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(Research Article)

A Clinical Evaluation of *Nardostachys jatamansi* in the Management of Essential Hypertension

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ABSTRACT

The present study was carried out to investigate the efficacy and safety of rhizome of Nardostachys jatamansi in the treatment of essential hypertension. An observational prospective study was done at Government Siddha Medical College Hospital, Chennai. Fifty patients of either sex in age group of 30 years to 70 years with established primary systemic hypertension without any co morbid illness were given finely powdered dried rhizome of Nardostachys jatamansi (Choornam) in the dose of 1 gm thrice a day with honey for 30 – 60 days. The clinical efficacy with respect to symptoms and changes in systolic and diastolic blood pressure were assessed using sphygmomanometer prior to and throughout the treatment. At the end of the study majority of the patients showed a highly significant response in ways of remarkable reduction in blood pressure and various symptoms. Treatment with drug for 3 weeks produced significant improvement of systolic BP and Diastolic BP. None of the patients showed any adverse effects with NJ. The results of the present study suggested that the usefulness of NJ rhizomes in patients with essential hypertension. Changes in systolic BP and diastolic BP were analyzed statistically by Student's paired t- test. On the first visit the mean SBP and DBP was 163.76±1.21and 100.84±0.80 mm Hg respectively. After 8 weeks of therapy there was a statistically extremely significant fall in SBP (Mean±SEM) 123.24 ± 0.35 and DBP (Mean±SEM) 80.16 ± 0.27 mm Hg. P value (< 0.05) considered as significant.

Key Words: *Nardostachys jatamansi,* Essential hypertension, Sadamanjil, Jadamanjil, Blood pressure.

INTRODUCTION

Hypertension, the silent killer since there is no warning signs or manifesting symptoms and can be detected only through routine measurements. Because, hypertension or high blood pressure is one of the major preventable risk factors for premature death from CVD worldwide.[1] One in three adults worldwide, according to the WHO report, has raised blood pressure – a condition that causes around half of all deaths from stroke and heart disease.[2] The hypertensive complication in India is more dreadful. It was reported that of a total of 9.4 million deaths in India in 1990, cardiovascular diseases caused 2.3 million deaths (25%). A total of 1.2 million deaths were due to coronary heart disease and 0.5 million due to stroke. It has been predicted that by 2020, there would be a 111% increase in cardiovascular deaths in India.[3]

Long standing and uncontrolled hypertension causes atherosclerosis, stroke, blindness, renal failure, occlusive and non occlusive heart diseases. It also causes the heart to remodel and undergo a process of hypertrophy called left ventricular hypertrophy [4-5].

To overcome these serious consequences there are many antihypertensive drugs available in the market, which at the same time have many undesirable side effects too. In the Siddha system of medicine, many promising drugs are available to treat hypertension very effectively. Hence, from the treasure of this system, the author had decided to choose the rhizomes of *Nardostachys jatamansi* for its hypotensive potential.

Nardostachys jatamansi (in Tamil it is called as *Sadamanjil*) from Valerianaceae family commonly known as Indian spikenard or musk-root and it is a native of Himalayan region, available in the Deccan plateau also. The rhizome of this plant is said to possess hypotensive, diuretic, sedative and stimulant action. The oil is said to possess anti arrhythmic activity. *Nardostachys jatamansi* is used traditionally in the treatment of nervous headache, hypertension, epilepsy, intestinal colic, hysteria and depressive illness [6]. More than 25 active principles have been isolated from the rhizome part of this plant which includes alkaloids jatamansone, nardostachone, jatamansic acid, coumarins, lignan, neolignans and sesquiterpenes.[7-8] However, no clinical studies have been conducted so far in the efficacy of *Nardostachys jatamansi* (*NJ*) for its hypotensive activity. Therefore the present study was focused to evaluate the anti hypertensive activity of *NJ* clinically on patients with essential hypertension.

MATERIALS AND METHODS

An open labeled non-comparative prospective clinical study

was carried out from the OPD at Government Siddha Medical College Hospital, Arumbakkam, Chennai from June 2011 to December 2011. Total number of 50 Patients of either sex in the age group of 30 – 70 yrs with mild to severe primary or essential hypertension not taking any hypotensive drugs or agreed to discontinue the regular hypotensive drug with approval from the physician who is administered the drug for a period of two weeks prior to the enrollment of clinical trial. During the base line assessment, the causes of secondary hypertension which includes target organ damage, patients more than 70 years and less than 30 years, very severe hypertensive stage, patients with evidence of valvular disease, congenital heart disease, CCF, cirrhosis of liver, renal involvement, Hb less than 9 gms% and ECG evidence of Coronary arterial disease, Bundle branch block (BBB), other than sinus rhythm were identified and excluded from the study. The protocol of this clinical study was approved by the Institutional Ethical Committee and conducted according to the guidelines of the Declaration of Helsinki [9]. Patients and/or their attendees were fully informed about the properties of the drug, its effect, duration of the trial and overall plan of the study. All participants were provided with specific written informed consent (in English and Tamil) obtained prior to entrance into the study.

Pre-study Screening and Baseline Evaluation

All the patients with an admission diagnosis of primary or essential hypertension was screened by proper history, physical examination which includes blood pressure readings and laboratory investigations such as blood and urine analysis, chest x ray and electrocardiography at base line before they were considered for inclusion into the study. Essential or primary hypertension was diagnosed by taking measurement of blood pressure by using sphygmomanometer. Blood pressure measurements were used as an important clinical sign in the diagnosis and analyzing progress. Before taking the measurement, the patient has put on rest and comfortable for 5 minutes. On the first visit blood pressure measured in both arms and one leg and in both sitting and standing positions to rule out secondary causes such as coarctation of aorta, subclavian artery stenosis, and orthostatic hypertension. Except stage II hypertension, the prehypertension and stage I hypertensive patients were diagnosed with the blood pressure measurements for three consecutive visits and concluded. After enrolled in the clinical study, the blood pressure was taken in the right arm and recorded at the base line and each follow up. ECG findings by Rambhilt and Estee's point scoring system to identify LVH. To assess the data in a better way and to see the efficacy of the *Nardostachys jatamansi*, the hypertensive patients at the baseline were classified according to the Joint National Committee on Detection, Evaluation and Treatment of High Blood Pressure.

The classification of 4 categories of Joint National Committee criteria for hypertension is as follows [10]:

Category	Systolic B.P. (mm Hg)	Diastolic B.P (mm Hg)
Normal	<120	< 80
Pre Hypertension	120-139	80-89
Stage I Hypertension	140-159	90-99
Stage II Hypertension	≥160	≥100

The blood pressure measurement was done initially and at the end of every week during treatment. The laboratory investigation and the other physiological parameters were recorded initially at the end of the treatment and at the end of follow up as per the proforma (form III).

During the trial period systolic blood pressure (SBP) and Diastolic blood pressure (DBP) were recorded at every week.

Preparation of the Trail Drug *Sadamanjil Choornam* (*NJC*)

The raw drug of the rhizome of *NJ* was obtained from country drug shop at Chennai. After collection *NJ* was identified and authenticated at department of Botany, Govt.Siddha Medical College, Chennai and a voucher specimen has been preserved in the department for future reference. After then the roots of *NJ* were cleaned well and dried for a week in the shade. The roots after purification were made into fine powder and sieved by a white cloth and further purified as per the procedure given in the literature '*Chikitcha Rathna Deepam*'[11].

The recommended dosage of *Sadamanjil Choornam* according to classical text [12] was 1gm thrice a day to be taken orally with honey, preferably at 8:00 a.m., 2:00 p.m. and 8:00 p.m. for 60 days.

Diet and Habits Restriction

The preventive aspects form the key advantage of this traditional medical system to treat any disease. So the patients were advised to avoid smoking and alcohol and instructed to follow low fat, oil free, low salt diet and easily digestible raw foods (fruits and vegetables).

Adverse Reaction or Side Effects

At weekly visit, patients were asked for occurrence of any untoward effect if any, and improvement in the signs and symptoms observed and recorded.

Clinical Data Sheet

The clinical data sheet contained the complete record of every patient studied. This data sheet included a brief case history, finding on physical examination, laboratory and other diagnostic studies, medications, temperature chart and clinical course of illness, adverse drug reactions, if any, summary and evaluation of individual cases. Any problem of interest or untoward reactions manifested by the patient at any time during or soon after drug administration were carefully evaluated and reported.

Statistical Analysis

Statistical analysis was done according to intention-to-treat principles. Drug concentrations and all derived parameters were listed and summarized descriptively. The changes in various parameters in the post-treatment values were carried out by Student's t – test for paired values. P values ≤0.05 were considered statistically significant.

RESULTS AND DISCUSSION

In the present study, total number of 58 cases of essential hypertension has been registered. Only 50 patients completed the study. The remaining 8 patients were excluded from the study, because, 5 of them had inter current illness, 3 patients decided to withdraw from the study and 2 of them had uncontrolled hypertension which prevented for further treatment.

Baseline characteristics like age, sex were considered. There were 27(54%) males and 23 (46%) females. The age group of patients ranged from 30 to 70 years with a Mean ± SD age group of the patients was 52.88 ± 9.86 which represented in Table 1.

The patients were classified into prehypertensive 17 (34%), stage I hypertension 21 (42%) and stage II hypertension 12 (24%) based on the Joint National Committee criteria for hypertension which is summarized in Table.2.

The primary factors like habit of smoking and tobacco chewing was found to be prevalent to the extent of 17 (34%) of the focused population. 22 (44%) had a positive family history. Clinical obesity was noted in 21 (42%) of the patients. Inactive lifestyle was noted in 13 (26%) patients and 6 (12%) patients had previous history of taking medications of contraceptive pills, corticosteroids and counter medications. All are represented in Table.3.

The clinical features of all patients involved in the study were noted and recorded at base line and follow ups. Initially 24 (48%) were asymptomatic, 40 (80%) patients had headache , dizziness 29 (58%), nausea 9 (18%), blurred vision 10 (20%), insomnia 32 (64%), palpitation 15 (30%), pedal oedema 22 (44%), shortness of breath 8 (16%), chest pain 16 (32%), pulmonary congestion 03 (06%), fatigue 28 (56%), constipation 11 (22%), Nocturia 21 (42%), loss of appetite 14 (28%) and tinnitus 6 (12%). After one month of trial drug *NCJ* administration, there was a gradual improvement in the signs and symptoms observed in all the patients and at the end of the study, the clinical manifestations were significantly reduced which is presented in the Table-4.

Blood pressure measurements were regularly monitored and recorded throughout the entire period of study. Initially the mean ± SEM of systolic blood pressure (SBP), mean ± SEM of diastolic blood pressure (DBP) were 163.76 ±1.21 and 100.84 ±0.80 mm Hg respectively. No major difference in SBP and DBP were observed in one week of treatment. The result of two weeks treatment was insignificant and after one month of treatment, the mean SBP and mean DBP were gradually decreased (131.44 ±0.66 and 85.2 ±0.54 mm Hg respectively) and at the end of the study period the mean SBP and mean DBP were 123.24 ±0.35 and 80.16 ±0.27 mm Hg respectively. The efficacy of the trial drug *NJC* was analyzed by Student's paired t- test and provided in Table.5 and Table.6 and Fig.1 and Fig.2 which were extremely significant (P value < 0.0001).

Based on the reduction in systolic and diastolic blood pressure measurements and clinical improvements, the efficacy of the trial drug *NJC* on patients with essential hypertension have been assessed in terms of excellent response, marked response, moderate response, mild response and no response.

Out of the 50 patients selected for the clinical study, excellent response was showed in 9 (18%) patients, marked response was showed in 24 (48%) patients, moderate response was showed in 16 (32%) patients, poor response was showed in 01 (02%) patient and 0% showed no response which is summarized in Table.7 and Fig.3.

All the patients were carefully observed and monitored for any adverse drug reactions or side effects and there were no clinically significant adverse drug reactions and side effects noted during the course of the treatment.

Treatment regimen for hypertension nowadays is governed by established goals given by *JNC* recommendations. Due to poor patient compliance and adverse effects of available antihypertensive drugs, not all the patients are having a controlled hypertension. So there arises an interest recently to rediscover the safer, rejuvenating herbal preparations for the treatment of ailments. Being an effective traditional system of medicine, Siddha system bears with it innumerable preparations for the well being of mankind. The trial drug *Nardostachys jatamansi* is one such kind.

The trial drug is powdered rhizomes of *NJ*. It is termed as *Sadamanjil Choornam* in Siddha system of medicine. Its oily extract has been found to have anti oxidant [13], anti convulsant [14], anti ischaemic [15] and anti arrhythmic [16] potential. It also increases the HDL levels which are protective lipids [17]. A few studies have also mentioned the anxiolytic action.

In the above clinical trial, significant hypotensive effect in terms of BP (both systolic and diastolic blood pressure) and statistical improvement in clinical manifestations were observed early at four weeks.

CONCLUSION

Thus the results of present study suggested that there was appreciable amelioration of the severity of symptoms of hypertension. No change in any general parameters and adverse effects during the course of the study suggested the safety of the drug in the prescribed dosage.

Finally the authors concluded that *Nardostachys jatamansi* is a very effective, potential and safe drug for the management of patients with essential hypertension along with dietary restrictions and modified lifestyle.

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Table 1: Age and Sex of participants

Age and sex	Male	Female
30 – 39	4	3
40 – 49	5	5
50 – 59	9	9
60 – 69	9	6
Total	27	23
Mean ± SD	52.88 ± 9.86	

Table 2: Treatment categories

Category	Male	Female	Percentage
Pre Hypertension	7	10	34%
Stage 1 HT	12	9	42%
Stage 2 HT	8	4	24%
Total	27	23	100%

Table 3: Baseline characteristics of patients with essential hypertension

Primary Factors	Male	Female	Percentage
Positive family history	14	8	44%
Smoking/tobacco chewing	13	4	34 %
Alcohol	16	1	34 %
Obesity	12	9	42 %
Inactive lifestyle	7	6	26 %
Medications (using contraceptive pills etc)	4	2	12 %

Table 4: Efficacy of NJC on signs and symptoms

Signs and Symptoms	BT	AT	% of improvement
Asymptomatic	24	24	-
Headache	40	02	95.0
Dizziness	29	02	93.1
Nausea	09	01	88.8
Blurred vision	14	01	92.8
Insomnia	32	04	87.5
Palpitation	15	02	86.6
Pedal oedema	22	04	81.8
Shortness of breath	08	01	87.5
Chest pain	16	01	93.7
Pulmonary congestion	03	02	66.6
Fatigue	28	06	78.5
Constipation	11	01	90.9
Nocturia	21	07	66.6
Loss of appetite	14	03	78.5
Tinnitus	06	01	83.3

Table 5: Statistical analysis of the efficacy of *NJC* on SBP and DBP

Blood Pressure	Initial reading	After 1 week	2 weeks	4 weeks	6 weeks	8 weeks
SBP	163.76 ±1.21	155.76±1 .24	136.2±1. 06	131.44±0 .66	128.6±0. 73	123.24±0 .35
DBP	100.84 ±0.80	94.44±0. 59	88.48±0. 63	85.2±0.5 4	80.16±0. 27	80.16±0. 27

Values are expressed in Mean ± SEM (n= 50) Student's t-test for paired values.

Table 6: Showing mean reduction of systolic blood pressure (mm Hg) and Diastolic blood pressure before and after NJC therapy.

Category	BT	AT	BT - AT
SBP	163.76±1.21	123.24±0.35****	40.52±1.27
DBP	100.84±0.80	80.16±0.27****	20.68±0.80

Values are expressed in Mean ± SEM (n= 50) Student's t-test for paired values. Where P **** represents extremely statistically significant at P<0.0001.

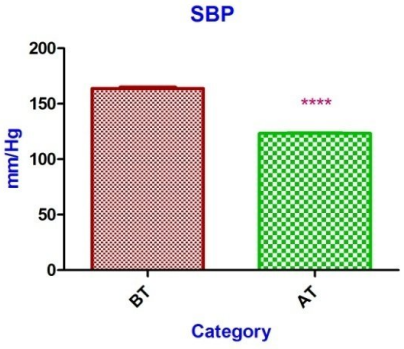

Fig 1: Showing SBP analysis

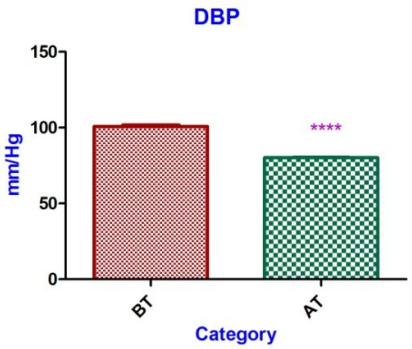

Fig 2: Showing DBP analysis

Table 7: Final result of treated patients

Effect	No. of Patients (n=50)	Percentage (%)
Excellent response	09	18
Marked response	24	48
Moderate response	16	32
Mild response	01	02
No response	00	00

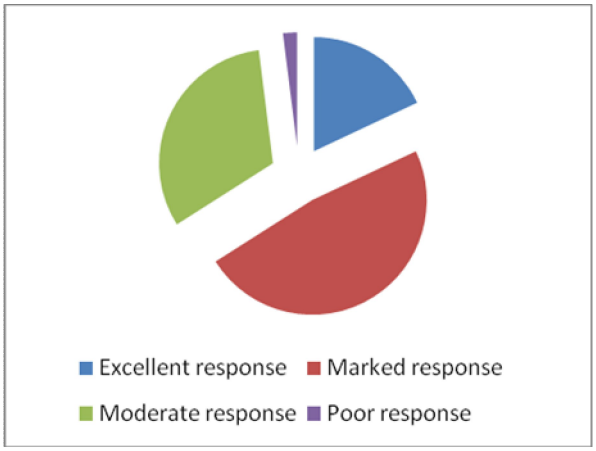

Fig 3: Showing final response to drug therapy.

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