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DIURETIC ACTIVITY OF *KIGELIA PINNATA* BARK EXTRACT

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Abstract- The present study was undertaken to investigate & rationalize the diuretic activity of *Kigelia pinnata* aqueous extract of bark in experimental rats. The preliminary phytochemical investigation was carried out to identify the various chemical constituents present in the extract. It was found that the KPB contain alkaline carbohydrate, glycosides, saponin, proteins, steroids, and flavonoids, tannic & phenolic compounds. Acute toxicity studies revealed that the KPB was safe up to 5000mg/kg. The diuretic properties of KPB were evaluated by determination of urine volume, electrolyte concentration &diuretic potency in male albino rats. Different concentrations of KPB (250mg/kg, 500mg/kg) were orally administered to hydrated rats & their urine output was immediately measured after 5 hours of treatment. Frusemide (10mg/kg) was used as reference drug while normal saline (0.9%) solution was used as control. KPB exhibited dose dependent diuretic property. The onset of diuretic action was extremely prompt (with in 1 hour) are lasted through out the study period (up to 5 hours). KPB at 500mg/kg displayed highest activity with potency value of 0.80 & dose of 250mg/kg give a value of 0.32 KPB caused mark increase in Na+, K+ & Cl^- label. The result suggests that the aqueous extract of KPB possess significant diuretic activity.
Key Words: - *Kigelia Pinnata*, Normal Saline, Frusemide.

INTRODUCTION

Diuretics are drugs that increase the rate of urine flow, sodium excretion and are used to adjust the volume and composition of body fluids in a variety of clinical situations. Drug-induced diuresis is beneficial in many life-threatening disease conditions such as congestive heart failure, nephritic syndrome, cirrhosis, renal failure, hypertension, and pregnancy toxaemia [1]. Most diuretic drugs have the adverse effect on quality of life including impotence, fatigue, and weakness. Naturally occurring diuretics include caffeine in coffee, tea, and cola, which inhibit Na + reabsorption and alcohol in beer, wine inhibit secretion of ADH.[2, 3]although most of the diuretics proved to be very effective in promoting sodium excretion, all cause potassium loss and prompted the search for potassium sparing diuretic. Hence search for a new diuretic agent that retains therapeutic efficacy and yet devoid of potassium loss is justified. [4]Many indigenous drugs have been claimed to have diuretic effect in Ayurvedic system. Among the several plants, *Crataeva nurvala Dolichos biflorus, Tribulus terrestris, Dendrophthoe falcata, Boerhaavia diffusa, Saccharum officinarum, Butea frondosa, Boerhaavia repens, Boerhaavia rependa, Homonia riparia and Centratherum anthelmintivum* have shown excellent diuretic activity [5,6,7,8,9,10,11,12]. Diur-08 is a polyherbal formulation containing aqueous extracts of *Centratherum anthelmintivum, Boerhaavia diffusa, Saccharum officinarum and Butea frondosa*. The present study has been planned to evaluate diuretic activity of Diur-08 in healthy albino rats.*Kigelia* is a genus of flowering plants in the family *Bignoniaceae*. The genus comprises only one species, *Kigelia africana*, which occurs throughout tropical Africa from Eritrea and Chad south to northern South Africa, and west to Senegal and Namibia. The family contains trees, shrubs and climbers. The tree can grow to more than 20 m tall. It is found mostly in riverine areas where distribution is restricted to the wetter areas (Cordell, 2000). Venereal diseases are commonly treated with the extracts usually in palm wine as oral medication. The fruits and barks, grind and boiled in water, are also taken orally or used as enema in treating stomach ailments (Burkill, 1985).*Kigelia pinnata* is mentioned in all the reference books dealing with economic plants of the parts of Africa where it grows[15,16,17,18]. There are some uses which are widespread, like a decoction which is used in many parts of Africa as a laxative and the powdered dried fruit helps extensively as a dressing for wounds, ulcers and sores. Of particular interest is the use of the fruit to treat cancer which is reported from Togo (Neuwinger 1996) and especially from Southern Africa where it has a considerable reputation for being effective against solar keratosis which may

develop into skin cancer (Hutchings *et al*. 1996). Ethnobotanical uses of *Kigelia pinnata* with particular reference to its medicinal uses.Ayurvedic medicines are based upon plants either single ingredient or in combination (poly herbal) having specific & diagnostic principles [13]. Nature has been a source of medicinal agents for thousands of years and an impressive number of modern drugs have been isolated from natural sources, many of these isolations were based on the uses of the agents in traditional medicine (Cragg and Newman, 2001) [14]. This plant-based traditional medicine system continues to play an essential role in health care, with about 80% of the world's inhabitants relying mainly on traditional medicines for their primary health care (Farnsworth *et al*., 1985).

MATERIALS AND METHODS

Collection & authentication

The *bark* was collected in February 2010 from forest department of Etawah, U.P., and India & authenticated by Dr. Harish K. Sharma, Ayurvedic Medical College, Devangere, Karnataka, India, and IAEC. *Bark* was collected & dried under shade. A voucher specimen No.DU 100 was deposited in the herbarium of the institute.

Extraction

Bark was grinded by the mechanical grinder & change in fine powder. Fine powder was passed through the sieve no. 40. Extraction was done by the cold maceration. In this process 500g of powder subjected to 5 liter distill water. The filtrate was dried in the oven at 60˚C. Aqueous extract yield is about 10.52%. Extract was stored in universal bottle at 4˚C.

Phytochemical evaluation

After the primary examination of aqueous extract of KPB show the presence of numerous secondary metabolites. These compounds include irridoids, flavonoids, napthoquinones, coumarines & phenolic compounds (Table-1). The aqueous extract yield was found out 10.52%.

Animals:

Male albino rats (120-180g) obtained from animal house of *Sir Madanlal Institute of Pharmacy, Etawah, U.P., and India.* This animal house is approved by the IEAC.

Result

Preliminary phytochemical screening indicated the presence of tannin & flavanoid aqueous extract of *KPB* displayed dose dependent diuretic activity. 500mg/kg dose caused increase of urinary water & electrolytes in normal rat. This is nearest diuretic potency & urine output to the frusemide than normal saline. The urine volume of *KPB* (500mg / kg) is about 2.03 ml near to that of frusemide with the urine volume of 3.75 ml. The study of electrolyte balance in the *KPB* (500mg/kg) treated urine sample, it is found that the Na+, K+ & Cl^- concentration is 249.90±2.246, 5.72±0.194 & 137.35±0.496 respectively & in the frusemide (10mg/kg) treated urine sample, it is found that the Na+, K+ & Cl^- concentration is 252.35±1.485, 5.817±0.111 & 142.25±8.174 respectively. According to the statistical analysis it is found that all electrolyte balance is found significant.

Discussion

Animals were divided in to 4 different groups. 6 animals per group were kept in standardized environmental condition. Animals have free Accessed to food & water. Animals were deprived of food & water 18 hours before the experiment. The institutional ethical committee approved the protocol of this study. For the determination of dose & toxicity study OECD guideline 423 methods was used. The LD 50 dose was found out 5000mg/kg body wt. & the effective concentration dose was found out the 500mg/kg. For the assessments of diuretic activity standard method was employed. Rat housed in 4 groups of 6 each were fasted & deprived of water for 18 hours prior to the experiment. Normal saline (0.9%) & frusemide (10mg/kg) served as control & standard drug. Like this 250mg/kg *KPB* & 500mg/kg *KPB* were administered orally to animals in each group. Immediately after dosing animals were placed in metabolic cages specially designed to separate urine & faeces & kept at room temperature. The urine was collected in measuring cylinder up to 5 hours after dosing. During this period, no water & food was made available to the animals. The urine volume was measured with graduated measuring cylinder. The parameters taken for each individual rat were total urine volume, urine concentration of Na+, K+ & Cl^-. Na+ & K+ concentration was determined with flame photometer while Cl^- concentration was estimated titrimetrically. The mean urine volumes were determined & diuretic potency was accessed by comparison of urine excretion due to the extracts with respect to the standard drug frusemide. All values are shown as mean SEM. The result was statically analyzed using one way ANOVA (Table-2).

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Table 1- *Chemical constituents present in aqueous extract of* ***Kigelia Pinnata****.*

S.No.	Plant constituent	Result
1.	Alkaloids	++
2.	Carbohydrates	++
3.	Glycosides	++
4.	Saponins	+
5.	Phytosterols	+
6.	Proteins	+
7.	Flavonoids	++
8.	Fat & oils	+
9.	Tannins & Phenolic compound	++
10.	Gum & Mucilage	+

Table 2: *Diuretic effect of the Bark extract of* ***Kigelia Pinnata***

EXTRACT / DRUG	DOSE (mg/kg)	MEAN URINE VOLUME (ml.)	DIUREIC POTENCY	ELECTROLYTE CONCENTRATION		
				Na+	K+	Cl^-
Kigelia Pinnata Bark (KPB)	250	0.81±0.030	0.32	222.05 ±0.803*	5.08 ±0.065*	115.18 ±0.652 *
Kigelia Pinnata Bark (KPB)	500	2.03±0.069	0.80	249.90 ±2.246*	5.72 ±0.194*	137.35 ±0.496 *
Frusemide	10	3.75±0.27	1.4	252.35 ±1.485*	5.817 ±0.111	142.25 ±8.174 *
Normal Saline	0.9%	0.31±0.01	0.12	213.65 ±0.89	4.95 ±0.056	110.85 ±0.64

Values (except diuretic potency) are mean ±SEM (n = 6), *p ≤ 0.001 (Followed by ANOVA) compared with control. Diuretic potency is a ratio urine volume due to tested drug to that of standard drug.

Abbreviations

KPB: - Kigelia Pinnata Bark Extract
Na+:- Sodium Ion
K+:- Potassium Ion
Cl^-:- Chloride Ion
SEM: - Standard Error for Mean