

EFFECTIVENESS OF CARDIAC WALKING ON BLOOD PRESSURE AMONG PATIENTS WITH HYPERTENSION AT A SELECTED HOSPITAL IN CHENGALPATTU DISTRICT

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ABSTRACT

Objective: Hypertension is common disorder worldwide. This study was conducted to identify the effectiveness of cardiac walking on blood pressure (BP) among patients with hypertension at a selected hospital in Chengalpattu District. **Methods:** A quasi-experimental pre- and posttest with comparison group design was chosen for this study. A total of 100 samples were recruited for the study using purposive sampling technique which included 50 each in study and comparison groups. Pre-test was done using a structured instrument that included demographic, biological, clinical variables, and BP was measured by stethoscope and sphygmomanometer. Cardiac walking was implemented for the study group participants whereas comparison group participants. Both descriptive and inferential statistics were used for the analysis. **Results:** The paired t-test revealed the statistically significant difference between pre- and post-test systolic and diastolic BP within the study group participants at level p<0.001 in post-test 6. Independent t value on comparison of systolic and diastolic blood pressure between study and comparison revealed statistically significant difference at p<0.001 in post-test 6.

Key words: Cardiac walking, Systolic Blood pressure, Diastolic Blood pressure Hypertension. INTRODUCTION

"Hypertension is a silent killer but preventable." The current lifestyle pattern of human beings is assiduous and diligent to keep in pace with the tremendous changes in their work schedule. This mounts enormous pressure and creates health problems. In the contemporary world, one of the common lifestyle-related health problems is hypertension which is also known as high or raised blood pressure (BP). It is a major global public health issue. A combination of lifestyle factor increases the risk of non-communicable disorders, especially increases the resistance of blood flow through the arteries leading to high BP. Globally, the overall prevalence of raised BP in adults aged 25 years and over was around 40% in 2008 (World Health Organization [WHO]). The proportion of the world's population with high BP, or uncontrolled hypertension, fell modestly between 1980 and 2008 [1]. The study conducted by the Indian Council of Medical Research (2014) in Tamil Nadu, Maharashtra, Jharkhand, and Chandigarh unveiled that the prevalence of hypertension was highest in Tamil Nadu at 27.6%, followed by Chandigarh at 25.8%, Maharashtra at 25%, and Jharkhand at 23%. While overall prevalence of hypertension was more in urban areas than in rural areas [2]. According to the WHO (2012), hypertension is the number one cause of mortality in the world and it is a major risk factor for cardiac diseases and stroke [3]. The progressively higher BP leads to end-stage renal disease. Hence, to investigate the simple measure to reduce BP, a study was conducted with an objective of determination of the effect of cardiac walking on BP among patients with hypertension.

Materials and Methods

A quantitative research approach of quasi-experimental pre- and post-test with comparison group design was chosen for this study. A total of 100 samples were recruited using purposive sampling technique which composed of 50 each in study (n=50) and comparison groups (n=50). Ethical approval was obtained from the Institutional Ethical Committee from the selected hospital at Chengalpattu District, and informed consent was obtained from all the samples.

Criteria for sample collection

Inclusion criteria

Patients who were male and diagnosed to have hypertension, who were ambulatory and aged between 35 and 45 years, and able to talk and understand Tamil or English were included for the study.

Exclusion criteria

Patients who had impaired physical mobility of the lower limbs and unable to walk, mentally challenged, disoriented, and unable to follow the instructions, who were diagnosed to have congestive cardiac failure, valvular disorders, and cardiomyopathy, who had edema in the lower limb, and who were regularly practicing yoga and/or exercises were excluded from the study.

The structured tools included were Part I, II, III, and IV.

• **Part I: Demographic variables** were obtained by interview method. It was designed with nine items that included age, marital status, religion, education, occupation, and dietary pattern, history of smoking, history of alcoholism, and history of chewing tobacco

• **Part II: Biological variables** were obtained by anthropometric measurements and interview method. It encompassed height, weight, body mass index, waist circumference, and sleeping pattern

• Part III: Clinical variables were collected by clinical record survey which included co morbidity, time since diagnosis, name of the antihypertensive medication, duration of treatment, blood glucose level, and total cholesterol level

• Part IV: Assessment of Blood Pressure

Consisted of assessment of BP (mmHg) using stethoscope and sphygmomanometer and classification of BP as shown in Table 1. Classification of BP

Classification of BP	Systolic (mmHg)	Diastolic (mmHg)
Normal	<120	And<80
Pre-hypertension	120-139	Or 80-89
Stage 1 hypertension	140-159	Or 90-99
Stage 2 hypertension	≥160	Or≥100

Table 1. Classification of BP

Data collection procedure

The data were obtained using structured instrument Part I, II, III, and IV in pre-test and only Part IV was obtained in post-test for both the study and comparison group participants. Pre-test was conducted on day 1 for study and comparison group participants .Cardiac walking was practiced daily by study group participants for 6 months with routine treatment whereas .comparison group was on only with routine care. Post-test I,II,III,IV,V and VI were conducted on 30th ,60th,90th,120th,150 th and 180 th day respectively for both the group participants .

Cardiac walking was taught for the study group participants that encompassed three phases, namely,

• Phase I: Warm up – It involved 5-10 minutes of low intensity walking • Phase II: 10-15 minutes of moderate intensity walking • Phase III: Cool down, this included 5-10 minutes of low intensity walking. The study group participants were given audio-visual session regarding general information about hypertension (definition, causes/risk factors, normal systolic and diastolic BP values, management, and complications) and demonstration of cardiac walking by the investigator after pre-test on day 1, whereas comparison group participants were on routine care that was only antihypertensive medications. Post-test I,II,III,IV,V and VI were done for both study and comparison group participants . The data were analyzed using Statistical Package for Social Sciences version 16. The paired t- and independent t-tests were computed to find the difference in BP within and between the study and comparison groups, respectively. The hypothesis "H¹ : There is a significant difference in the systolic and diastolic BP among patients with hypertension who had subjected to cardiac walking than those who do not" was tested in this study.

RESULTS

Age-wise distribution showed that 14 (28%) participants in study and comparison groups each were aged between 35 and 37 years whereas 13 (26%) participants in each group were aged between 38 and 40 years. Out of 50 samples, 30 (60%) study group participants had the habit of chewing tobacco against 30 (60%) in comparison group (Table 2).

With respect to the body mass index classification, 26 (52%) participants in study group and 26 (52%) in comparison group were classified as overweight. Out of 50 participants each in

study and comparison groups, 10 (20%) and 8 (16%) participants, respectively, had the waist circumference ranging from 89 to 98cm (Table 2).

With reference to the total cholesterol, 27 (54%) study group participants had the value between 191 and 210 mg/dl against comparison group participants of 27 (54%) (Table 3).

The distribution of level of BP in pre- and post-test among study group participants revealed that all the 47 (94%) study group participants had Stage 1 systolic and diastolic hypertension in the pre-test, whereas in post-test 1, 16 (32%) and 25 (100%) participants had pre-hypertension systolic and pre-hypertension diastolic, respectively. no participant had Stage 1 hypertension systolic in the post-test5, post test 6 (Table 4).

The distribution of level of BP in the pre- and post-test among comparison group showed that all the 25 (100%) comparison group participants had the Stage 1 systolic and diastolic hypertension in the pre-test, whereas in the post-test, 23 (92%) had Stage 1 systolic and diastolic hypertension. About 2 (8%) participants progressed to Stage 2 systolic and diastolic hypertension in the post-test (Table 6). The comparison of pre- and post-test systolic and diastolic BP within the study group depicted statistically significant difference at p < 0.001 level.

S.No	Demographic variables	Study gro	oup(n=50)	Compa group()	rison 1=50)
		No	%	no	%
1	Age (years)				
	35 - 37	14	28	13	26
	38-40	12	24	14	28
	41-43	17	34	16	32
	44-45	7	14	7	14
2	Sex				
	Male	28	56	31	62
	Female	22	44	19	38
3	Marital status				
	Married	46	92	45	90
	Unmarried	4	8	5	10
4	Religion				
	Hindu	30	60	30	60
	Christian	11	22	11	22
	Muslim	9	18	9	18
5	Educational				
	Primary	10	20	9	18
	Middle	10	20	11	22
	High	10	20	10	20
	Higher secondary	11	22	11	22
	UG	15	10	5	10

Table 2: Distribution of demographic variables among study and comparison group (N=100)

	Others	4	8	4	8
6	Occupational status				
	Labour	17	34	16	32
	Farmer	15	30	16	32
	Govt. employee	3	6	3	6
	Private employee	8	16	8	16
	Business	7	10	7	14
7	Income				
	6000 - 10,000	35	70	31	62
	10,001 - 15,000	14	28	15	30
	15,001 - 20,000	1	2	4	8
8	Dietary habits				
	Vegetarian	7	14	3	6
	Non – vegetarian	-	-	9	18
	Mixed	43	86	38	76
9	History of smoking				
	Yes	11	22	10	20
	No	39	78	40	80
10	No of cigarettes/day				
	1-5	3	6	2	4
	5-10	8	16	8	16
11	History of alcoholism				
	Yes	16	32	14	28
	No	39	78	36	72
12	History of tobacco				
	Yes	20	40	20	40
	No	30	60	30	60

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TABLE :3 Distribution of clinical variables among study and comparison group(N=100)

S. No	Clinical variables	Study group (n=50)			Comparison group (n=50)		
		NO	%	NO	%		
	Comorbity						
	Diabetes mellitus	21	42	16	32		
1	Bronchial asthma	12	24	7	14		
	Osteoarthritis	17	34	22	44		
	Hypothyroidism						

		-	-	5	10
	Time since diagnosis months				
	6-13				
2		33	66	32	64
	14-21	12	24	14	28
	22 - 30	5	10	4	8
	History of treatment				
3	Yes	50	100	50	100
	no	-	-	-	-
	Antihypertensive medication				
	Atenolol				
4		21	42	21	42
	Amlong	23	46	23	46
	Propranolol	6	12	6	12
	Duration of treatment in months				
	1 - 10				
5	Nov-20	16	32	15	30
	21-30	29	58	31	62
		5	10	4	8
	Blood glucose Level(mg/dl)				
	100 - 120				
		27	54	29	58
	121 - 140	12	24	11	22
		12		11	
6	141 - 160				
		1	2	1	2
	161 – 180	9	18	8	16
	181 - 200	1	2	1	2
	Total cholesterol (mg/dl)		2		2
	170 - 190	19	38	19	38
7	101 210	27	54	27	50
/	211 220	2	1	2/	6
	211 - 230		4	3 1	2
	~231 - 230	2	4	1	2

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Table 4: Distribution of biological variables among study and comparison group

S.No	Biological variables	Study group(r	n=50)	Comparison				
			1	group(n=50)				
		No	%	no	%			

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1	Body mass index				
	Under weight<18.5	-	-	-	-
	Normal range 18.5 -24.9	3	6	3	6
	Over weight 25.0 -29.9	26	52	26	52
	Obese >30	21	42	21	42
2	Sleep duration				
	4-5	2	4	2	4
	6-7	32	64	32	64
	8-9	16	32	16	32
3	Waist circumference				
	69-78	6	12	9	18
1	79-88	34	68	33	66
	89-98	10	20	8	16

Table 5 : Distribution of level of BP in pre and post test among study group

N =

50															
s.no	Level of BP	Pre test		Post test 1		Post test 2		Post test 3		Post test 4		Post test 5		Post test 6	
	(mm of hg)	f	%	f	%	f	%	F	%	f	%	f	%	f	%
1	Normal <120-80	-	-	-	-	-	-	-	_	-	-	2	4	42	84
2	Pre hyper 120-139 /80-89	-	-	16	32	21	42	23	46	46	92	48	96	8	16
3	StageI140-159/90-99	47	94	32	64	29	58	27	54	4	8	-	-	-	-
4	Stage II ≥160/≥100	3	6	2	4	-	-	-	-	-	-	-	-	-	-

Table 6: Distribution level and BP in pre and post test among comparison50

N=

S.No	Level of BP	Pre	test	Pos test	t 1	Post test	t 2	Post test	t 3	Pos test	t 4	Pos test	st t 5	Pos test	st : 6
	(mm of hg)	f	%	f	%	f	%	F	%	f	%	f	%	f	%
1	Normal <120-80	-	-	-	-	-	-	-	_	-	-	_	_	-	-
2	Pre hyper 120-139 /80-89	-	-	-	-	4	8	-	-	-	-	-	-	16	32
3	StageI140-159/90-99	44	88	45	90	40	80	47	94	48	96	48	96	33	66
4	Stage II ≥160/≥100	6	12	5	10	6	12	3	6	2	4	2	4	1	2

Table :7 Comparison of pre and post test systolic BP within study and comparison group N=100

S.N	Observatio	Study	group	o(n=50)	Comparison group(n=50)					
0	ns	mean	SD	Mean differen ce	Paire d "t" test	P valu e	Mea n	SD	MD	Paired "t" test P value
1	Pretest systolicBP Post test 1 systolicBP	142.9 1 140.8 4	5.5 3.8 3	2.10	3.697	0.00 0	146.5 6 145.4 0	7.87 6.63	1.16 0	1.026* ** SS P=0.00 0
2	Pretest systolicBP Post test 2 systolicBP	142.9 1 139.0 8	5.5 2.1 8	3.86	4.481	0.00 0	146.5 6 145.0 8	7.87 6.71	1.48 0	1.229 SS P=0.00 0

3	Pretest systolicBP Post test 3 systolicBP	142.9 7 138.8 8	5.5 3.2 6	4.06	4.309	0.00 0	146.5 6 144.1 6	7.87 5.72 6	2.40	1.994 SS P=0.00 0
4	Pretest systolicBP Post test 4 systolicBP	142.9 7 136.2 4	5.5 2.7 5	6.70	7.981	0.00 0	146.5 6 142.4 6	7.87 4.56	4.10	4.506 SS P=0.00 0
5	Pre test systolicBP Post test 5 systolicBP	142.9 7 134.4 2	5.5 3.7 9	8.52	9.481	0.00 0	146.5 6 142.8 8	7.87 4.48	3.68 0	3.565 SS P=0.00 0
6	Pre test systolic Post test 6 systolicBP	142.9 7 121.3 0	5.5 4.4 9	21.640	24.46 1	0.00 0	146.5 6 141.6 4	7.87 4.36	4.92 0	4.594 SS P=0.00 0

*** statistically significant at level P<0.001

There is a statistically significant difference between pre test and post test 1, 2, 3, 4, 5and 6 systolic blood pressure in study group at level p<0.001

There is a statistically significant difference between pre test and post test 4, 5 and 6 systolic blood pressure within comparison group at level p<0.001 and between pre test and post test 3 systolic blood pressure at level p<0.005

There is a statistically significant difference between pre test and post test 1,2, 3, 4, 5 diastolic blood pressure in study group at level p<0.001

Table:8 comparison of pre and post diastolic BP within study and comparison group $N{=}100$

S.N	Observatio	Study	group	(n=50)			Comp	ariso	n grou	ıp(n=50)
0	ns	mea n	SD	Mean differen ce	Paire d "t" test	P valu e	Mea n	SD	M D	Paired" t" test, P value
1	Pre test diastolic BP Post test 1 diastolic BP	91.5 2 89.6 4	3.26 3.04 2	1.88	3.504	0.00	92.5 2 92.0 0	4.4 0 3.4 2	0.5 2	0.780 NS P=0.439
2	Pre test diastolic BP Post test 2 diastolic BP	91.5 2 88.8 8	3.26 2.49	2.64	4.627	0.00 0	92.5 2 91.9 6	4.4 0 3.3 6	0.5	0.884 NS P=0.381
3	Pre test v diastolic BP Post test 3 diastolic BP	91.5 2 89.0 0	3.26 3.70	2.52	3.508	0.00	92.5 2 92.2 4	4.4 0 2.9 0	0.2 8	0.491 NS P=0.626
4	Pre test diastolic BP Post test 4 diastolic BP	91.5 2 86.4 4	3.26 2.56	5.08	9.506	0.00 0	92.5 2 92.2 8	4.4 0 3.2 0	0.2 4	0.400 NS P=0.691
5	Pre test diastolic BP Post test 5 diastolic BP	91.5 2 84.9 0	3.26 2.32	6.62	14.05 2	0.00 0	92.5 2 92.3 8	4.4 0 3.1 2	0.1 4	0.222 NS P=0.826

6	Pre test diastolic BP Post test 6 diastolic BP	91.5 2 80.3 2	3.26 2.82	11.200	20.35 2	0.00 0	92.5 2 92.2 8	4.4 0 3.9 5	2.2 4	3.03** SS

** SS at P<0.001

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Table :9 comparison of systolic BP between study and comparison groupN=100

S.No	Observations	Study group		Comparison group		Mean difference	"t" value &
		mean	SD	Mean	SD		"p" value
1	Pre test	142.94	5.50	146.56	7.87	3.620	2.663 SS P=0.009
2	Post test 1	140.84	3.83	145.40	6.63	4.560	4.210*** SS P=0.000
3	Post test 2	139.08	2.18	145.08	6.71	6.000	6.008*** SS P=0.000
4	Post test 3	138.88	3.26	144.16	5.72	5.280	5.665***SS P=0.000
5	Post test 4	136.24	2.75	142.46	4.56	6.220	8.241*** SS P=0.000
6	Post test 5	134.42	3.71	142.88	4.84	8.460	10.188*** SS P=0.000
7	Post test 6	121.30	4.49	141.64	4.36	20.340	22.964*** SS P=0.000

Statistically significant at p<0.01 , *p<0.001

There is a statistically significant difference between pre test and post test 6 at p<0.01. The independent t value on comparison of systolic blood pressure between study and comparison group revealed that there was a statistically significant difference in the systolic blood pressure in pre test at level p<0.001, post test 1, 2, 3, 4, 5, and 6 at level p<0.001. It proved that cardiac walking yielded good clinical outcome in terms of reduction of systolic in study group

Table : 10 C	Compariso	n of diastolic	between	study gr	oup and	compa	rison group o	ver a
period of tin	ne						N = 100	

S.No	Observations	Study g	roup Comparison group		Mean difference	"t"value &"p" value	
		Mean	SD	Mean	SD		
1	Pre test	91.52	3.26	92.52	4.40	-1.00	-1.291 P=0.200 NS
2	Post test 1	89.64	3.04	92.00	3.42	2.360	-3.641*** P= 0.000 SS
3	Post test 2	88.88	2.49	91.96	3.36	3.080	5.195*** P=0.000 SS
4	Post test 3	89.00	3.70	92.24	2.90	3.240	4.864*** P=0.000 SS
5	Post test 4	86.44	2.56	92.28	3.20	5.840	10.055*** P=0.000 SS
6	Post test 5	84.90	2.32	92.38	3.12	7.480	13.589*** P=0.000 SS
7	Post test 6	80.32	2.83	90.28	3.95	9.960	14.456*** P=0.000

***Statistically significant at p<0.001

The independent of value on diastolic blood pressure between study and comparison group unveiled that is a statistically significant difference in post test1, 2, 3, 4, , and 6 diastolic

blood pressure in study group at p<0.001 .the repeated measure of ANOVA on comparison of systolic and diastolic blood pressure from pre test post test and revealed statistically significant difference between study and comparison group at level p<0.001.

Table.11 comparison of systolic BP	between study	group and	comparison group	over a
period of time			N=100	

S.N Observations		Study group		Comparis	on group	"F" value
0		Mean	SD	Mean	SD	"P" value
1	Pre test	142.94	5.50	146.56	7.87	
2	Post test 1	140.84	3.83	145.40	6.63	
3	Post test 2	139.08	2.18	145.08	6.71	
4	Post test 3	138.88	3.26	144.16	5.72	50.389*** P=0.000 SS
5	Post test 4	136.24	2.75	142.46	4.56	
6	Post test 5	134.42	3.79	142.88	4.84	
7	Post test 6	121.30	4.49	141.64	4.36	

*** Statistically significant at p<0.001

Table : 12 comparison of diastolic between study group and comparison group over a period of time (N = 100)

S.N	Observation	Study grou	р	Comparis	on group	"F" value
0	S	mean	SD	Mean	SD	"P" value
1	Pre test	91.52	3.26	92.52	4.40	30.94*** P=0.000 SS

2	Post test 1	89.64	3.04	92.00	3.42	
3	Post test 2	88.88	2.49	91.96	3.36	
4	Post test 3	89.00	3.70	92.24	2.90	
5	Post test 4	86.44	2.56	92.28	3.20	
6	Post test 5	84.90	2.32	92.38	3.12	
7	Post test 6	80.32	2.83	90.28	3.95	

*** Statistically significant at p<0.001

Hypertension is the common disorder worldwide affecting larger population. The mortality and morbidity rate of patients with hypertension are steadily increasing and pose the greatest threat to the health-care system. This emphasized that non-pharmacological measure of cardiac walking reduced the BP in spite of antihypertensive medications among study group participants because both study and comparison group participants received antihypertensive medications. Since cardiac walking is a simple measure, patients with hypertension must be motivated to practice regularly.

This proved that cardiac walking had reduced the BP among study group. The study group participants had taken antihypertensive drugs and also practiced cardiac walking whereas comparison group participants had taken only antihypertensive drugs without any non pharmacological measures to reduce BP. These findings highlight the importance of regular cardiac walking among patients with hypertension. These findings are substantiated by the study conducted by Lima et al. which revealed that there were immediate 14 mmHg and 12 mmHg reduction in systolic BP and 4 mmHg in diastolic BP after the exercise session for 5 days, which were statistically significant at p <0.001 level [4,5].

This findings of the study were supported by the study conducted by Grassi et al. on the effectiveness of walking exercise program in controlling the BP which revealed that, after walking, there was a mean reduction of 12 mmHg (6,7). A study conducted by <u>Simona Mandini</u> et al (2018) revealed that six months of supervised walking, significantly reduced the systolic blood pressure (p < 0.001), with the maximum reduction of 21.3 mmHg in systolic blood pressure among subjects with baseline Systolic Blood Pressure >160mm Hg and the smallest reduction of 2.6 mmHg among subjects with baseline systolic blood pressure of 120–129 mmHg [8]. Another study conducted by **Stephen mcmullan** et al unveiled that daily Walking

of minimum 30 minutes reduces systolic blood pressure by 4.11 mm Hg (95% CI, 3.01 to 5.22 mm Hg) and diastolic blood pressure by 1.79 mm Hg (95% CI, 1.07 to 2.51 mm Hg) [9]. A meta analysis conducted by <u>Ling-Ling Lee</u> et al also revealed that regular walking of 153 minutes per week reduces the systolic blood pressure by 4.11 mmHg and diastolic blood pressure by 1.79 mmHg among people aged more than 40 years with hypertension. It is evident from these findings that minimum of 30 minutes daily walking reduces blood pressure among individual with hypertension and reduces the risk of complication associated to Hign blodd pressure. It reduces the health health care expenditure and proved to be cost effective measure against high blood pressure .

Conclusion:Blood pressure among patients with hypertension can be maintained within normal limit with cardiac walk along with medical management which will prevent the complications and promote the quality of life. It is a cost effective measure that can be easily practiced by all the individuals.

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