, 1991, 114, 886-894.
3. Hegnauer, R., in T. Swain, ed. Comparative Phytochemistry, Academic Press, London, 1967.
4. Holdsworth, D.K. Int. J. Pharmacog., 29, 1991, 71-79.
5. Whistler,W. A., Polynesian Medicinal Plants, (Everbest Publishing Co., Ltd., Hong Kong, 1992, 200-201.
6. Weiner, M. A., Secrets of Fijian Medicine, Govt Printer, Suva, Fiji, 1984, 98.
7. Harbone, JP, Phytochemical methods, a guide to modern technique of plant analysis *(Chapmann and Hall, London)*, 1973, 1-271.
8. OECD, 2002. Acute oral toxicity. Acute oral toxic class method guideline 423 adopted in: Eleventh Addendum to the OECD, guidelines for the testing of chemicals organisation for economical co-operation and development.
9. Lipschitz WL, Hadidian Z, Kerpcar A: Bioassay of Diuretics. *J. Pharmacol. Exp. Ther*. 79, 1943, 97–110.
10. Mukherjee PK, Das J, Saha K, Pal M, Saha BP: Diuretic activity of Rhizome of *Nelumbo nucifera* Gaertn. (Fam. Nymphacaceae). *Phytotherapy Research* 10, 1996, 424–425.
11. Murugesan T, Manikandan L, Suresh KB, Pal M, Saha BP: Evaluation of Diuretic potential of *J. suffruticosa* Linn. extract in Rats. *Indian J. of Pharm. Sci.* 62(2), 2000, 150.
12. Dubois HP, Geiling EMH. Textbook of Toxicology. Oxford University Press, Oxford, UK, 1959.
13. Bevevino LH, Vieira FSA, Cassola AC, Sanioto SML. Effect of crude extract of leafs *Bredemeysra floribunda* Wild I. Effect on arterial blood pressure and renal excretion in the rats. *Journal of Ethnopharmacology*, 43, 1994, 197–201.
14. Abderahim A, Jaouad E, Zafar HI, Basiaa L. Acute diuretic effect of continuous intravenous infusion of an aqueous extact of coriandrum sativum L. In anesthetized rats. *J Ethanopharmacol.*, 115, 2008, 89-95.
15. Abed L, Benmrabet K. Int´erˆet de l'apport en potassium et sodium des infusions de plantes m´edicinales. Plantes m´edicinales et *phytoth´erapie.* Tome XV 1, 1981, 92–98.
16. Tanira MOM, Ageel AM, Al-Said MS. A study on some Saudi medicinal plants used as diuretics in traditional medicine. *Fitoterapia* LX 5, 1988, 433–447.
17. Jouad H, Lacaille-Dubois MA, Eddouks M. Chronic diuretic effect of the water extract of *Spergularia purpurea* in normal rats. *Journal of Ethnopharmacology* 75, 2001, 219–223.
18. Maghrani M, Lemhadri A, Jouad H, Eddouks M. Inhibition of renal glucose reabsorption accounts for the hypoglycaemic effect of *Retama raetam* in streptozotocin-induced diabetic rats, 2005.( In press)
19. Bevenino LH, Mello Aires M. Effect of crude extract of leafs of *Bredemeyera floribunda* Willd II. Effect on glomerular filtration rate and renal tubular function of rats. *Journal of Ethnopharmacology*, 43, 1994, 203–207.