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Formulation and Evaluation of Diuretic Activity of Polyherbal Drug in Rats

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Abstract:. *An attempt was made in this study to investigate the diuretic activity of an ethanolic extract of a polyherbal formulation containing four drugs: seeds of Coriandrum sativum, buds of Syzigiumaromaticum, leaves of Ocimum sanctum, and curcumin (Curcuma longa), as well as leaves of Syzigiumaromaticum. According to the findings of this investigation, the extract of a polyherbal formulation (including seeds of Coriandrum sativum, buds and leaves of Syzigiumaromaticum& leaves of Ocimum sanctum, and Curcuma longa) possessed substantial activity. Various quantities of Polyherbal formulations (200 and 400 mg/kg), furosemide (10 mg/kg), and vehicle were given orally to rats (n = 6 animals per group), and the urine output was collected after 24 hours. All concentrations of Polyherbal formulation exhibited a dose-dependent relationship when compared to the control animals in the study. According to the findings of this study, the Polyherbal formulations have significant diuretic effect in rats when tested in the above-mentioned experimental model. That polyherbal formulation extract has such potent effect may be due to their ability to stimulate the excretion of Na+, K+, and Cl- concentrations in urine while also increasing the amount of urine excreted by the body. As diuretics, medicinal herbs are a key source of supply. When it comes to diuretics, both mono- and poly-herbal formulations have been employed successfully*

Keywords: polyherbal, diuretic activity, ethanolic extract

I. INTRODUCTION

Diuretics are usually defined as drugs that increase the amount of urine produced by kidney. The term “saluretic” is sometime used to describe a drug that increase the renal excretion of sodium and chloride ion Diuretics are responsible for increase the rate of urine flow, sodium excretion and to maintain the volume and composition of body fluids in a various clinical Disorders. But drug-induced diuresis is very much beneficial in such type of life-threatening disorders like CHF, hypertension, renal failure, Liver cirrhosis and often pregnancy toxaemia [1] Diuretics relieve pulmonary congestion and peripheral edema. This decreases cardiac workload, oxygen demand and plasma volume, thus decreasing blood pressure. Thus, diuretics play an important role in hypertensive patients.[2] Plant medicine is commonly used in the traditional treatment of some renal diseases, and many plants are reported to have significant diuretic activity. The diuretic activity of a number of plants used in ethnomedicine as diuretic agents has been confirmed in experimental animal.[3] The progress of a polyherbal formulation is a tough job because of the large number of different chemical compounds present in the different medicinal plants.

Diuresis

Diuresis is increased urination and the physiologic process that produces such an increase. It involves extra urine production in the kidneys as part of the body's homeostatic maintenance of fluid balance. [4] In healthy people, the drinking of extra water produces mild diuresis to maintain the body water balance. Many people with health problems such as heart failure and kidney failure need diuretic medications to help their kidneys deal with the fluid overload of edema. These drugs help the body rid itself of extra water via the extra urine. The concentrations of electrolytes in the blood are closely linked to fluid balance, so any action or problem involving fluid intake or output (such as polydipsia, polyuria, diarrhea, heat exhaustion, starting or changing doses of diuretics, and others) can require management of electrolytes, whether through self-care in mild cases or with help from health professionals in moderate or severe cases.

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Complication Related to Diuretics

Hypokalemic, Hypochloremic, Metabolic, Alkalosis, Less Hypokalemia, Metabolic Acidosis, Cardiovascular Hyponatremia, Permanent Neurologic Damage. Ototoxicity. Nephrocalcinosis, Nephrolithiasis, Hypomagnesemia, and Hyperuricemia Interstitial Nephritis, Noncardiogenic Pulmonary Edema, Pancreatitis, and Myalgias [5].

II. MATERIALS AND METHODS

Selection and Collection Plant Material

The plant parts (Seeds of *Coriandrum sativum*, buds of *Syzigiumaromaticum*& Leaves of *Ocimum sanctum*, *Curcuma longa*,). After authentication the plant parts were washed, shade dried and ground in a mechanical grinder to obtain coarse powder for extraction.

Extraction of Plant Materials

The powdered plant parts were extracted with ethanol using maceration method. The extract was then dried and stored. 0.714 mg of each extract were taken and mixed to prepare a polyherbal formulation for assaying antioxidant activity.[6]

Maceration.

This is an extraction procedure in which coarsely powdered drug material, either leaves or stem bark or root bark, is placed inside a container; the menstruum is poured on top until completely covered the drug material. The container is then closed and kept for at least three days.

Assessment of diuretic Activity

Experimental animals

Healthy adult Swiss Albino Rat weighing between 100gm – 120gm were used. Animals were housed in standard environment conditions (temperature 28-30oC) photoperiod; approximately 12 h natural light per day; relative humidity: 50-55%) and maintained with free access to water and ad libitum standard laboratory diet. The experimental protocol was approved by Institutional Animal Ethical Committee as per the CPCSEA guidelines, Ministry of Social Justice and Empowerment, Government of India. The animals were divided into four groups (Six in each) deprived of food and water for 18hrs prior to the experiment. On the day of experiment, the group I animals received normal saline (5ml/kg, p.o.). The group II animals received frusemide (10mg/kg, i.p.) the group III and IV animals received Formulation (f1) (200mg/kg, p.o.) and Formulation (f2) (400mg/kg, p.o.) respectively. Immediately after the administration, the animals were kept in metabolic cages (two per cage) specially designed to separate urine and feacal matter and kept at room temperature. The total volume of urine was collected at the end of 24h. During this period no water and food was made available to the animals. The parameters accounted for ascertaining the diuretic activity are total volume of urine andurine concentrations of Na+, K+ and Cl- . The Na+ and K+ concentrations were measured by flame photometry and Clconcentration was estimated by titration with silver nitrate solution using potassium chromate as indicator [7, 8].

Table: Assessment of Diuretic activity

Sr. No	Animal Group	Treatment	Dose
1	Group I	Normal saline	5ml/kg, p.o
2	Group II	Frusemide	10mg/kg, i.p.
3	Group III	Formulation-I	200mg/kg, p.o.
4	Group IV	Formulation-II	400mg/kg, p.o.

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IV. RESULT AND DISCUSSION

Present study shows that the polyherbal formulation possess good diuretic activity. Results of present investigation showed that formulation is most effective in increasing urinary electrolyte concentration of all the ions i.e Sodium, Potassium and Chloride.

Group I animals were treated with Normal saline at the dose (05ml/kg p.o.) and total urine output is 2.6 ml

Group II animals were treated with Furosemide at the dose (10mg/kg i.p). and total urine output is 5.3 ml

Group III animal were treated with Polyherbal formulation (f1) at the dose (200mg/kg, p.o.) and urine output is 4.2 ml

Group IV animal were treated with Polyherbal formulation (f2) at the dose (400mg/kg, p.o.) and urine output is 5 ml.

Figure 1-Graph showing effect of formulation-I and formulation-II on urine output

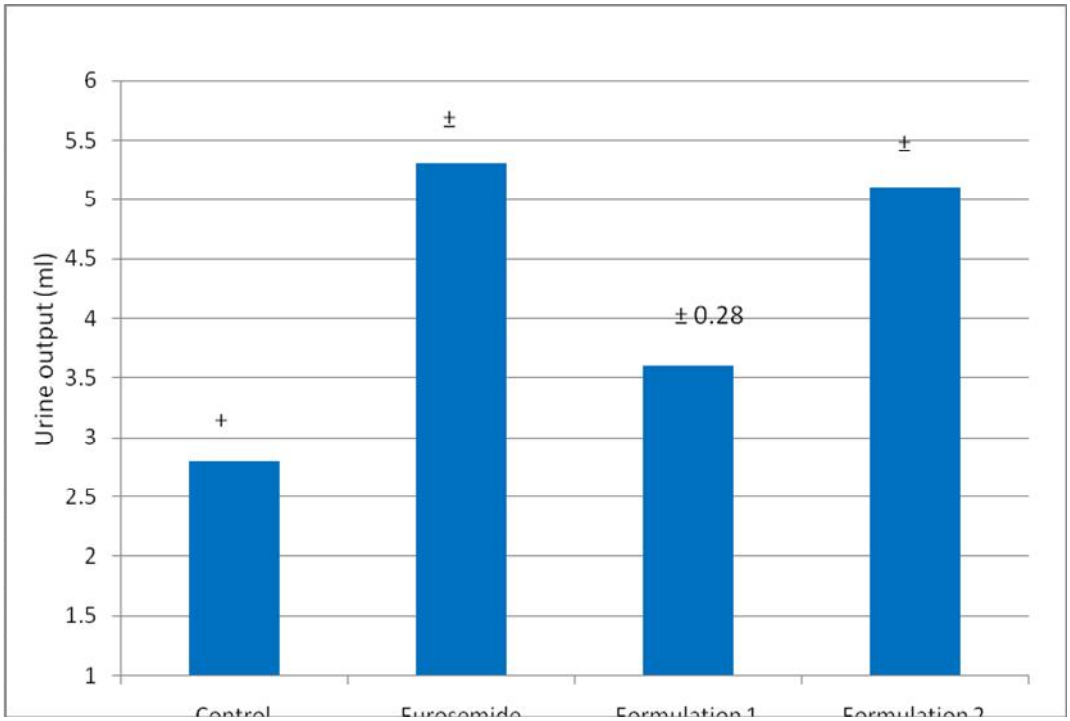

Table: Polyherbal formulation induced diuretic activity in rat.

Sr. No	Treatment	Dose (mg/kg)	Urine volume (ml)	Electrolyte Excretion		
				Na^+ (µmole/kg)	K^+ (µmole/kg)	Cl^- (µmoles/kg)
1.	Control (Normal saline)	05ml/kg	2.6±0.24	2000±39	906±35	2032±24
2.	Furosemide	10mg/kg	5.3±0.77	3425±69	1883±305	3506±65
3.	Formulation(f1)	200mg/kg	4.2±0.28	2990±57	1311±492	3075±27
4.	Formulation(f2)	400mg/kg	5±1.09	3277±46	1807±155	3406±13

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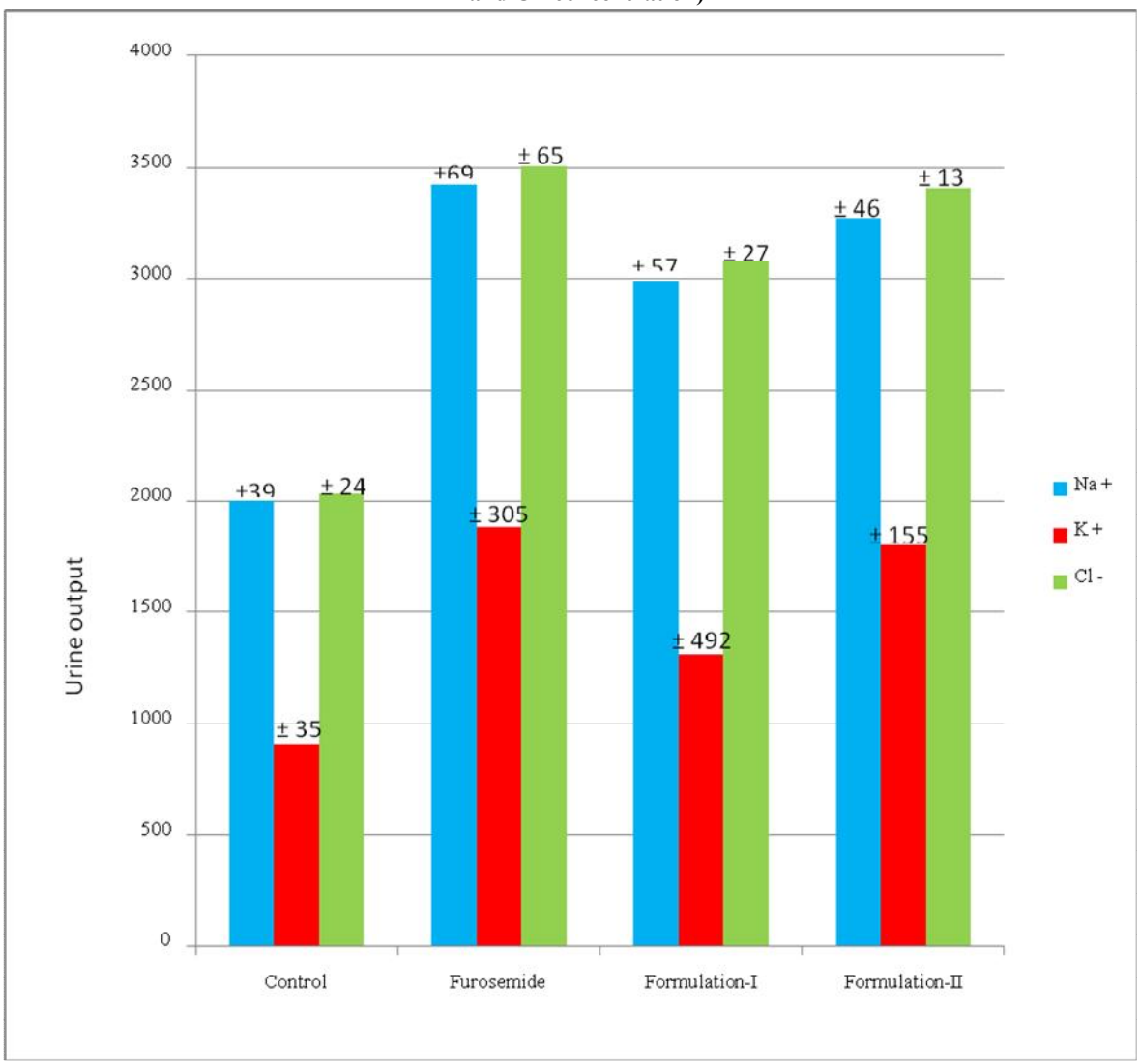
Figure 2-Graph showing effect of formulation-I and formulation- II on urine parameters (concentration of Na^+, K^+ and Cl^- concentration)



V. CONCLUSION

In conclusion, our study has showed that Furosemide at a dose of 10mg/kg i.p. exhibits diuretic effect when administered intravenously. Conclusion: Based on the findings presented, it appears that both polyherbal formulations have diuretic action (Seeds of *Coriandrum sativum*, buds of *Syzigiumaromaticum*& Leaves of *Ocimum sanctum*, *Curcuma longa*,).

When given at a dose of 200 mg/kg, both polyherbal formulations (Seeds of *Coriandrum sativum*, Buds of *Syzigiumaromaticum*, and Leaves of *Ocimum sanctum*, *Curcuma longa*) increased the urine volume in a dose-dependent manner. When compared to the conventional medicine furosemide, the pohyherbal formulation produced the greatest amount of pee at the highest dose (400 mg/kg), indicating that it possessed significant diuretic action (92%) in comparison to the standard drug. All doses of thepolyherbal formulation (Seeds of *Coriandrum sativum*, Buds of *Syzigiumaromaticum*, and leaves of *Ocimum sanctum*, as well as *Curcuma longa*) resulted in a rise in the urine excretion of sodium, potassium, and chloride.

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