

"Quasi Experimental Study to Assess the Stress Level and Effects of Progressive Muscle Relaxation Exercise on Blood Pressure among Hypertensive Patients Attending Bule Hora Hospital OPD in Bule Hora Town, West Guji Zone, Southern Ethiopia"

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Abstract

Background: Stress is a physiological response to anything that upsets our personal balance. Hypertension is elevation of blood pressure above normal for a period. It is one of the most common health problems in adults and the leading cause of various health issues like cardiovascular disorder and stroke. Progressive muscle relaxation techniques (PMR) significantly reduced patients' perceptions of stress and improved their health. PMR is beneficial for patients with essential hypertension, and nurses can use it to improve their quality of life.

Objective: 1) Assess the level of stress, Blood Pressure and its association with socio-demographic and illness profile variables 2) Assess the effects of progressive muscle relaxation exercise in reducing blood pressure among patients with hypertension.

Materials and Methods: Quasi Experimental design was adopted and simple random sampling techniques were used and about 330 outpatient department (OPD) patients were included with elevated blood pressure. Three sets of standard questionnaires to assess demographic variable, illness profile and stress level. Stress level was assessed by standard scale as perceived Stress scale developed by Cochin in the year 1983 and practiced about Modified Jacobson's (1963) Muscle Relaxation Exercises. Data Analysis used in the study were descriptive statistics like Frequency and Percentage. Inferential statistics like independent 't' test and paired 't' test, Chi-square test, Mann Whitney Test and ANOVA test was done for comparison of means of the blood pressure among 3 different groups of personal habits.

Results: - Perceived stress scale assessment shows that 246 patients (74.54%) had moderate stress, only 9 (2.72%) had severe stress and 75(22.72%) had mild stress. Illness profile assessment shows that majority 91(55.4 %) had family history of Hypertension in experimental group, regarding illness for more than one year was 100 (60.7%) and regular treatment seeking behavior among 100(60.7%) in experimental group. Significant association was found between age and stress level ($\chi^2=15.277$), between personal habits and Blood Pressure level ($\chi^2=10.891$). Effectiveness in reduction of Blood Pressure by Progressive Muscle Relaxation techniques was statistically significant in Systolic Blood Pressure as

(148.39 mm of Hg-139.50 mm of Hg) the mean difference reduction was 8.89 mm of Hg. The “t” value is 7.215. Comparison of mean score of blood pressure by ANOVA among three different groups of personal habits revealed that smoking and alcoholics had association in elevation in diastolic Blood Pressure.

Conclusion: - Old Age, Personal habits like smoking and alcohol has strong association with stress and Blood pressure. The study findings suggest that Progressive Muscle Relaxation techniques had significant effect on systolic blood pressure in hypertensive patients. It has also showed the various responses and views of the subjects like feeling of relaxation, peace and calmness as a result of the relaxation exercises. The investigator strongly urges the health care personnel to adopt relaxation exercise as a non-pharmacological method of treating hypertension.

Key Words: - Progressive Muscle Relaxation, Blood Pressure, Hypertension, Stress Level.

INTRODUCTION

Hypertension is defined as blood pressure that is consistently higher than normal. It is one of the most common health problems in adults and the leading cause of cardiovascular disorders [1]. The etiology of essential hypertension is recognizably linked to stress [2]. Hypertension is a chronic condition of concern due to its role in the causation of coronary heart disease, stroke and other vascular complications, which accounts for 20-50 percent of all deaths [3]. Essential hypertension is the most prevalent form of hypertension accounting for 90% of all cases of hypertension. Hypertension is classified as “secondary” when some other disease process or abnormality is involved in its causation [4]. Complementary therapies that are natural therapeutic treatments include herbal therapy, nutrition therapy, progressive muscle relaxation, meditation, laughter therapy, acupuncture, aroma therapy, and reflexology. Complementary therapies to treat hypertension include progressive muscle relaxation therapy, music therapy, aerobic and yoga aerobics [5]. Jacobson's progressive muscle relaxation is a skill that can be learned and used to reduce or eliminate tension and experience comfort without depending on things or subjects outside of him. Jacobson progressive muscle relaxation can help lower blood pressure in patients with hypertension and also effective in insomnia, asthma, anxiety and stress or tension [6].

NEED FOR THE STUDY

Hypertension is a worldwide health problem that needs to be addressed because it can cause serious harm in both developed and developing countries. According to the World Health Organization (WHO), the prevalence of hypertension cases was 839 million in 2012, and it is expected to rise to 1.15 billion (29%) of the total world population by 2025, in which women (30%) suffering more than men (29 %) [7].

Majority of the study report in Ethiopia shows that the prevalence of Hypertension was from 16.0-28.3% [13-14]. Hypertension related death percentage as 45% and 51% due to heart disease and stroke [8].

Several relaxation techniques for blood pressure management have been studied in recent years, including progressive muscle relaxation (Jacobson, 1939). In well-controlled studies, relaxation resulted in blood pressure reductions of up to 25/16 millimeters of mercury [9]. The progressive muscle relaxation technique can be used as an alternative or complementary treatment to control the rate of hypertension [10].

OBJECTIVE OF THE STUDY

1. Assess the stress level, Blood Pressure and its association with demographic and illness profile variables.
2. Assess the effect of progressive muscle relaxation in reducing blood Pressure among hypertensive patient.

METHODOLOGY OF STUDY:

Study area

Bule Hora is a town in southern Ethiopia located on the paved Addis Ababa to Moyale high way in West Guji Zone of the Oromia region and located 467 km south (fig.1). It has altitude and longitude of 1716 m above sea level. It lies approximately between longitudes 380 15' E and 380 20' E and latitude 50 27' N and 50 32' N in western Guji Zone. Study was conducted in Bule Hora hospital located in Oromia regional state south Ethiopia, which provide health services for a catchment population of approximately 59024.

Study design

Quasi experiment approach, Pretest-posttest control group design was adopted for this study since the investigation is aimed to evaluate the effectiveness of progressive muscles relaxation exercise on elevated blood pressure patient.

Study population

Male and female patients who attended the outpatient department, diagnosed with hypertension in Bule Hora Hospital.

Sample size and Sample size determination

- Sample size is determined using standard formula for single population proportion based on the following assumptions.

$$n = \frac{z \left(\frac{\alpha}{2} \right)^2 * P(1 - p)}{d^2}$$

- **Where;**
- **n**= the desirable calculated sample size
- **Z (a/2)** =1.96 (95% confidence level of the survey)
- **P** = estimated proportion of target population from previous study is 25.1% in 2020 [11].
- **d** = degree error tolerated (5%)

From Formula, no= (1.96)² (0.251) (1-0.251)/ (0.05)²=299

The minimum sample size for this study was **330** by adding 10% non-response rate.

Sampling Technique

By reviewing outpatient entry record, the maximum regular hypertensive follow up cases were approximately 500 patients per month. Sample was composed of all male and female patients between the age of 25-65 years were included as who approached the out patients department of general medicine with elevated blood pressure.

Simple random sampling method was used to select the subjects. Even numbers were given to the control group and odd numbers for the experimental group. Based on the above classification experimental group had 165 and control group had 165 samples.

Intervention to Experimental Group: - (Training of PMR)

The investigator developed a good rapport with all the subjects. They were interviewed in-order to collect demographic data and illness profile data. Their stress levels also were assessed by using Perceived Stress Scale. The investigator personally checked the blood pressure of the subjects. The investigator explained about relaxation exercises to the experimental group and made sure that they understood progressive muscle relaxation by doing once with the investigator and repeated them 3 times over a period of 20-25 minutes. Initial blood pressure measurements (pre-test) are performed every time before progressive muscle exercises, as well as the final post-test blood pressure measurements performed after each progressive muscle workout. For the control group the investigator checked blood pressure and collected demographic data, illness profile data and level of stress were assessed and no exercise were taught to them. The first respondent will be treated as the treatment group until 25 people are reached, then the next 25 people will be the control group, with in consecutive days the same procedure were followed to obtain desired sample size for this study.

Description of Tool and Scoring Procedure

Development of tool

Three sets of questionnaires were developed to assess demographic variable, illness profile and stress level.

The level of stress was assessed by using perceived stress scale developed by Cochlin (1983) [12]. It is a standard free scale consisting of 10 questions to assess the level of stress. Subjects were asked to rate their level of stress along the 5 point scale. The data was collected by self-administered questionnaire method.

The score allotted were as follows:

Never	-	0
Almost never	-	1
Sometimes	-	2
Fairly often	-	3
Very often	-	4

Reverse scoring was done for positively stated items namely (4, 5, 7, and 8). The score for each subject was calculated and further categorized as follows:

0 - 13	-	mild stress
14 - 27	-	moderate stress
28 - 40	-	severe stress

Finally a check list was used to record systolic and diastolic blood pressure. This data was not scored. Based on the high blood pressure Modified Jacobson's (1963) Muscle Relaxation Exercises were adopted to check out effectiveness [13].

Results:-

Socio-demographic variables

Table1

Demographic Variables	Experimental Group (n= 165)		Control Group (n=165)	
	No	%	No	%
Age				
25-35	18	10.7	18	11.1
36-45	47	28.6	28	16.7
46-55	62	37.5	67	40.7
56-65	38	23.2	52	31.5
Gender				
Male	106	64.3	89	53.7
Female	59	35.7	76	46.3
Education				
Illiterate	18	10.7	24	14.8
Primary	29	17.9	15	9.3
Secondary	44	26.8	86	51.9
Graduate	56	33.9	28	16.7

Post Graduate	18	10.7	12	7.4
Occupation				
Laborer	41	25	52	31.5
Sedentary	29	17.9	18	11.1
Business	12	7.1	9	5.6
Retired	12	7.1	12	7.4
Others	71	42.9	73	44.4

Table 1 shows the distribution of subjects with regard to demographic variables. It was seen that between 46 - 55 years age group 62 (37.5%) were in experimental group and in control it was 67 (40.7%). Among 330 subjects 106(64.3%) were males in experimental group and 89(53.7%) were males in control group, 56(33.9%) were graduate in experimental group and 86(51.9%) had secondary school education in control group. In experimental group 71(42.9%) and in control group 73(44.4%) where in the group of others which included teachers, housewife's and unemployed individuals.

Table 2
Illness profile variables:-

Illness Profile	Experimental Group (n= 165)		Control Group (n=165)	
	No	%	No	%
Family History of H.T				
Parents	91	55.4	70	42.6
Sibling	6	3.6	12	7.4
None	68	41.1	83	50.0
Personal habits				
Smoking	32	19.6	40	24.1
Alcohol	6	3.6	6	3.7
Nonsmokers /Non alcoholics	127	76.8	119	72.2
Duration of illness				
Less than 6 months	50	30.4	52	31.5
6-12 months	15	8.9	24	14.8
More than 12 months	100	60.7	89	53.7
Classification of the severity of illness				
Mild	106	64.3	104	63
Moderate	47	28.6	37	22.3
Severe	12	7.1	24	14.8
Treatment taken				
Regular	100	60.7	83	50.0

Irregular	24	14.3	34	20.4
None	41	25	49	29.6

Table 2. shows the distribution of subjects with regard to illness profile 91 (55.4%) subjects in the experimental group stated that their parents had hypertension. 83 (50%) of the subjects from control group reported that they have no family history of hypertension. 32 (19.6%) from experimental group and 40 (24.1%) from control group had the habit of smoking. 127 (76.8%) in experimental and 119 (72.2%) in control group were nonsmokers/Non alcoholics. 100 (60.7%) from experimental group and 89 (53.7%) were having hypertension for more than 12 months. In experimental group 106 (64.3%) and in control group 104 (63%) had mild hypertension. 100 (60.7%) in experimental group and 83 (50%) in control group said that they were taking medicines regularly.

Table 3

Association between level of stress and selected socio-demographic variables

Demographic Variables	Total No (330)	Stress			X ²
		Mild	Moderate	Severe	
Age					
25-35	36	9	21	6	
36-45	75	27	45	3	15.277*
46-55	129	21	108	0	
56-65	90	18	72	0	
Gender					
Male	195	57	135	3	
Female	135	18	111	6	4.382
Occupation					
Laborer	93	24	66	3	
Sedentary	21	9	12	0	
Business	48	15	33	0	5.243
Retired	24	6	18	0	
Others	144	21	117	6	
Education					
Illiterate	42	12	30	0	
Primary	45	12	36	3	7.477
Secondary	129	18	108	3	
Graduate	84	30	51	3	
Post Graduate	30	9	21	0	

*statistically significant at p<0.05) level

Above table depicts that there is statistically significant association between age and stress as the p value <0.05. Other demographic variables do not have significant association with stress.

Table 4:-
Association between levels of stress with illness profile

Illness Profile	Total No(330)	Stress			χ^2
		Mild	Moderate	Severe	
<i>Family History</i>					
Parents	162	105	39	18	
Sibling	18	15	0	3	2.677
None	150	90	45	15	
<i>Personal Habits</i>					
Smoking	72	27	45	0	
Alcohol	12	0	12	0	5.483
Non Smoker/Non Alcoholic	246	48	189	9	
<i>Duration of illness</i>					
<6 months	102	21	75	6	
6-12 months	39	0	36	3	8.741
More than 12 months	189	54	135	0	
<i>Classification of severity of illness</i>					
Mild	210	45	156	9	
Moderate	84	21	63	0	1.859
Severe	36	9	27	0	
<i>Treatment Taken</i>					
Regular	183	42	138	3	
Irregular	57	18	39	0	3.751
None	90	15	69	6	

Table 4 depicts that there is no statistically significant association between illness profile and stress as the $p > 0.05$.

Table 5:
Association between Blood pressure level and socio-demographic variables

Demographic Variables	Total No (330)	Blood Pressure			χ^2
		Mild	Moderate	Severe	
<i>Age</i>					

25-35	36	24	12	0	
36-45	75	45	24	6	3.293
46-55	129	81	30	18	
56-65	90	60	18	12	
Gender					
Male	195	114	54	27	
Female	135	96	30	9	
Education					
Illiterate	42	36	3	3	
Primary	45	27	15	3	9.170
Secondary	129	75	36	18	
Graduate	84	57	15	12	
Post Graduate	30	15	15	0	
Occupation					
Laborer	93	54	27	12	
Sedentary	48	33	12	3	
Business	21	6	6	9	10.380
Retired	24	18	6	0	
Others	144	99	33	12	

Table 5 shows that there is no statistically significant association between demographic variables and blood pressure as $P > 0.05$.

Table 6:-
Association between BP levels with illness profile

Illness Profile	Total No	Blood Pressure			χ^2
	(330)	Mild	Moderate	Severe	
Family History					
Parents	162	105	39	18	
Sibling	18	15	0	3	2.677
None	150	90	45	15	
Personal Habits					
Smoking	63	42	15	15	
Alcohol	12	0	9	3	10.891*
Nonsmoker/Non Alcoholic	246	168	60	18	
Duration of illness					
< 6 months	102	66	27	9	
6-12 months	39	18	18	3	3.942
More than 12 months	189	126	39	24	
Treatment taken					
Regular	183	117	42	24	
Irregular	57	36	15	6	1.171

None	90	57	27	6	
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*statistically significant at $p < 0.05$ level

Table 6 depicts that there is statistically significant association between personal habits and blood pressure p value < 0.05 . No other variables in the illness profile have statistically significant association with blood pressure.

Table 7

Comparison of mean scores of blood pressure levels among three different groups of personal habits (smoking, alcoholics, and nonsmokers/non alcoholics)

Table shows there	Blood Pressure	Mean Score	7 that is a
	Pre- Systolic BP. between groups	642.620	
	Within groups	365.987	
	Pre- Diastolic BP between groups	562.253	
	Within groups	110.708	

significant difference in the mean scores of Diastolic BP between the personal habits groups. Hence, there exists an association between the Diastolic BP and personal habits (like smoking and drinking alcohol).

Table 8

Statistical Analysis (comparison) between Pre Test and Post Test Measurement of Blood Pressure, After Muscle Relaxation Exercises in Experimental and Control Group

Blood Pressure	Experimental	Mean Differ	Control	Mean Differ	T value
	Mean $\pm$ S.D		Mean $\pm$ S.D		
Pre Test Systolic Blood Pressure	148.39 $\pm$ 17.550	8.89	153.15 $\pm$ 20.780	6.96	7.215*
Post Test Systolic Blood Pressure	139.50 $\pm$ 15.194		146.19 $\pm$ 19.046		
Pre Test Diastolic Blood Pressure	96.21 $\pm$ 10.428	2.64	97.15 $\pm$ 11.463	3.71	1.444
Post Test Diastolic Blood Pressure	93.51 $\pm$ 17.072		93.44 $\pm$ 13.645		

*Statistically significant

Table 8 shows that there is statistically significant reduction ($P < .05$) in systolic blood pressure in experimental group after relaxation exercises, compared to control group. There is no statistically significant reduction in the diastolic blood pressure between both groups as the p value is > 0.05

Discussion:-

The study mean pretest systolic blood pressure in experimental group was 148.39mmHg and mean posttest systolic blood pressure was 139.50mmHg with a mean difference of 8.89mmHg and posttest diastolic blood pressure mean difference is 3.71mmHg. So there is a significant reduction in the systolic blood pressure after relaxation exercise. A similar study result shows that average BP with muscle relaxation technique counted as many as 152.44 mmHg and blood pressure with progressive muscle relaxation technique therapy was 142.14 mmHg. The average of blood pressure shows a decrease of 10.30 mmHg. The study result concluded that Progressive muscle relaxation exercise effective in reducing BP in hypertensive client [10]. Another study in Taiwan, quasi-experimental design, recruited a convenience sample of 40 subjects from a hypertension outpatient clinic. Twenty subjects received PMR training once a week and practiced at home daily for 4 weeks. PMR training had an immediate effect, reducing pulse rate 2.35 beats/min, systolic blood pressure 5.44 mm Hg, and diastolic blood pressure 3.48 mm Hg. [14] A study done in Iran, shows that in experimental group reduced mean systolic and diastolic blood pressure after the intervention which were significantly lower than control group ($p < 0.001$) and the study result concluded that the Progressive muscle relaxation (PMR) will cause reduce blood pressure in MI patients with essential hypertension.[15]

The study association report shows that level of stress and age ($\chi^2 = 15.277$) and Blood Pressure level and personal habits ($\chi^2 = 10.891$) had significant association at $p < 0.05$ level. A similar study supporting that lifetime cigarette smoking was significantly associated with hypertension (1.89[1.04, 3.45]) [15]. Alcohol may increase BP by a different mechanism, such as by increasing: the sympathetic nervous system, cortisol, renin, calcium, angiotensin II, norepinephrine, and decreasing baroreceptor response [16]. Drinking alcohol cause decreases the anti-hypertensive effect of medications [17].

The study result shows that 82 (74.54%) subject out of the total 106 experienced moderate stress. 25 (22.72%) experienced mild stress and only 3 (2.72%) subjects experienced severe stress. Another study support that the prevalence of hypertension associated with stress in India is about 3 million (30%) people approximately and it may keep on increasing in status [18].

Conclusion:-

The study suggests that relaxation exercise had significant effect on systolic blood pressure in hypertensive patients. It has also showed the various responses and views of the subjects like feeling of relaxation, peace and calmness as a result of the relaxation exercises. Subjects were eager to do regular exercise in future as they found it useful and easy to perform. The investigator strongly urges the health personnel to adopt relaxation exercise as a non-pharmacological method of treating hypertension. And nurses who are considered as the

primary health care professionals, we have the immense responsibility to educate our patients regarding the importance and practice of progressive muscle relaxation exercise.

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