International Journal of Research and Review
DOI: https://doi.org/10.52403/ijrr.20210516
Vol.8; Issue: 5; May 2021
Website: www.ijrrjournal.com
Original Research Article *E-ISSN: 2349-9788; P-ISSN: 2454-2237*

Anti-Hypertensive Activity of Hydro Alcoholic Extract of *Cìraka Cūraṇam* on High Salt Loaded Wistar Albino Rats

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ABSTRACT

Background: Hypertension is called as Silent killer. The most important risk factor for heart diseases and stroke and it may leads to premature death. Several medicinal plants have high effective in anti-hypertensive and anti-thrombotic activity without any side effects.
Aim: To evaluate the anti-hypertensive activity of hydro alcoholic extract of *Cìraka cūraṇam* on deoxycorticosterone acetate (DOCA) salt induced wistar albino rats.
Study design: Observational in-vivo study
Place and duration of study: Animal house, Dept. of Pharmacology, Arulmigu Kalasalingam College of Pharmacy, Krishnankoil, Srivilliputtur, Tamilnadu.
Materials and methods: Antihypertensive activity was conducted on wistar albino rats by determining serum Sodium and Potassium levels by using semi auto analyzer (RA-50, Bayer Diagnostics), using specific kits (Auto span, India) at 500 and 550 nm respectively and left carotid artery (for recording BP) was cannulated under aseptic conditions with polyethylene cannula filled with 1% heparin in normal saline. Rest procedure, which was stated under the 2K1C-model was followed and BP was observed in terms of mm of Hg.
Results: The *Cìraka cūraṇam* possesses strong antihypertensive effect against DOCA-salt hypertensive rats, which is evidenced by a considerable decrease in blood pressures.

Keywords: Anti-hypertensive activity, *Cìraka cūraṇam*, Wistar albino rats, Deoxycorticosterone acetate

1.0 INTRODUCTION

Primary hypertension (SHT) is global burden, causes cardiovascular diseases and stroke and also cause 17 million deaths per year resulting from cardiovascular disease worldwide. [14] Managing hypertension and preventing the development of SHT and the complications are big challenges. Approximately 1.6 billion adults have been affected worldwide by 2025. [11] Several studies have reported an increasing trend in the prevalence of hypertension in the world. Cumin seeds (*Cuminum cyminum* Linn.) belong to the family Apiaceae were screened for Hypotensive, Hypolipidemic, Diuretic Antimicrobial activity Anti-diabetic, Antioxidant, Anti-inflammatory, Analgesic, Bronchodilator, Anti-amyloidgenic, Anti-osteoporotic, Weight reduction effect Insecticidal effect, Effect on platelet function, Immunological effect, Contraceptive effect, Aldose reductase and alpha-glucosidase inhibitor Tyrosinase inhibitory effect and effect on erythrocyte hemolysis in recent studies. [1,2,15,17,19] People like to consume natural medicines than modern medicines becuses of their less or no side effects. Henceforth there is an

imperative need for treatment of hypertensive activity by assessment that the several medicinal plants having potent anti-hypertensive activity. The present study was to evaluate the anti-hypertensive activity of *CC (Cìraka cūraṇam)* on deoxycorticosterone acetate (DOCA) salt induced wistar albino rats.

2.0 AIM

To evaluate the anti-hypertensive activity of hydro alcoholic extract of *Cìraka cūraṇam* on deoxycorticosterone acetate (DOCA) salt induced wistar albino rats.

3.0 MATERIALS AND METHODS

3.1 Study population - 30 Wistar Albino rats

3.2 Study design - In-vivo Observational Study

3.3 Study period - 45 days

3.4 Study place - Animal bred house, Dept. of Pharmacology, Arulmigu Kalasalingam College of Pharmacy, Krishnankoil, Srivilliputtur

3.5 Study procedure

Wistar albino rats which having average body weight of 150 g were selected and put on 2% w/v sodium chloride solution as a substitute of plain water until they achieved the body weight of 200 gm. Wistar albino rats were divided into total five groups, treated as above comprising six animals in each group.

Table no: 01 The study design of trial drug *CC*

Group	Treatment	Dose
I	Normal Control	0.25% w/v sodium (Carboxy methyl cellulose) *CC* (10 ml/kg, p.o.)
II	Hypertensive Control	0.25% w/v sodium *CC* (10 ml/kg, p.o.) + DOCA salt (10 mg/kg, s.c., twice in a week).
III	Standard group	Hydrochlorothiazide (5 mg/kg, p.o.) + DOCA salt (10 mg/kg, s.c. twice in a week).
IV	Test group I	*CC* (200 mg/kg, p.o.) + DOCA salt (10 mg/kg, s.c. twice in a week).
V	Test group II	*CC* (400 mg/kg, p.o.) + DOCA salt (10 mg/kg, s.c. twice in a week).

As per table no: 01, all above drug treatments were given on a daily basis for 43 days. DOCA salt dissolved in sesame seed oil was administrated twice weekly up to 43 days. In control group, instead of DOCA only sesame seed oil was administrated twice in a week.

Following parameter has been assessed in this model:

- Serum sodium and potassium level were measured after 43 days of treatment protocol
- BP was measured after 43 days of the protocol using invasive technique.

3.6 Measurement of serum sodium and potassium

Blood samples were collected by retro orbital method after 43 days of treatment. Animals were anesthetized by ether. After blood collection, centrifuge the blood at 6000 RPM for 15 min at 25°C. Supernant were used for analyze of sodium and potassium level. Serum Na^+ and K^+ levels were estimated by using semi auto analyzer (RA-50, Bayer Diagnostics), using specific kits (Auto span, India) at 500 and 550 nm respectively. Both Na^+ and K^+ levels were determined in mmol/L.

3.7 Measurement of BP

On 43rd day of experimentation, rat were anesthetize with ketamine (25 mg/kg, i.m.). Under aseptic conditions with polyethylene cannula filled with 1% heparin in normal saline, left carotid artery (for recording BP) was cannulated. Finally, the 2K1C-model was followed and BP was observed in terms of mm of Hg.

3.8 Statistical analysis

All values were expressing in terms of mean ± standard error of the mean. After completion of the study, one-way analysis of variance followed by Tukey's multiple range tests was applied to check the level of significance using commercially attained computer software. When compared to the control group and hypertensive group, $P < 0.05$ was considered as statistically significant activity.

4.0 RESULTS

4.1 Effect of drug *CC* on serum sodium and potassium level

Table no: 02 Serum Sodium and Potassium level

S. No	GROUP	SERUM LEVEL	
		SODIUM	POTASSIUM
1	Normal	226.55 ±3.69	5.55±0.23
2	Hypertension	261.42±8.42	4.10±0.23
3	Hydrochlorothiazide	217.81±4.21	5.16±0.32
4	Low dose	226.42±2.87	4.92±0.46
5	High dose	222.21±0.32	5.06±0.01

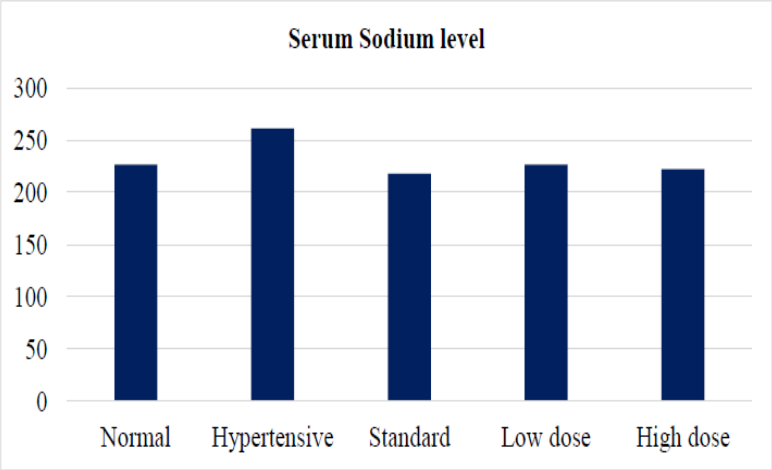

Figure no: 01 Serum Sodium level

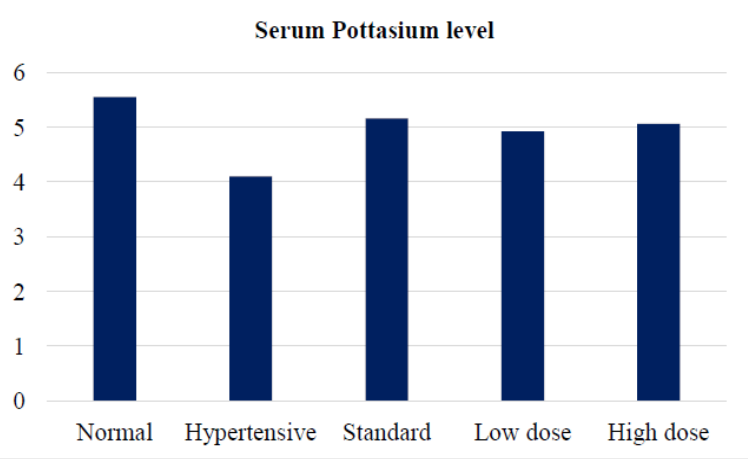

Figure No: 02 Serum Potassium level

Table no: 02, figure no: 01 and 02 have shown the dose dependent effect of *CC* on DOCA-salt hypertensive rats. The sodium was considerably (P<0.05) increased in DOCA-salt hypertensive rats (group 2) compared to normal rats (group 1). Oral administration of *CC* (200, 400 mg/kg bw) for a period of 43 Days considerably (P<0.05) decreased sodium in DOCA-salt treated rats (groups 4 and 5). The effect group 3 was better than the other two doses (200 and 400 mg/kg bw). Table no – 01 has shown the dose dependent effect of *CC* on DOCA-salt hypertensive rats. The potassium was considerably (P<0.05) decreased in DOCA-salt hypertensive rats (group 2) compared to Normal rats (group 1). Oral administration of *CC* (200, 400 mg/kg bw) for a period of 43 Days considerably (P<0.05) increased potassium in DOCA-salt treated rats (groups 4 and 5). The effect group 3 was better than the other two doses (200 and 400 mg/kg bw).

4.2 Effect of drug *CC* on systolic and diastolic BP measurement after 43 days in the DOLA induced hypertension

Table no: 03 The effect the drug *CC* in blood BP measurements

S. No	Groups	Blood pressure in mm/hg	
		Systolic	Diastolic
1	Normal	113.35±2.62	82.46±3.42
2	Hypertension	173.33±2.33	145.54±1.23
3	Hydrochlorothiazide	103.72±1.25	92.63±1.82
4	Low dose	135.03±2.56	92.63±1.01
5	High dose	106.02±3.46	72.05±0.53

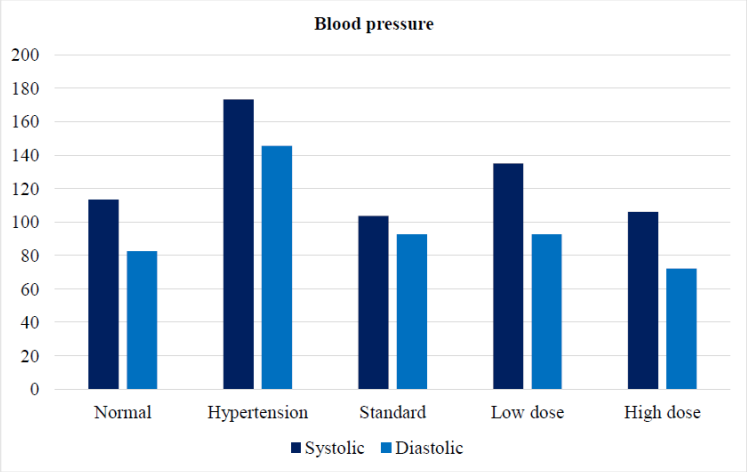

Figure no - 03 The effect the drug *CC* in blood BP measurements

Table no - 03 and figure no -03 have shown the dose dependent effect of *CC* on DOCA-salt hypertensive rats. The systolic and diastolic blood pressure was considerably (P<0.05) increased in DOCA-salt hypertensive rats (group 2) compared to normal rats (group 1). Oral administration of CC (200, 400 mg/kg bw) for a period of 43 Days considerably (P<0.05) decreased systolic and diastolic blood pressure in DOCA-salt treated rats (groups 4 and 5). The effect group 3 was better than the other two doses (200 and 400 mg/kg bw).

5.0 DISCUSSION

Mineralocorticoids cause retention of sodium and water within the body until escape diuresis occurs due to increased pressure on the kidneys. No additional retention of sodium and water occurs, but the general level of body sodium and water is slightly raised. [3,4,12] Hans Selye *et al.* was the first to demonstrate that DOCA produces high BP in rats.[8] DOCA evoked high BP is salt dependent since neither administration of DOCA nor partial removal of renal mass is effective in increasing BP when applied without salt administration. [4] Previous studies have shown that the administration of mineralocorticoid together with salt leads in sodium retention, potassium depletion, hypertension, extensive tissue damage and even death, whereas activating natriuretic systems and suppressing sodium- and water-retaining systems to extend sodium excretion. [3-10]

As per table no: 03 and figure no: 03, drug has shown important reduction in systolic and diastolic pressure as compared to hypertensive rat. The probable mechanism would be the rise in sodium excretion through kidney and retention of potassium in its exchange. This results in reduction in volume overload. This mechanism fit well in our study, as after 43 days of DOCA salt treatment in drug treated group animals, there was a significant decrease in serum sodium level and side by side significant increase in serum potassium level (Table no: 02, Figure no: 01 and 02). These results were additionally comparable with standard drug hydrochlorothiazide.

6.0 CONCLUSION

Cìraka cūraṇam possesses strong antihypertensive effect against DOCA-salt hypertensive wistar albino rats, which is proven by a substantial decrease in blood pressures.

Acknowledgement: None

Conflict of Interest: None

Source of Funding: None

Ethical Approval: Approved

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How to cite this article: Sujeethasai K, Manoharan A, Santhanakumar M. Anti-hypertensive activity of hydro alcoholic extract of cìraka cūraṇam on high salt loaded wistar albino rats. *International Journal of Research and Review*. 2021; 8(5): 110-115. DOI: *https://doi.org/10.52403/ijrr.20210516*

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