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ANTI-HYPERTENSIVE ACTIVITY OF SIDDHA HERBO- MINERAL FORMULATION *ELADHI CHOORANAM* IN SPONTANEOUSLY HYPERTENSIVE RATS

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ABSTRACT

Siddha drugs are currently very popular among the people. At the same time there has been an increase in the research of scientific siddha drugs. The reason is that it acts on diseases and cures them and causes fewer side effects. One of the secure and sinful anti-hypertensive Siddha medicine is Eladhi Chooranam (ECM). Which is used for this study to identify the anti- Hypertensive activity by using spontaneously hypertensive rats (SHR). Systolic blood pressure (SBP) and heart rate measurement of SH rats was carried out using tail-cuff method plethysmography (LE 5001 Pressure Meter). The SH rats were randomly divided in to four groups and each consists of six rats per group. All the groups were categorized into control, group received verapamil hydrochloride 12.5mg control, ECM 200mg and ECM 400mg. Test drug Eladhi chooranam was administrated (200mg/400mg/kg) orally. The systolic blood pressure (SBP) and heart rate (HR) of the rats were recorded. Administration of ECM for 28 days remarkably reduced the SBP and HR. The tidings obtained from this study shows decrease in Systolic BP and Heart Rate was more conclusive high dose level 400mg/kg than low dose 200mg/kg indicated bravery response to anti-hypertensive activity of the Siddha formulation Eladhi chooranam in a research-based way.

KEYWORDS: Eladhi chooranam, Siddha, Anti-hypertensive, Spontaneously Hypertensive rat.

INTRODUCTION

Hypertension is often called the "silent killer". Hypertension, also known as high or raised blood pressure, is a condition in which the blood vessels have persistently raised pressure. Blood is carried from the heart to all parts of the body in the vessels. Blood pressure is created by the force of the blood pushing against the wall of blood vessels (arteries) as it is pumped by the heart. The highest the pressure the harder the heart has to pump.[1]

High blood pressure (BP) is the leading modifiable risk factor for morbidity and mortality worldwide. The basis for diagnosis and managing hypertension is the measurement of BP, whichis routinely used to initiate or rule out costly investigations and long-term therapeutic interventions, inadequate measurement methodology or use of inaccurate BP measuring devices can lead to overdiagnosis and unnecessary treatment, or underdiagnosis and exposure to preventable cardiovascular disease (CVD).[2]

As per WHO, cardiovascular diseases account for around 29% of total deaths from NCDsin India.[3] Hypertension is a major public health problem due to its high prevalence all around the globe. Around 7.5 million deaths or 12.8% of the total of all annual deaths worldwide occur due to high blood pressure. It is predicted to be increased to 1.56 billion adults with hypertension in 2025.[4] The age-adjusted prevalence of hypertension in India was 11.3% among persons aged between 15 and 49 and was four percentage points higher among males 13.8% than among females 10.9%. persons in the urban location had a marginally higher prevalence than persons in rural location.[5]

Raised blood pressure is a major risk factor for chronic heart disease, stroke and coronaryheart disease. Elevated BP is positively correlated to the risk of strike and coronary heart disease.Other than coronary heart disease and stroke, its complications include heart failure, peripheral vascular disease, renal impairment, retinal hemorrhage and visual impairment.[6] Recently attention has been focused towards herbal and mineral preparations which are traditionally used as potential therapeutic agents in the prevention and management of cardiovascular diseases.[7]

This is important because treating hypertension results in significant reductions in risk of subsequent cardiovascular disease.[8] Hypertension management deals not only in reducing the blood pressure but also minimize the cardiovascular risk by lifestyle measures, lipid managements, smoking cessation, dietary intervention, weight reduction and physical activity. Uncontrolled blood pressure can lead to stroke, aneurysm, heart failure, vision loss, metabolic syndrome and even memory loss.

MATERIALS AND METHODS

Ingredients

The Siddha formulation *Eladhi Chooranam* comprises of the following ingredients

Elakkai (Elettaria cardamomum)	- 120 g
Thamarai poovithaz (Nelumbo nucifera)	- 120 g
Allipoo (Nymphaea nouchali)	- 120 g
Korai kizhangu (Cyperus rotundus)	- 120 g
Athimathuram (Glycyrrhiza glabra)	- 120 g
Kirambu (Syzygium aromaticum)	- 120 g
Ilanthai kottai paruppu (Ziziphus mauritiania)	- 120 g
Pachai karpooram (Dryobalanops aromatica)	- 120 g
Nerpori (Oryza sativa)	- 120 g

Collection of Ingredients *(ECM)*

The raw materials of *Elettaria cardamomum, Dry Cyperus rotundus, Glycyrrhiza glabra root, Syzygium aromaticum, Dry Ziziphus mauritiania seeds, Dryobalanops aromatica and Puffed rice* were collected from the raw drug country shop at Parrys corner, Chennai-104, Tamilnadu, India. The Petals of *Nelumbo nucifera* and *Nymphaea nouchali* were collected at Sriperumbudur, Kancheepuram-602105, Tamilnadu, India. All the raw drugs were identified and authenticated by the Botanist and *Gunapadam* experts in Government Siddha Medical College, Arumbakkam, Chennai – 106.

Purification

All the drugs mentioned here were purified as per the Siddha literature [9]. All the impurities are removed from *Elakkai*, *Korai kizhangu*, *Kirambu*, and fried at low flame. Impurities of *Pachai karpooram* and *Nerpori* were removed. The root of Indian liquorice was cleaned with water and cut into small pieces and then dried. *Ilanthai kottai paruppu* impurities are removed and the outer shell was breached off. *Thamarai Poo* and *Allipoo petals impurities* were removed and dried in cool dark place.

Preparation of *Eladhi Chooranam*

All the above-mentioned ingredients were purified and dried in the shade until complete evaporation of the moisture content. It was roasted and powdered and filtered individually. Then all are thoroughly mixed to make *Eladhi Chooranam* and kept in an air tight container.

Stock solution preparation and dosing

Eladhi chooranam suspended in distilled water. The test substance suspensions were freshly prepared every two days once for 28 days. The control animals were administered vehicle only. Extract suspensions were stored at 4ºC and were allowed to reach room temperature before administration.

Dosing levels

ECM was administered to animals at the dose levels of 200mg, 400mg. The drug was administered orally by using oral gavage once daily for 28 consecutive days.

EXPERIMENTAL ANIMALS

All animal experiments were performed in accordance with the Guidelines of OECD. Spontaneously Hypertensive Rats (SHR) 9 weeks old and age-matched Wistar rats male, weighing 250±20gm, were purchased from King Institute of Preventive Medicine and Research. Rats were kept in a room temperature-controlled room (25 °C), with 12 hours dark and 12 hours artificial illumination daily (7:00— 19:00). Food and water were available ad libitum. Then the SH rats were randomly assigned to control and different treatment groups, six animals per group. All experiments were performed with the approval of Institutional Animal Ethical Committee (IAEC) and the study was conducted in commensurate with CPCSEA guidelines.

Grouping

The animals were divided into following groups:

Group I	Control untreated group which received normal saline.
Group II	Received Verapamil 12.5 mg/kg b.w
Group III	Eladhi chooranam 200mg/kg b.w
Group IV	Eladhi chooranam 400mg/kg b.w

METHOD

Systolic blood pressure (SBP) and heart rate measurement of SH rats was carried out using tail-cuff method plethysmography (LE 5001 Pressure Meter). A mean of six measurements was obtained for each animal. For blood pressure measurement, the animals were warmed up to 42°C for 5 min in a confinement cage. The animals were first submitted to a period of adaptation for 15 days before the experiments.

During the final week of the treatment, the rats were allowed to acclimatize to the experimental conditions of non-invasive SBP measurements by allowing them to stand in rat restrainers for 30 min every day. SBP measurements were recorded 24 hours after the last treatment dose. At least 8-10 recordings were taken for each rat and the mean of the lowest 4 values within less than 10 mmHg difference was taken as the mean SBP.[10]

RESULTS AND DISCUSSION

Antihypertensive activity of *ECM*

Table no 1: Effect on Systolic Blood Pressure (SBP) of *Eladhi Chooranam* on varioustreatment groups on SH-rats.

Group	SBP (mm/Hg) (Mean ± SEM)	7th day	28th day
Control	220.3±4.15	210.4±6.46	200.3±8.65
Verapamil hydrochloride 12.5mg/kg b.w	182.6±4.28	170.2±2.46	110.2±2.08***
ECM 200	210.4±6.86	196.8±6.82	152.4±2.14**
ECM 400	190.8±6.24	182.2±6.24	126.2±3.12***

*Values represent mean ± SEM of 6 experiments. * P< 0.05; ** P< 0.01; *** P < 0.001, treatment versus control group*

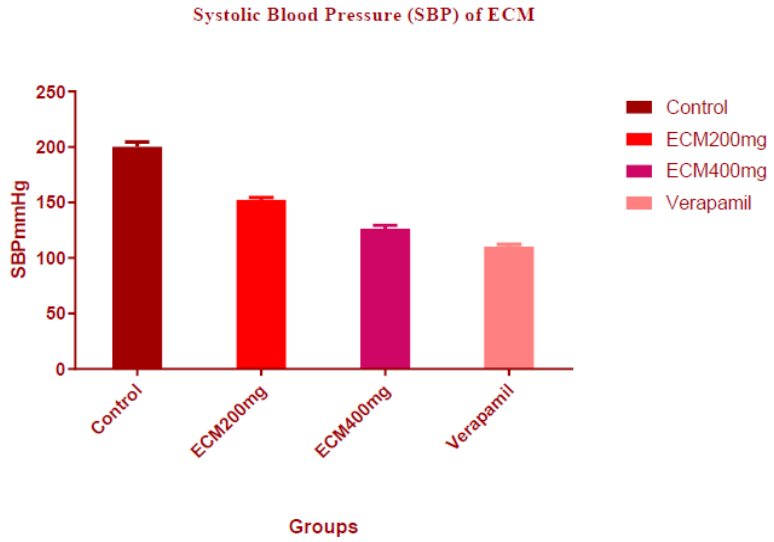

Chart no.1. Effect of Systolic Blood Pressure (SBP) of *ECM* on various treatment groups onSH-rats at 28th day.

Table 1 and chart 1 shows the effect of *ECM* on systolic BP in Spontaneously Hypertensive rats. The systolic blood pressure and heart rate were recorded in the conscious animals in non- invasive tail cuff method. The results reveal that the *ECM* exhibits antihypertensive effect in theform of significant lower in systolic blood pressure and heart rate after continued administration for 7 days. The readings were compared with control group and the group II treated with Verapamil hydrochloride 12.5mg. The systolic blood pressure on 7th day treated with *ECM* 200mg and 400mg/kg body weight showed moderate reduction in Systolic blood pressure (196.8±6.82 and 182.2±6.24) compared with 7th day of control (210.4±6.46). But the reduction of Systolic blood pressure measured on 28th day of *ECM* 200mg and 400mg /kg body weight treated group showed significant reduction of Systolic blood pressure (152.4±2.14 and126.2±3.12) compared with 28th day of control group (200.3±8.65) persistence highly significant antihypertensive effect was noticed even after cessation of dosing 7 days earlier. Thissuggests absence of rebound phenomenon after withdrawal of the test drug *ECM* which an advantage in the therapy of hypertension.

Table no 2: Effect on Heart rate (HR) of *Eladhi chooranam* various treatment groups onSH-rats.

Group	HR beats/min Initial	7th day	28th day
Control	498.2±5.81	496.6±2.86	490.2±6.43
Verapamil hydrochloride 12.5mg/kg b.w	470.6±6.21	480.8±4.21	320.1±1.14***
ECM 200	490.6±2.84	455.21±8.24	436.4±1.02**
ECM 400	482.6±4.81	438.6±8.24	367.2±2.21***

*Values represent mean ± SEM of 6 experiments. * P< 0.05; ** P< 0.01; *** P < 0.001,treatment versus control group*

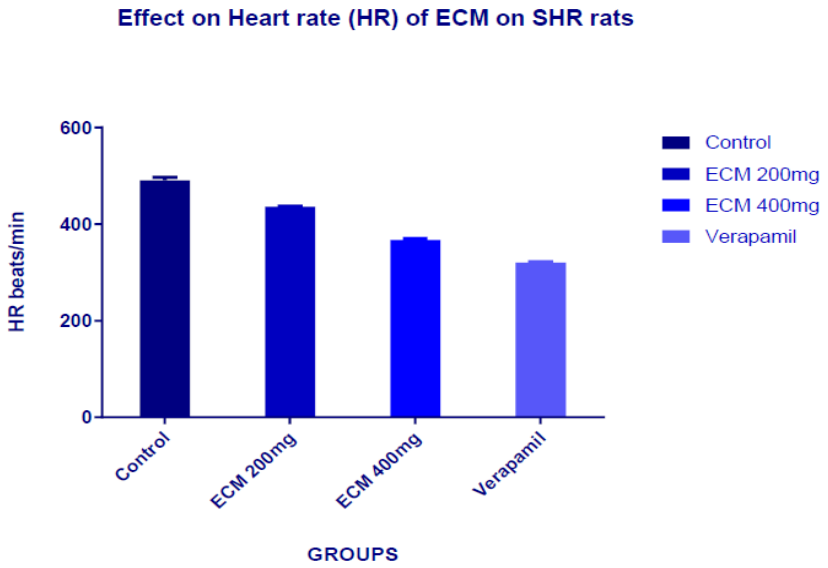

Chart no.2. Effect on Heart rate (HR) of *Eladhi Chooranam on* various treatment groupson SH-rats at 28th day.

Table 2 and chart 2 shows the effect of *ECM* on Heart rate in Spontaneously Hypertensive rats. The systolic blood pressure and heart rate were recorded in the conscious animals in non- invasive tail cuff method. The results reveal that the *ECM* exhibits antihypertensive effect in theform of significant lower in systolic blood pressure and heart rate after continued administration for 7 days. The readings were compared with control group and the group II treated withVerapamil hydrochloride 12.5mg. The heart rate on 7th day treated with *ECM* 200mg and400mg/kg body weight showed moderate reduction in heart rate (480.8±4.21 and 455.21±6.2) compared with 7th day of control (496.6±2.86). But the reduction of heart rate measured on 28thday of *ECM* 200mg and 400mg /kg body weight treated group showed significant reduction of heart rate (436.4±1.02 and 367.2±2.21) compared with 28th day of control group (490.2±6.43)persistence highly significantly reducing heart rate was noticed even after cessation of dosing 7days earlier.

CONCLUSION

Anti-hypertensive activity was carried out in Spontaneously Hypertensive Rats. The trial drug *Eladhi Chooranam*-200mg and 400mg/kg b.w showed significant decrease in systolic blood pressure and heart rate. Thus, this activity reveals the effect of the drug against Hypertension.

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