

**Original article**

**Study of Antihypertensive effects of *Ocimum sanctum***

*Borhanuddin M*

**Abstract:**

**Background:** *Ocimum sanctum* is a well reputed medicinal herb being used in the treatment of various ailments in this Indo Pak Subcontinents since ancient time. **Methods:** In this study the Antihypertensive effects of water extract of *Ocimum sanctum* and Water soluble fraction of methanol extract of *Ocimum sanctum* were tried for its antihypertensive effects on albino rats. Extracts were administered via vein and BP was recorded in the carotid artery by direct invasive method. **Result:** Normal blood pressure was 81/71 mm of Hg (mean blood pressure was 75 mm of Hg. Water extract of *Ocimum sanctum* has got significant antihypertensive effect(19-30 %). Water soluble fraction of methanol extract of *Ocimum sanctum* has also got significant antihypertensive effect(15-27 %)

**Key Words:** Blood pressure , *Ocimum sanctum*, Antihypertensive drugs, pressure transducer

Bangladesh Journal of Medical Science Vol. 15 No. 03 July'16. Page : 357-361

**Introduction:**

*Ocimum sanctum* commonly known as Tulsi (Bengali) widely popular among the Hindu as sacred basil; has a wide distribution throughout the whole Indo-Pak-Bangladesh Sub-Continent, Arabia, Chaina, Burma, Ceylon, Malay archipelago, Australia, Islands of Pacific and western Asia<sup>1</sup>. The herb *Ocimum sanctum* Line (Family-Labiatae) are annual 30 to 60 cm in height and are much branched. It has got a wide use since ancient time in Ayurveda system of medicine. It is used as stomachic, anthelmintic , alexiteric , antipyretic and is also useful in diseases of heart and blood, leucoderma, strangury, asthma , bronchitis , vomiting, foul smells, lumbago pains, hiccough, painful eye , purulent discharge of the ear and in earache. It is also useful in cutaneous diseases like ringworm and for dislodging maggots. In Ceylon, the herb used in decoction for cough and catarrh , sometimes chewed as a substitute for betel. Fresh roots are ground with water and are applied to the bites of wasps , bees ,worms and leeches. Fixed oil of *Ocimum sanctum* was found to have anti inflammatory effect <sup>2,3</sup> along with its analgesic activity. The crushed fresh roots, leaves and stems are applied to the bites of mosquitoes <sup>4</sup>.The leaves of *Ocimum sanctum* are rubbed with lime juice over the ring worm to cure it . *Ocimum sanctum* has got its preventive role on measles. The leaves of *Ocimum sanctum* are expectorant in chronic cough specially in children and given

sweetened with honey. Juice of leaves along with honey and juices of ginger & onion relieve asthma . The leaf juice is antispasmodic and antiemetic. Again the same is aphrodisiac and is useful in dysentery , indigestion , hemorrhoids. Dried leaf dust is used as snuff in gastro-intestinal tract. Decoction of roots are helpful in malaria fever & causes sweating . Volatile oils from the leaves got anti-microbial <sup>5,6</sup> and mosquito repellent action<sup>7</sup> . The leaves have been reported to have antifertility effect<sup>8</sup>. Till today the Hindues use to lay their dead bodies or moribund patient under *Ocimum sanctum* plants . It is a sacred basil to them .So a lot of scientific exploration , and efforts were made in the past to establish the ancient use of *Ocimum sanctum* in the modern science.

It has got anti diabetic effects also<sup>9,10</sup>.Dhar et al screened some Indian plants for biological activity. Ethanol extract(50%) of *Ocimum sanctum* was found to possess antihypertensive effect along with other effects<sup>11</sup>.

Hypertension is a main noncommunicable disease of our country. In one of our study we found 22.22% of a rural population of 60-64 years suffers from hypertension<sup>12</sup>.

**Materials and Methods:**

The leaves of ‘ *Ocimum sanctum* were collected from the medicinal plant garden of pharmacy Dept. of Rajshahi University, Rajshahi and dried. Voucher specimen was identified by Bangladesh National Herbarium and deposited there too (DACB

**Corresponds to:** Md. Borhanuddin. Prof of Pharmacology, Ibn-Sina Medical College, Dhaka, Bangladesh e-mail address: dr\_borhan777@yahoo.com

Accession No . 28100 dated 21/10/2000).

Leaves were collected in the month of October and dried in shade with fan. Then grinded to powder and extracted with menthol (ME) .The residue is then extracted with distilled water and freeze dried(WE). The menthol (ME) extract is sparingly soluble in distilled water(11.84%). This water soluble fragment (WF) was also tried with different doses. Aqueous solutions were prepared from this water extract.

Water extract(WE) dissolved in distilled water in various concentrations and was administered intravenously

The experiment was carried out on Swiss-albino rats, 2-3 months old, weighing between 200-300 gms of either sex. The animals were obtained from the animal house of BCSIR Laboratories, Chittagong.

25% aqueous solution of Urethane was administered in a dose 0.7ml/100g of rat; 50% of which was administered intraperitoneally and rest half subcutaneously to anaesthetize the rats. After anaesthesia the animal was placed in a supine position on a dissecting table with arms ligated. Carotid artery was cannulated and connected to the transducer properly filled with heparinized saline. Heparin was procured from local market and diluted with normal saline such that one

ml contains 100units. Special precaution was taken about the air bubble. No bubble was The transducer is again connected to a recorder. Two channel Recorder(Gemini model no.7070) was used. Pressure transducer preamplifier Model no. 7082 UGO Basile, Biological Research Apparatus Comerio-(va)-Itali was used to convert pressor response to electrical responses which is being recorded.

Jugular vein was cannulated by cannulae filled with normal saline to administer drugs of various concentrations in volume of .05-0.2 ml. Tracings were recorded and studied. Treatment with distilled water served the negative control whereas prazosin as positive control. Statistical analysis was done by students'-t' -test.

Ethical approval was taken before the study

### **Results:**

The normal blood pressure of rat was 83/71 mm of Hg (displayed in table 1). Treatment with *Ocimum sanctum*(WE) reduced the pressure by 66/50mm of Hg with 1mg dose which is highly significant in comparison to normal. Higher doses also produced significant fall. Smaller dose(0.05mg) does not produce any significant change in blood pressure. Prazocin 2 $\mu$ g produced similar hypotension(63/51 mm of Hg) for more prolonged period( table 1). Mean blood pressures were responded similarly.

**Table 1:** Effects of *Ocimum sanctum*(WE) on normal rats.

Sl. No	Drug	Dose/rat	Systolic BP mm of Hg $\pm$ SE n	Diastolic BP mm of Hg $\pm$ SE n	Mean BP mm of Hg $\pm$ SE n
1	Distilled water		81.38 $\pm$ 2.98 n=52	71.38 $\pm$ 3.15 n=52	74.72 $\pm$ 3.03 n=46
2	<i>Ocimum sanctum</i> (WE)	0.5mg	73.33 $\pm$ 2.75 n=12 NS	68.0 $\pm$ 4.97 n=12 NS	69.78 $\pm$ 4.21 n=12 NS
3	“	1mg	65.65 $\pm$ 5.18 n=17 **	50.12 $\pm$ 5.03 n=17 ***	55.29 $\pm$ 4.93 n=17 **
4	“	1.5mg	60.80 $\pm$ 2.99 n=6 ***	54.80 $\pm$ 1.6 n=6 ***	56.80 $\pm$ 1.9 n=6 **
5	“	3.0mg	64.0 $\pm$ 1.78 n=6 ***	59.6 $\pm$ 3.59 n=6 *	61.07 $\pm$ 2.87 n=6 **
6	Prazocin	2 $\mu$ gm	63.0 $\pm$ 5.3 n=6 **	50.6 $\pm$ 4.34 n=6 ***	54.89 $\pm$ 4.62 n=6 *

\* = Just significant (p < .05)

n = number of experiments

\*\* = significant (p < .01)

SE = standard error

\*\*\* = Highly significant (p < .001)

**Table 2:** Effects of *Ocimum sanctum* methanol extract water soluble fraction(WF) on normal rats.

Sl. No	Drug	Dose/rat	Systolic BP mm of Hg±SE	Diastolic BP mm of Hg±SE	Mean BP mm of Hg±SE
1	Distilled water		81.38±2.98 n=52	71.38±3.15 n=52	74.72±3.03 n=46
2	<i>Ocimum sanctum</i> (WF)	0.5mg	88.33±3.21 n=12 NS	64.0±2.92 n=12 NS	69.78±2.91 n=12 NS
3	“	1mg	69.09±3.14 n=11 **	53.09±3.8 n=11 ***	58.42±3.55 n=11 ***
4	Prazocin	2µgm	63.0±5.3 n=6 **	50.6±4.34 n=6 ***	54.89±4.62 n=6 *

\* = Just significant (p &lt; .05)

SE = standard error

n = number of experiments

\*\*\* = Highly significant (p &lt; .001)

\*\* = significant (p &lt; .01)

**Table 3:** Comparison between the potency of *Ocimum sanctum*(WE) and methanol extract water soluble fraction(WF) on normal rats.

Sl.No	Drug	Dose/rat	Systolic BP mm of Hg±SE	Diastolic BP mm of Hg±SE	Mean BP mm of Hg±SE
1	Distilled water		81.38±2.98 n=52	71.38±3.15 n=52	74.72±3.03 n=46
2	<i>Ocimum sanctum</i> (WE)	1mg	65.65±5.18 n=17 ** <b>19.32 % ↓</b>	50.12±5.03 n=17 *** <b>29.78 % ↓</b>	55.29±4.93 n=17 ** <b>26 % ↓</b>
3	<i>Ocimum sanctum</i> (WF)	1mg	69.09±3.14 n=11 ** <b>15.1 % ↓</b>	53.09±3.8 n=11 *** <b>25.62 % ↓</b>	58.42±3.55 n=11 *** <b>21.81 % ↓</b>
4	Prazocin	2µgm	63.0±5.3 n=6 ** <b>22.58 % ↓</b>	50.6±4.34 n=6 *** <b>29.11 % ↓</b>	54.89±4.62 n=6 * <b>26.54 % ↓</b>

\* = Just significant (p &lt; .05)

SE = standard error

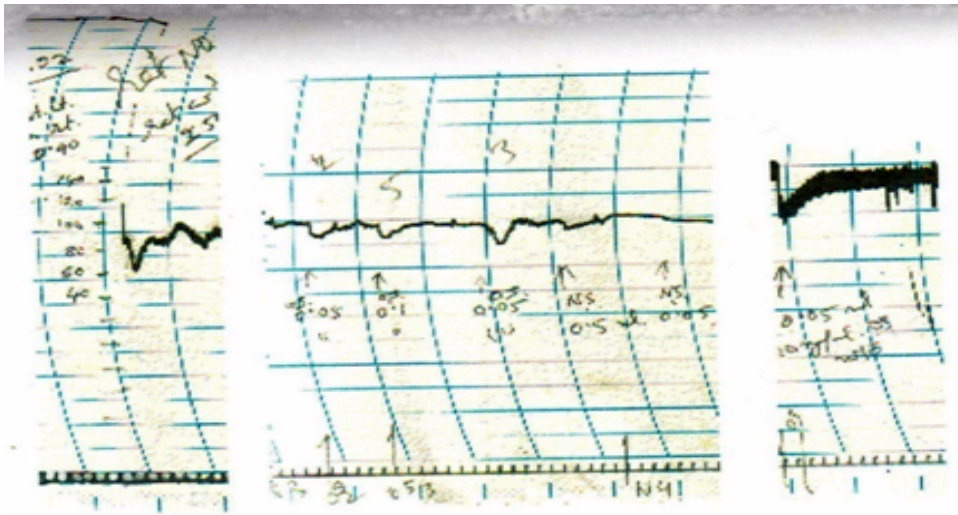
n = number of experiments

\*\*\* = Highly significant (p &lt; .001)

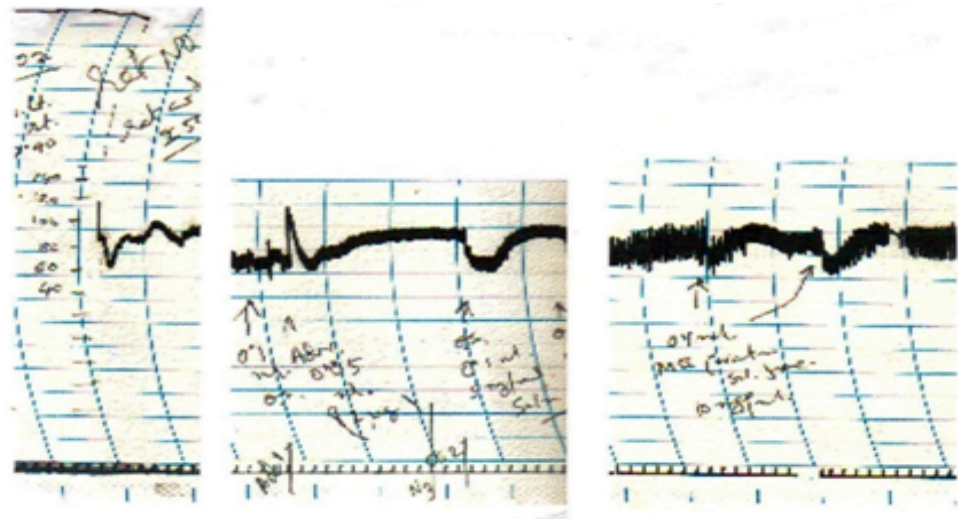
\*\* = significant (p &lt; .01)

Water soluble fraction of methanol extract did not produce any significant in all systolic, diastolic and mean blood pressure with low dose(05mg / kg rat) but produced better hypotensive effect with larger dose(Plate-B1). It is even better than water

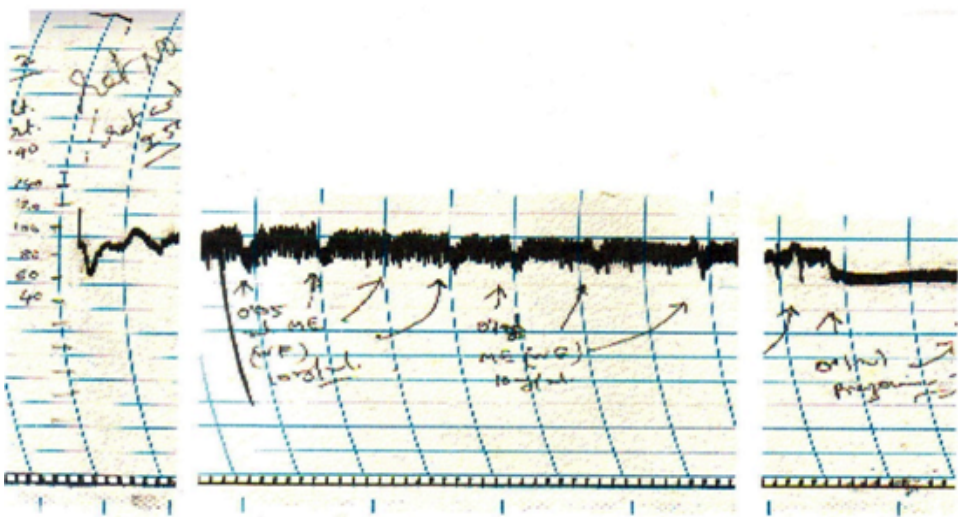
extract(table-2). Comparison between the potency of water extract(WE) and water soluble fractions of methanol extract(WF) has been shown in (table-3). Water extract lowers the blood pressure more by 5 % than that of WF with the same dose .



**Plate-B1:** Blood Pressure tracings of rats after treatment with different doses of *Ocimum sanctum*



**Plate-B2:** Blood Pressure tracings of rats after treatment with different extracts of *Ocimum sanctum*



**Plate-B3:** Blood Pressure tracings of rats after treatment with prazosin and *Ocimum sanctum*

Water extract lowers the blood pressure by 19-30 % whereas the WF by 15-27 % . Increase in dose does not produce more hypotension (plate- B2) Repeated administration of *Ocimum sanctum* produced a baseline fall in blood pressure (plate-B3). The highest inhibition in mean blood pressure was found with prazosin(27%) in contrast to water extract of *Ocimum sanctum* (24%).

**Discussions:**

*Ocimum sanctum* (water extract) has got anti-hypertensive effect . Hypertensives are vulnerable to cardiovascular accident . As it has got antiplatelet effect also<sup>13,14</sup>, so it will be more adventitious than

other antihypertensive drugs to have two-in-one effect.

There is an atypical finding that the hypotensive effect was not dose dependent that means that increase in dose does not produce more hypotension(Plate B4,B5) that means it will not produce postural hypotension..

**Inference:**

*Ocimum sanctum* is supposed to be a very good drug for hypertensives. These patients will not need any anti-platelet drug .Further study is suggested to find out how it works.

**Conflict of interest:** None

**References:**

1. Caius FJ: The medicinal and Poisonous Plants of India. 1986:409.
2. Singh S, Majumder DK and Yadav MR: Chemical and Pharmacological studies on fixed oil of *Ocimum sanctum*. Ind J Exp Biol 1996;34:1212-1215
3. Singh S, Majumder DK and Rehan HMS : Evaluation of anti-inflammatory potential of fixed oil of *Ocimum sanctum*.(holy basil) and its possible mechanism of action. J Ethnopharmacology 1996;54(1):19-26
4. Kirtikar KR, Bashu BD An ICS: Indian Medicinal Plants.2<sup>nd</sup> ed. Deradun: M/S BSM Pal Sing 1984:1959-68
5. Rajendran J, Mani MA and Navaneethakannan K. : Antibacterial activity of some selected medicinal plants. Postgrad.Res. Dep. Zool 1998;25(4):280-282.
6. Direkbusarakom Direkbusarakom S, Ezura Y, Yoshimuzu M and Herunsalee A: Efficacy of Thai Traditional herb extracts against fish and shrimp pathogenic bacteria. Fish pathology 1998;33(4)437-441.
7. Zaheed SH, Chopra RN, Prashad B, Santapu RH Krishnan MS and Deshapravu SB (eds): The Wealth of India-Raw Materials, Vol. VII. Delhi: CSIR1966:87-89.
8. Reghunandan R, Sood S, Reghunandan V , Arora B B, Gopinathan K, & Mahajan K K.Effects of feeding *Ocimum sanctum*(Tulsi) leaves and fertility in rabbits. : Biomedical Reserch (Aligarh) 1997 ; 8 (2):187-191.
9. Borhan uddin M, Choudhury SAR, Badaruddin M, Khatun F and Ahmed K. Effects of Oscimum sanctum on diabetic rats and its comparison with chlorpropamide. Journal of Dhaka Medical College Vol.1, 1992 : 1(1&2) : 1-3.
10. Giri J, Suganthi B and Meera G : Effects Tulshi (*Ocimum sanctum*) on diabetes mellitus. Ind J Nutr Dietet 1987;24:337-341.
11. Dhar ML,Dhar MM, Dhaawan BN, Mehrotra BN and Roy C : Screening of Indian plants for biological activity. Part-1. Ind J Exp Biol 1968;6:233-247.
12. Badaruddin M,Firoza K, Borhanuddin M, Khaled A: Study of hypertension in a northern district of Bangladesh. Specialist, Pakistans J Med Sci1993;9(2):145-148.
13. Borhan uddin M. Antiplatelet effects of *Ocimum sanctum*(Tulshi). Northern International Medical College Journal 2009;1(2);37-39.
14. Sing S, Rehan HMS and Majumder DK: Effects of *Ocimum sanctum* fixed oil on blood pressure, blood clotting time and pentobarbitone induced sleeping time. J ethnopharmacol 2001;78(2-3):139-143.