A Quasi-Experimental Study to Assess Effectiveness of Drumstick Leaves Powder Consumption among Selected Hypertensive Patients in Selected Rural Area of Maharashtra

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Abstract

Background: This study was a quasi-experimental study to assess effectiveness of drumstick leaves powder consumption among selected hypertensive patients in selected rural area of Maharashtra.

Objective: The objective of the study is to determine whether drumstick leaf powder consumption affects blood pressure (BP) levels among hypertensive patient and to find an association between post-test BP levels and selected demographic factors of hypertension patients.

Methods: The study design is quasi-experimental two group pre-test and post-test. Sixty hypertensive patients were chosen using non-probability purposive sampling.

Results: The unpaired t-test was used for assessing the effectiveness and comparing the means of different days. The comparison between post-test level of systolic BP among selected hypertensive patients in experimental group and control group, the mean and standard deviation is 17.96 ± 3.75. The unpaired t-test value is 19.85, df=58, $P < 0.05$, S(t-table value=2 for df = 58) also comparison between post-test level of diastolic BP among selected hypertensive patients in experimental group and control group, the mean and standard deviation is -11.07 ± 0.55. The unpaired t-test value is 11.91, df=58, $P < 0.05$, S (t-table value=2 for df = 58); hence, calculated values are greater than table value, which shows significant difference in pre-test and post-test values.

Conclusion: The analysis indicates that using drumstick leaf powder to lower BP in hypertensive patients is an effective intervention. Furthermore, it was noted that except age, habit of cigarette smoking, and habit of alcohol consumption have significant association with effectiveness of drumstick leaves powder among selected hypertensive patient.

Keywords: Hypertension, drumstick leaves powder, hypertensive patients, blood pressure

INTRODUCTION

High blood pressure (BP) or hypertension is a "silent killer" that quietly damages blood vessels and leads to serious health problems.[1] One of the health journalists states that hypertension or high BP affects nearly three in ten Indians and is responsible for 17.5% of all deaths and 9.7% of disability-adjusted life years (DALYs) in India. DALYs measure the total disease burden and the years lost due to disability, ill-health, and early death.[2]

Antihypertensive drugs are widely used to manage BP levels in hypertensive patients. The major concerns that often delay treatment allude to higher costs of antihypertensive drugs, their availability and accessibility, the undesired side effects of antihypertensive drugs, and the reduced patient compliance to consume more than a pill per day. Taking this into account,

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hypertensive patients, especially those dwelling in rural areas, seek alternative approaches such as herbal remedies for their treatment of hypertension and other diseases.[3]

Several studies observe that intake of food which contains flavonoid will decrease risk of hypertension. Taking into consideration individual flavonoid subclasses, dietary anthocyanins intake was associated with 8% reduction in risk of hypertension, when comparing highest versus lowest exposure.[4] In 2019, a clinical study was conducted to monitored the effect of eating cooked *Moringa oleifera* leaves on the BP of healthy participants in view of the perception that consumption of *Moringa* is associated with an increase in BP, which is contradictory to the findings from the literature. The findings in human subjects indicated the lowering effect of *M. oleifera* leaves consumption on the 2 h postprandial BP and showed a potential lowering effect on both systolic blood pressure and diastolic blood pressure despite prior high consumption of salt (7 g/d).[5] The researcher felt that there is a need to investigate the effect of drumstick leaves powder consumption of the level of BP among hypertensive patients. So that it can be used as a alternative management for hypertension.

Materials and Methods

The quasi-experimental, that is, two group pre-test post-test research design is adopted to assess the effect of drumstick leaves powder consumption on level of BP among selected hypertensive patients. The target population selected for the study are hypertensive patients in a selected rural area Maharashtra. Sixty hypertensive patients are selected as samples from selected rural area of Maharashtra. These 60 samples are divided into the experimental and control group, that is, 30 samples in each group. Purposive sampling technique is adopted. The tool consists of demographic data and *in vivo* biophysiological tool, that is, calibrated sphygmomanometer and stethoscope.

Description of intervention

The drumstick leaves powder provided by the investigator to the hypertensive patients was procured from FSSI certified ayurvedic pharmacy.

Drumstick leaves powder is prepared by collecting green drumstick leaves and washed under running water then dried under sun light just to remove the moisture without changing its green color then added it into the pulverizer (powder making machine) to prepare powder.

After procuring the powder, the certificate of quality control was taken from authorized laboratory.

After collecting pre-test data, the 21 packets of 3 g of drumstick leaves powder were given to the subjects who are in the experimental group for 21 days. Furthermore, instructions for consuming the drumstick leaves powder were given to the subjects.

While providing drumstick leaves powder the participants were instructed to take it 3 g of drumstick leaves powder (1 sachet) in 200 mL of water. Participants should consume it in the morning (6–8 am) with empty stomach. Participants should consume similar type of mixture for next 21 days on same time (6–8 am).

On the 22nd day of intervention, the post-test data, that is, BP of the participants were collected from the subjects using the calibrated BP apparatus. The three BP reading at interval of 5 min and mean BP is taken into consideration.

Results

The data were analyzed using inferential and descriptive statistics on the basis of objectives. The comparison between pre-test level of systolic BP among selected hypertensive patients in the experimental group and control group, the mean and standard deviation is -0.76 ± 0.06. The unpaired t-test value is 2.24, df=58, $P < 0.05$, S (t-table value=2 for df = 58) (Table 1). The comparison between post-test level of systolic BP among selected hypertensive patients in experimental group and control group, the mean and standard deviation is 17.96 ± 3.75. The unpaired *t*-test value is 19.85, df=58, $P < 0.05$, S (t-table value=2 for df = 58) (Table 2). The comparison between pre-test level of diastolic BP among selected hypertensive patients in the experimental group and control group, the mean and standard deviation is -0.96 ± 0.19. The unpaired t-test value is 1.72, df=58, $P < 0.05$, S (t-table value=2 for df = 58) (Table 3). The above Table 4 describes frequency and percentage distribution of socio-demographic variables in experimental and control group. The sociodemographic variables like age, gender, dietary habits, habit of cigarette smoking, habit of alcohol consumption. The unpaired *t*-test value is 11.91, df=58, p<0.05, S (t-table value=2 for df = 58) (Table 5).

Table 1: Comparison between pretest level of systolic blood pressure among hypertensive patients in the experimental group and control group (*n*=60)

Level of systolic blood pressure	Pretest (mmHg), mean±SD	Unpaired *t*- test
Experimental group	151.29±5.77	−2.24, df=58, P<0.05, significant*
Control group	152.04±5.71	
Difference	−0.76±0.06	

P: Level of significance, df: Degree of freedom, SD: Standard deviation

Table 2: Comparison between post-test level of systolic blood pressure among hypertensive patients in the experimental group and control group (*n*=60)

Level of systolic blood pressure	Post-test (mmHg), mean±SD	Unpaired *t*-test
Experimental group	135.87±8.98	19.85, df=58, P<0.05, significant*
Control group	153.82±5.24	
Difference	−17.96±3.75	

P: Level of significance, df: Degree of freedom, SD: Standard deviation

The age, habit of cigarette smoking, and habit of alcohol consumption have significant association with the post-test level of BP with selected demographic variables of hypertensive patient.

The above Table 1 describes the comparison between pre-test level of systolic BP among selected hypertensive patients in the experimental group and control group, the mean and

Table 3: Comparison between pre-test level of diastolic blood pressure among hypertensive patients in the experimental group and control group (n=60)

Level of diastolic blood pressure	Pre-test, mean±SD (mmHg)	Unpaired t- test
Experimental group	92.44±2.86	1.72, df=58,
Control group	93.40±3.04	P<0.05, NS
Difference	−0.96±−0.19	

P: level of significance, df: Degree of freedom, SD: Standard deviation, NS: Not significant

Table 4: Frequency and percentage distribution of sociodemographic variables in the experimental and control group (n=60)

Socio-demographic variables	Frequency (%)	
	Experimental group	Control group
Age (years)		
30–40	10 (33.333)	10 (33.33)
41–50	10 (33.333)	10 (33.33)
51–60	10 (33.333)	10 (33.33)
Total	100	100
Gender		
Male	15 (50)	15 (50)
Female	15 (50)	15 (50)
Total	30 (100)	30 (100)
Dietary habits		
Vegetarian	7 (23.33)	4 (13.33)
Mixed	23 (76.66)	26 (86.66)
Total	30 (100)	30 (100)
Habit of cigarette smoking (years)		
No	18 (60)	16 (53.33)
1–5	4 (13.33)	4 (13.33)
6–10	4 (13.33)	4 (13.33)
>10	4 (13.33)	6 (20)
Total	30 (100)	30 (100)
Habit of alcohol consumption (years)		
No	15 (50)	15 (50)
1–5	4 (13.33)	3 (10)
6–10	4 (13.33)	8 (26.66)
>10	7 (23.33)	4 (13.33)
Total	30 (100)	30 (100)

Experimental group=30, control group=30

Table 5: Comparison between post-test level of diastolic blood pressure among hypertensive patients in the experimental group and control group (n=60)

Level of diastolic blood pressure	Post-test, mean±SD	Unpaired t- test
Experimental group	82.84±2.99	11.91, df=58,
Control group	93.91±3.54	P<0.05, significant*
Difference	−11.07±0.55	

P: Level of significance, df: Degree of freedom, SD: Standard deviation

standard deviation is −0.76 ± 0.06. The unpaired t-test value is 2.24, df=58, P < 0.05, S(t-table value=2 for df = 58); hence, calculated value is greater than table value; hence, we reject the null hypothesis. Hence, there is significant difference in the pre-test level of systolic BP in the experimental group and control group.

The above Table 2 describes the comparison between post-test level of systolic BP among selected hypertensive patients in the experimental group and control group, the mean and standard deviation is 17.96 ± 3.75. The unpaired t-test value is 19.85, df=58, P < 0.05, S (t-table value=2 for df = 58); hence, calculated value is greater than table value; hence, we reject the null hypothesis. Hence, there is significant difference in the post-test level of systolic BP in the experimental group and control group.

The above Table 3 describes the comparison between pre-test level of diastolic BP among selected hypertensive patients in the experimental group and control group, the mean and standard deviation is −0.96 ± 0.19. The unpaired t-test value is 1.72, df=58, P < 0.05, S(t-table value=2 for df = 58); hence, calculated value is less than table value; hence, we accept the null hypothesis. Hence, there is no significant difference in the pre-test level of diastolic BP in the experimental group and control group.

The above Table 5 describes the comparison between post-test level of diastolic BP among selected hypertensive patients in the experimental group and control group, the mean and standard deviation is −11.07 ± 0.55. The unpaired t-test value is 11.91, df=58, P < 0.05, S(t-table value=2 for df = 58); hence, calculated value is greater than table value; hence, we reject the null hypothesis. Hence, there is significant difference in the post-test level of diastolic BP in the experimental group and control group.

Table 6 shows association of post-test level of systolic BP among selective hypertensive patients in the experimental group of selected rural area of Maharashtra with the selected sociodemographic variables. It indicates that there was significant association between the post-test level of systolic BP among selective hypertensive patients with their selected sociodemographic variables such as age, habit of cigarette smoking, and habit of alcohol consumption and there was no association between gender and dietary habits.

Table 7 shows association of post-test level of diastolic BP among hypertensive patients in the experimental group with the selected sociodemographic variables. It indicates that there was significant association between the post-test level of diastolic BP among hypertensive patients with their selected sociodemographic variables such as age, habit of cigarette smoking, and habit of alcohol consumption and there was no association between gender and dietary habits.

DISCUSSION

In the present study, the drumstick leaves powder was provided to the 30 hypertensive patients who are in the experimental

Table 6: Association of post-test level of systolic blood pressure with the selected sociodemographic variables of hypertensive patients in the experimental group (n=30)

Sociodemographic variable	Frequency	Mean	Test
Age			
30–40	10	126.19	ANOVA test F
41–50	10	135.52	value=53.75 df=27/2
51–60	10	145.86	P=0.05 Significant*
Gender			
Male	15	131.91	t-test (unpaired)=0.01
Female	15	139.82	df=29 P<0.05 NS
Dietary habits			
Veg	07	137.80	t-test (unpaired)=0. 5
Mixed	23	135.27	df=28 P<0.05 NS
Habit of cigarette smoking (year)			
No	18	139.40	ANOVA test F
1–5	4	127	value=3.79 df=26/3
6–10	4	128.33	P=0.05 Significant*
>10	4	135.85	
Habit of alcohol consumption (year)			
No	15	139.18	ANOVA test F
1–5	4	127.33	value=2.87 df=26/3
6–10	4	135.33	P=0.05 Significant*
>10	7	132.57	

Level of significance: 0.05, NS: Not significant, df: Degree of freedom

Table 7: Association of post-test level of diastolic blood pressure with the selected sociodemographic variables of hypertensive patients in the experimental group (n=30)

Sociodemographic Variable	Frequency	Mean	Test
Age			
30–40	10	79.93	ANOVA F
41–50	10	82.13	value=19.14 df=27/2
51–60	10	86.46	P=0.02 Significant*
Gender			
Male	15	81.42	t-test (paired)=0.02
Female	15	84.26	df=29 NS
Dietary habits			
Vegetarian	07	83.04	t-test (unpaired)=2.13
Mixed	23	82.78	df=28 P<0.05 NS
Habit of cigarette smoking (year)			
No	18	84.48	ANOVA test F
1–5	4	80.5	value=4.26 df=26/3
6–10	4	79.66	P=0.01 Significant*
>10	4	81	
Habit of alcohol consumption (year)			
No	15	84.26	ANOVA test F
1–5	3	79.33	value=2.91 df=26/3
6–10	4	83.66	P=0.05 Significant*
>10	8	81.08	

Level of significance: 0.05, NS: Not significant, df: Degree of freedom

groups to assess the effect of drumstick leaves powder consumption on the level of BP among selected hypertensive patients. The BP of hypertensive patients was assessed by BP apparatus. As compare to the subjects in the control group, there is reduction in the systolic and diastolic BP of the subjects who are in the experimental group. Furthermore, significant association was found between age, habit of cigarette smoking, and habit of alcohol consumption with effectiveness of drumstick leaves powder among selected hypertensive patient and there was no any significant association that was found between gender and dietary habits with effectiveness of drumstick leaves powder among selected hypertensive patient.

An experimental study was conducted by BIDWE A. To study the effect of drumstick (*M. oliefera*) leaves powder on BP, an attempt was made to prepare drumstick leaves powder chutney utilizing Bengal gram dal powder, Black gram dal powder, and Niger seed powder to ensure minimum four-gram consumption of drumstick leaves powder in the daily diet. Twenty hypertensive subjects were selected for clinical study. The observations of BP were recorded at 0, 30, and 60 days of the experimental period. The supplementation of drumstick leaves powder chutney showed improvement in the BP levels, systolic (131 mm Hg to 116 mm Hg), and diastolic (86 mm Hg to 78 mm Hg) at the end of experimental period. This novel utilization of abundantly available drumstick leaves can be en-cashed as a value added product which is associated with healthy life by reducing BP.[6,7]

An experimental study was conducted by EN F to evaluate the effects of regular supplementation with drumstick leaf powder on BP of normal and obese hypertensive patients attending the diabetes and high blood clinic of the Regional Hospital in Ngaoundere. The researcher concluded that consumption of drumstick leaf powder could be beneficial for weight loss and reducing BP as well as for preventing other diseases which have obesity as risk factor.[8]

The findings of the present study are supported by the study which was conducted by Mrs. Jayshree. C (2012) to assess the effectiveness of drumstick leaves tea among hypertensive clients and observed using self-structured rating scale. The researcher concluded that there was improvement in the health status of hypertensive clients in relation to administration of drumstick leaves tea.[9]

In the present study, the significant association was found between age, habit of cigarette smoking, and habit of alcohol consumption with effectiveness of drumstick leaves powder among selected hypertensive patient and there was no any significant association that was found between gender and dietary habits with effectiveness of drumstick leaves powder among selected hypertensive patient.

The findings of this study were not consistent with the findings of study, which was conducted by Mrs. Jayshree. C (2012) to assess the effectiveness of drumstick leaves tea among hypertensive clients and observed using self-structured rating scale. The result of the study reveals that there was no significant association between age, gender, dietary habits, habit of cigarette smoking, and habit of alcohol consumption.[9]

CONCLUSION

The study concluded that consumption of drumstick leaves powder is an effective intervention for reduction of BP among hypertensive patients. Furthermore, it was noted that, except age, habit of cigarette smoking, and habit of alcohol consumption that there is no significant association found between selected sociodemographic variables with effectiveness of drumstick leaves powder among selected hypertensive patient.

CONFLICTS OF INTEREST

The author declares that there are no conflicts of interest.

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