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Effectiveness of Progressive Muscle Relaxation on Blood Pressure and Quality of Life in Hypertensive and Normotensive Subjects

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Abstract: ***A quasi-experimental study, to know the effectiveness of progressive muscle relaxation on blood pressure and quality of life in essential hypertensive and normotensive subjects, was done with 20 hypertensive subjects divide to two groups A_1 & A_2, 10 normotensive subjects in group B. Progressive muscle relaxation technique was taught to the subjects in group A_2 & B. They were asked to perform it twice daily for a period of 10 weeks. Measurement blood pressure and quality of life was taken baseline and after 10 weeks. The data was analyzed using paired 't' test for within group analysis and independent 't' test for analysis between groups A_1 & A_2 at 5% level of significance. Result: The analysis within groups showed significant reduction blood pressure in groups A_1 & A_2, no significant change in group B, and no significant change in quality of life in group A_1 and significant change in domain I & II of quality of life in group A_2 & B. The between group analysis showed no significant difference in pre-test values of blood pressure and quality of life, the post-test values of blood pressure showed significant difference. But no significant difference post-test values of quality of life. Conclusion: Progressive muscle relaxation can be used as an adjunct treatment to treat essential hypertension***

Keywords: Progressive muscle relaxation, hypertensive, quality of life

1. Introduction

Hypertension is one the major potentially modifiable risk factors for cardiovascular diseases and death. Hypertension is ranked as fourth top most disease on the basis of its prevalence [21]. It affects approximately one billion individuals worldwide [15].

Preventing and controlling hypertension is one of the most cost effective strategies to reduce global burden of cardiovascular disease in the general population. Reducing systolic blood pressure by just 3 mmHg in general population has the potential to reduce stroke mortality by 8% and coronary heart disease by 5% [3].

In India, the prevalence of hypertension in adult population varies from 3 to 10% and the average figure is 4.8%. The population at risk above the age of 20years is 330 million as per 1981 population figures[15].It is a major health problem and biggest of the challenges of the 21st century. Since many individuals who suffer from hypertension do not have specific symptoms related to their elevated blood pressure, so it is often called as the silent killer disease [8].

Essential, primary or idiopathic hypertension is defined as high blood pressure in which secondary causes such as renovascular diseases, renal failure, pheochromocytoma, aldosteronism or other causes of secondary hypertension are not present.

Essential hypertension accounts for 95% of all cases of hypertension [26].It is a heterogeneous disorder, with different patients having different causal factors that lead to high blood pressure, it is also greatly influenced by diet and lifestyle.

World Health Organization recommended the use of non-pharmacological approaches in the treatment of hypertension. Various non-pharmacological measures includes life style modification, weight reduction, regular physical exercises, cessation of smoking, tobacco use cessation, increase in intake of fruits and vegetable, reduction in alcohol, sodium intake and potassium supplementation.

Lifestyle changes include changes that need to be made before initiating, or in addition to pharmacologic treatment. These changes protect individuals from hypertension, prevent the advancement of hypertension in its initial stages and support treatment. Implementing lifestyle changes can also decrease the number and dosage of antihypertensive medications, many of which have side effects, thereby preventing complications. Another lifestyle risk factor that has been shown to contribute to high blood pressure is psychosocial stress. In 2007 Canadian Hypertension Education Program recommends considering stress reduction intervention for normotensive and hypertensive patients [22]

Relaxation training is often viewed as one component of a more comprehensive package of stress management. Reducing stress can lower high blood pressure. Relaxation is an active process involving technique that clams body and mind. Progressive relaxation technique is a well-known and widely practiced technique for reducing stress, anxiety and depression, there by reduction in blood pressure. Progressive relaxation technique consists of a physical and mental component. The physical component involves tensing and relaxing the muscle groups voluntarily. The mental component focuses on the differences between the feeling of muscle at its states of tension and relaxation.

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2. Methodology

Aim: To study the effectiveness of progressive relaxation technique on systolic and diastolic blood pressure and quality of life in mild hypertensive.

Objectives

- To find out the effect of progressive muscle relaxation on systolic and diastolic blood pressure and quality of life in hypertensive.
- To know the effect of progressive muscle relaxation on systolic and diastolic blood pressure and quality of life in normotensive.
- To compare the effect of progressive muscle relaxation verse conventional management on systolic and diastolic blood pressure and quality of life between hypertensive groups

Study design: Quasi experimental study

Sampling technique: Purposive sampling technique

Sample size: 20 hypertensive subjects divide into two groups A_1 and A_2 and 10 normotensive subjects in group B

Inclusion criteria

- Cooperative
- Age between 35 and 55 years.
- Systolic blood pressure over 140mmHg/ Diastolic over 90mmHg.
- With antihypertensive medications.

Exclusion criteria

- Diabetes mellitus
- Chronic liver disease
- Endocrine disease

Study method

Consent for participation, initial assessment and record of blood pressure was done using Sphygmomanometer and quality of life using WHOQOL-BREF questionnaire. Progressive muscular relaxation was taught to the subjects in group A_2 and B, and was asked to perform once in supervision. These subjects has be provided with a leaflet containing instruction of the technique and they were asked to perform twice daily over a period of 10 weeks. After 10 weeks blood pressure measurement and quality of life questionnaire was taken as with the same protocol as done for initial assessment.

Progressive muscle relaxation:

- The subject was made to sit on a chair with back and hands supported comfortably.
- The surrounding should be quite and ventilated.
- The subject was instructed to close eyes and focus attention on a given muscle group and not to hold breath during exercise.
- The subject was asked to concentrate and feel the difference between the states of tension and relaxation.

The subject was asked to contract the following muscle groups sequentially

1) Make a fist with the dominant hand without involving the upper arm.
2) Push the elbow of the same arm down against the arm of the chair, while keeping the hand relaxed.
3) Make a fist with the non-dominant hand without involving the upper arm.
4) Push the elbow of the non-dominant arm down against the arm of the chair, while keeping the hand relaxed.
5) Raise the eyebrows.
6) Screw up the eyes and wrinkling the nose.
7) Clench the teeth and pull back the corners of the mouth
8) Pull the chin down and press the head back, tensing the neck muscles
9) Draw the shoulders back
10) Tighten the abdominal muscles
11) Tense the thigh of the dominant leg by contracting the knee flexors and extensors together.
12) Point the dominant foot down.
13) Pull the dominant foot up.
14) Tense the thigh on the non-dominant leg by contracting the knee flexors and extensors together.
15) Point the non-dominant foot down.
16) Pull the non-dominant foot up

At the end of the session the subject was asked to move feet and legs slowly, bend and stretch the arms and hands, move the head slowly and to open the eyes slowly

3. Results

The statistical analysis were done using paired ‘t’ test and independent ‘t’ test.

Table 1 shows the paired t test analysis of blood pressure for group A_1, A_2, B.

In group A_1 systolic blood pressure, calculated ‘t’ value was 4.00, which is greater than the table ‘t’ value of 2.262, there is significant difference between the pre-test and post -test values. Diastolic blood pressure the calculated ‘t’ value was 3.28, which is greater than the table ‘t’ value of 2.262,there is significant difference between the pre-test and post -test values.

In group A_2 systolic blood pressure the calculated ‘t’ value was 19.89 which is greater than the table ‘t’ value of 2.262, there is significant difference between the pre-test and post -test values. Diastolic blood pressure the calculated ‘t’ value was 7.36, which is greater than the table ‘t’ value of 2.262,there is significant difference between the pre-test and post-test values.

In group B Systolic blood pressure the calculated ‘t’ value was 1.79 which is lesser than the table ‘t’ value of 2.262. Therefore there is no significant difference between the pre-test and post -test values. Diastolic blood pressure the calculated ‘t’ value was 0.89 which is lesser than the table ‘t’ value of 2.262. Therefore there is no significant difference between the pre-test and post-test values

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Table 1: Paired 't' test analysis of blood pressure

Paired 't'test		Group A_1		Group A_2		Group B	
		SBP	DBP	SBP	DBP	SBP	DBP
Mean value	Pre-test	145.7	93.6	145.8	93.2	121.8	80.8
	Post-test	144.9	92.9	141.4	90.5	120.8	80.5
Calculated 't' value		4.00	3.28	19.89	7.36	1.79	0.89
Table 't' value		2.262					
P value		P value < 0.05				P value > 0.05	

Table 2 *shows* paired 't' test of quality of life for group A_1, A_2, B

In group A_1 the calculated 't' value for domain I, II, III & IV was 1.50, 1.49, 1.0 & 0.56 respectively, which is lesser than the table 't' value of 2.262. Therefore there is no significant difference between the pre-test and post -test values in quality of life.

In group A_2 the calculated 't' value for domain I, II, III & IV was 3.66, 2.52, 1.12 & 1.50 respectively, domain I & II values is greater than and domain III & IV is lesser than the table 't' value of 2.262. Therefore there is significant difference between the pre-test and post-test values in domain I & II and there is no significant difference between the pre-test and post-test values in domain III & IV of quality of life.

In group B the calculated 't' value for domain I, II, III & IV was 2.33, 2.98, 1.84 & 0.99 respectively, domain I & II values is greater than and domain III & IV is lesser than the table 't' value of 2.262. Therefore there is significant difference between the pre-test and post-test values in domain I & II and there is no significant difference between the pre-test and post-test values in domain III & IV of quality of life.

Table 2: Paired 't' test analysis of quality of life of group A1

Paired 't' test		Group A_1				Group A_2				Group B			
WHOBREF-QOL domains		I	II	III	IV	I	II	III	IV	I	II	III	IV
Mean value	Pre-test	51.40	49.40	67.40	60.80	52.50	50.70	61.80	63.90	64.0	68.20	73.20	72.80
	Post-test	52.60	50.70	68.60	61.40	56.20	54.22	63.30	65.10	68.20	71.40	75.90	74.50
Calculated't' value		1.50	1.49	1.0	0.56	3.66	2.52	1.12	1.50	2.33	2.98	1.84	0.99
Table 't' value		2.262											
P value		P value> 0.05				P value <0.05		P value >0.05		P value <0.05		P value >0.05	

Table 3 shows independent 't' test of blood pressure between group A_1 and A_2.

In pre-test systolic blood pressure the calculated 't' value was 0.629 and diastolic blood pressure calculated 't' value was 0.323 which is lesser than the table 't' value of 2.101. Therefore there is no significant difference in pre-test values of systolic and diastolic blood pressure between two groups. In post-test the calculated 't' value for systolic blood pressure was 2.352 and diastolic blood pressure was 2.239 which is greater than the table 't' value of 2.101.There is significant difference in post-test values of systolic and diastolic blood pressure between two group

Table 3: Independent 't' test analysis of blood pressure

Independent 't' test		Pre- test		Post-test	
		SBP	DBP	SBP	DBP
Mean value	Group A_1	145.7	93.6	144.9	92.9
	Group A_2	145.8	93.2	141.4	90.5
Table 't' value		2.101			
Calculated 't' value		0.629	0.323	2.352	2.239
P value		P value > 0.05		P value < 0.05	

Table 4 shows independent 't' test of quality of life between group A_1 and A_2

In pre-test, the calculated 't' value for domain I, II, III & IV was 0.342, 0.454,1.211 & 0.829 respectively was is lesser than the table 't' value of 2.101.Therefore there is no significant difference in pre-test values of quality of life between two groups.

In post-test, the calculated 't' value for domain I, II, III & IV was 1.198, 0.075, 1.176 & 0.9071 respectively was is lesser than the table 't' value of 2.101.Therefore there is no significant difference in post-test values of quality of life between two groups.

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Table 4: Independent 't' test analysis of quality of life

Independent 't' test		Pre-test				Post-test			
WHOBREF-QOL domains		I	II	III	IV	I	II	III	IV
Mean value	Group A_1	51.40	49.40	67.40	60.80	52.60	50.70	68.60	61.40
	Group A_2	52.50	50.70	61.80	63.90	56.20	54.22	63.30	65.10
Calculated 't' value		0.342	0.454	1.211	0.829	1.198	0.975	1.176	0.907
Table 't' value		2.101							
P value		P value> 0.05							

4. Discussion

Hypertension is the disease, which causes multi system involvement. It poses severe risk factors on various diseases. Current treatment guidelines for hypertension include antihypertensive medications and health-promoting lifestyle modifications.

The antihypertensive medications and lifestyle modifications successfully reduce blood pressure to optimal levels. However, despite the effectiveness of antihypertensive medication, adherence to medication regimens is often poor and interferes with the goal of reducing blood pressure. In addition, hypertensive medications can produce troublesome side effects such as insomnia, sedation, dry mouth, drowsiness, impotence, and headaches [5].Due to difficulty adhering, side effects, and prescription drug costs, hypertensive individuals may desire a nonpharmacologic intervention to avoid or complement their antihypertensive medication regimen. Therefore, whereas continued improvement in pharmacologic treatments is necessary, these advancements must be complemented by nonpharmacological approaches to blood pressure control.

The paired 't' test results of blood pressure showed significant difference in group A_1 and A_2. The difference is due to the antihypertensive medication in group A_1, and in group A_2 is due to progressive relaxation training and antihypertensive medication. But there is no significant difference in group B as the blood pressure level is optimal, so progressive relaxation training does not lower blood pressure as it does in hypertensive. The quality of life was assessed using four domains physical health, psychological, social relationships and environment. The paired 't' test results of quality of life in group A_1 showed no significant difference in all the four domains, group A_2 showed significant difference in physical health and psychological domains but no significant difference in social relationships and environment domains, group B showed significant difference in physical health and psychological domains but no significant difference in social relationships and environment domains.

The independent 't' test result showed insignificant difference in pre-test values of blood pressure and quality of life which suggest that group A_1 and A_2 have almost same values of blood pressure and quality of life.

The independent 't' test result of post-test values showed significant difference in blood pressure, which suggest that blood pressure in group A_2 has been reduced, this could be due to the effect of progressive relaxation training that involves physical and mental components in form of tensing and relaxing of muscle groups and focusing the difference between the feelings of the tension and relaxation.

The main idea of initiating the relaxation response in this way is to take control of the voluntary muscles through creation of tension in them, followed by forcing them into a state of relaxation. When the body is aware of the presence of the tension, it will respond by triggering the muscles to relax, where the rest of the other components of the relaxation response will naturally follow. Further, it is believed that blood pressure may accompany anxiety; one can reduce anxiety by learning how to relax the muscular tension, but no significant difference was observed in any of the domains of quality of life.

Chesney et al observed that individuals with higher baseline blood pressures tend to benefit more from relaxation therapy than individuals with lower baseline blood pressures.[6]

Stewart et al suggest that progressive relaxation training does not automatically lead to blood- pressure lowering. Apparently cognitive processes can interfere with or promote the blood-pressure-lowering effect of muscle relaxation [30].

This study found systolic blood pressure decline of 3.5 mmHg and diastolic blood pressure decline of 2.4 mmHg in hypertensive subjects when compared between the hypertensive groups, within the relaxation group in hypertensive showed decline of 4.4 mmHg in systolic blood pressure and 2.7 mmHg in diastolic blood pressure and in normotensive systolic blood pressure decline of 1mmHg and diastolic blood pressure decline of 0.3 was noted after 10 weeks of progressive relaxation training.

A 2008 review of evidence for relaxation for high blood pressure found some evidence that progressive muscle relaxation lowered blood pressure a small amount. However, the review found no evidence that this effect was enough to reduce the risk of heart disease, stroke, or other health issues due to high blood pressure [11].Thus the relaxation technique is a method of reducing blood pressure but did not return blood pressure to normal levels. This study suggests that progressive relaxation training can be used as an adjuvant therapy.

5. Conclusion

This study aimed at finding the effect of progressive relaxation training on blood pressure and quality of life in essential hypertensive and normotensive subjects.

This study found that progressive relaxation training has lowered the blood pressure in hypertensive group and there

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no marked reduction in blood pressure in normotensive group. The paired 't' test found improvement in domain I (physical health) & II (psychological) of quality of life in hypertensive and normotensive who received training.

Thus, progressive relaxation training can be used as an adjunct treatment to treat essential hypertension and can be practiced to reduce stress. The main advantage is that the technique is simple and easy to use, does not require any equipment.

6. Future Scope

- Studies can be done with larger sample.
- Further follow-up and assessment can be done to know the long term effects of progressive relaxation training on blood pressure and quality of life.
- Progressive relaxation training and other methods of relaxation can be compared.
- Studies can be done with progressive relaxation training along with walking and breathing exercise.
- Other classifications of blood pressure can be studied.

References

[1] Aivazyan T A et al; Effects of relaxation techniques in hypertensive patients, Health psychology; 1988, 7 Suppl: 193-200.
[2] Alparslan et al; Effects of walking and relaxation exercises on controlling hypertension, Journal of the Australian traditional-medicine society; 2010, Vol.16 Issue.
[3] Appel L J; Lifestyle modification as a means to prevent and treat high blood pressure, J Am SocNephrol, 2003, 14 (7), S99-S102.
[4] Bombardier C. et al; Clinical Approach to Hypertension. Harvard publication, 2000, 43,1520-1528.
[5] Carly M G, Richard J, Susan X, Joel W H;Current perspectives on the use of meditation to reduce blood pressure, international journal of hypertension,2012.
[6] Chesney M.A, D.M. Williams, Y. Ding, and A. P. Shapiro; Relaxation therapy for hypertension: design effects and treatment effects, Annals of Behavioral Medicine, 1991, vol. 13, no. 1, pp. 5–17.
[7] Cheung Y L Derib T H et al; Progressive relaxation improves anxiety and stress levels in colorectal cancer patients after surgery, Journal of psychooncology, 2007, 23, 734-739.
[8] Contractor A; Role of exercise in prevention and treatment of hypertension. Hypertension India, 2002, 18(3), 52-63.
[9] David Zieve, MD, MHA, and David R. ; Eltz. Solutions Acupuncture, a private practice specializing in complementary and alternative medicine, AZ. Review provided by VeriMed Healthcare Network, Phoenix. 2006;20(1):46-51
[10] Davison, G., Williams, M., Nezami, E., Bice, T. & Dequattro, V; Relaxation, reduction in angry articulated thoughts and improvements in borderline hypertension and heart rate. Journal of Behavioral Medicine, 1991, 14, 453-468.
[11] Dickinson H, Campbell F, Beyer F, Nicolson Dj, Cook J, Ford G, Mason J; Relaxation therapies for the management of primary hypertension in adults: a Cochrane review. J Hum Hypertens, 2008, 22 (12):809-20.
[12] Dr. Mateus C Laterza; Exercise training helps control blood pressure, Hypertension journal, 2007, 58-62.
[13] European Society of Hypertension- European Society of Cardiology guidelines for the management of arterial hypertension, Journal of hypertension, 2003, 21:1011-1053.
[14] Gerald C et al; Relaxation, reduction in angry articulated thoughts, and improvements in borderline hypertension and heart rate, Journal of behavioral medicine, 1991, Vol.14,No.5.
[15] Gupta R; Hypertension in Indian scenario, Hypertension India, 2002, 15(1), 5-12.
[16] Herbert Benson; The Hand Book of Relaxation.
[17] Iris B Goldstein et al; Home relaxation techniques for essential hypertension, psychosomatic medicine, Vol.46, No.5 1984.
[18] Issac et al; Muscle relaxation and continuous ambulatory blood pressure in mild hypertensive, Psicothema, 2002, Vol. 14, 47-52.
[19] Jamshid Najafian et al; A study of the effect of relaxation and biofeedback-assisted relaxation on patients with mild hypertension, ARYA journal, 2006, 1(3): 178- 182.
[20] Johnston, D.W; Stress management in the treatment of mild hypertension. Hypertension, 1991, 17(suppl III), III63-III68.
[21] Khadikar HA, Ghattargi CH, Thite GH; Study of prevalence of hypertension and sociodemographic factors in a rural community of Maharashtra, South Asian journal of preventive cardiology, 2004, 8(4), 205-210.
[22] Khan N, Hemmelgarn B, Padwal R; The 2007 Canadian hypertension education program recommendations for the management of hypertension: part2-therapy, Can J Cardiol, 2007,23,539-550.
[23] Khanna A et al; A study to compare the effectiveness of GSR biofeedback training and PMRT in reducing blood pressure and respiratory rate among highly stressed individuals, J PHYSIOL PHARMACCOL 2007;51(3): 296-300.
[24] Nisha Shinde, et al. Immediate effect of Jacobson's Progressive Muscular Relaxation in Hypertensive, Sch.J. App. Med. Sci.,2013;1(2):80-85.
[25] Nola J et al; Physiologic responses of clients with essential hypertension to progressive muscle relaxation training, 2007, J Nurs Sch; 25(3).
[26] Oscar A C, Suzanne O; Clinical cardiology: New Frontiers, Circulation, 2000, u101, 329-335.
[27] Pender N J et al; Effects of progressive muscle relaxation training on anxiety and health locus of control among hypertensive adults, Research in nursing and health, 8, 67-72.
[28] Raina et al; Do snack of exercise lower blood pressure, The New Zealand medical journal, 2006,119: 1-9.
[29] Ranjbar F et al; Relaxation therapy in the background of standard antihypertensive drug treatment is effective in management of moderate to severe essential hypertension, Rawal medical J 2007; 32: 120-124.

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[30] Robert H F et al; Effects of exercise on blood pressure control in hypertensive patients, European journal of cardiovascular prevention and rehabilitation, 2007, 14: 12-17.
[31] Schneider H R et al; A randomized controlled trail of stress reduction for hypertension in older African Americans, Am J Hypertension, 2005, 18(1).
[32] Sheu S et al; Effects of progressive muscle relaxation on blood pressure and psychological status for clients with essential hypertension in Taiwan, HNP 2003,17(1).
[33] Shomaker J E et al; The effects of muscle relaxation on blood pressure of essential hypertension; Behavioral research and therapy, 1976,Vol. 13, Issue.1.
[34] Sloman W Edmilson J N et al; Effect of progressive relaxation training and guided imagery on physical performance in breast cancer patients, 95, 528-535, 2006.
[35] S M Skevington et al; The World Health Organization's WHOQOL-BREF quality of life assessment: psychometric properties and results of international field trial. A report from the WHOQOL group, Quality of life research, 2004,13(2):299-310.
[36] Subhash M Khatri, et al. Effectiveness of Jacobson's Relaxation Technique in Hypertension. International Journal of Health Sciences and Research, 2011; Vol.01; Issue 02.
[37] Tahereh D, Heidarnia A, Ramezankhani A, Sadeghian S, Ghofranipour F; Effect of progressive relaxation improves states of stress and quality of life in patients after CABG, Indian journal of medical research 129, 603-608, 2009.
[38] Tasto D L et al; The effects of muscle relaxation and stress on the blood pressure levels of normotensive, Behaviour research and therapy, 1976, Vol 14, Issue1.
[39] Telles S, Vempati R P ; Yoga based guided relaxation reduces sympathetic activity in subjects based on baseline levels, Psychological Reports,2002, 90: 487–494.
[40] Tom Baster; Exercise and Hypertension, Australian family physician, 2005, 34, 419-423.
[41] Varogli L, Darviri C; Stress management techniques: evidence-based procedures that reduce stress and promote health; Health science journal, 2011, Vol.5. Issue.2.
[42] W. Stewart Agras, Michael Horne, C. Barr Taylor; Expectation and the blood pressure lowering effects of relaxation, Psychosomatic Medicine, 1982, 44, 389-395.
[43] Wadden T A et al; Relaxation therapy for essential hypertension: specific or nonspecific effects; Journal of psychosomatic research, 1984, Vol.28. Issue.1.
[44] Yeligar R R et al; The most reliable approach to kill 'a silent killer', IJPSR 2010, July, 18 (1-3).
[45] Yoo H J Ahn S H et al; Progressive relaxation reduces chemotherapy side effects in breast cancer patients, Eur j of cancer, 42, 273-278, 2002.
[46] Yung P et al; Relaxation training as complimentary therapy for mild-hypertensive control and implications of evidence-based medication; Complimentary therapies in nursing and midwifery, 2001, Vol.7, Issue.2

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