



## RESEARCH ARTICLE

### EFFECT OF AUTOGENIC RELAXATION TRAINING COMBINED WITH AEROBIC EXERCISE ON POSTMENOPAUSAL HYPERTENSION AND STRESS

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#### ABSTRACT

**Objectives:** This study was conducted to determine if autogenic relaxation training combined with aerobic exercise have more effect than aerobic exercises alone on postmenopausal hypertension and stress. **Methods:**Forty five postmenopausal women diagnosed with hypertension and stress, they were selected randomly from outpatient clinic of obstetrics and gynecology in Zagazig general hospital, their age ranged from 45 to 55 years old and their body mass index didn't exceed 35kg/m<sup>2</sup>, the participants were assigned into three groups of equal numbers. Group (A) received Captopril 25mg twice daily for 6 weeks, while group (B) received Captopril 25 mg twice daily in addition to aerobic exercises for 30minutes/session, 3times/week for 6 weeks. Group (C) received Captopril 25 mg twice daily in addition to aerobic exercises for 30minutes/session and autogenic training for 20 minutes 3times/week for 6 weeks. All participants were evaluated by Mercury sphygmomanometer and stethoscope, perceived stress scale (PSS) and serum cortisol levels before and after treatment. The results of this study revealed that there was statistically significant improvement in systolic & diastolic blood pressure, stress degree on PSS and cortisol level in group(C) than group (A) and group(B). **Conclusion:** It can be concluded that autogenic training combined with aerobic are more effective than aerobic exercises alone in reducing hypertension as well as stress after menopause.

#### INTRODUCTION

Menopause is the time in women's lives when menstrual periods stop permanently and they are no longer able to bear children. Menopause typically occurs between 49 and 52 years of age. Medical professionals often define menopause as having occurred when a woman has not had any menstrual bleeding for a year. It may also be defined by a decrease in hormone production by the ovaries Takahashi & Johnson, (2015). The common symptoms of menopause are that women (75%) experience vasomotor symptoms, including hot flashes, night sweats and flushing. Headache, palpitation and tiredness are common. Genitourinary syndrome of menopause includes dryness of the vagina or vulvovaginal atrophy which causes sore, itching, and burning in the vagina and severe dyspareunia. Also, it includes urgency, frequency, nocturia, repeated urinary tract infection and sexual dysfunction. Mood changes like irritability, lack of concentration, loneliness, forgetfulness, insomnia, anxiety and depression Shaikh& Nasreen, (2019). Epidemiological studies have shown that menopausal women have a high prevalence of hypertension, regardless of their ethnicity.

Although the mechanisms underlying this increased susceptibility remain unclear, recent studies have suggested that menopausal women have increased sympathetic tone, which in turn may increase arterial blood pressure and lead to renal damage. Both chronic inflammation and oxidative stress contribute to the pathogenesis of hypertension Zilberman *et al* .,(2015). Many women find the time around menopause stressful and chronic stress is not good for anyone's health. It may cause increased blood pressure and heart rate, headaches, gastric reflux, depression, anxiety and over the long term an increased risk for heart disease. Some believe that chronic stress may affect our immune system, making us more susceptible to illness, infections, and even cancer Richardson, (2012). Several studies have indicated that exercise is an important non-pharmacological strategy to prevent and treat hypertension. Aerobic exercise decreases sympathetic tone, arterial blood pressure, oxidative stress, and inflammation). Exercise has been thought to reduce postmenopausal symptoms through the increase of endorphin levels, which decrease as estrogen production decreases Grindler & Santoro, (2015). A variety of psychotherapeutic interventions, such as relaxation techniques Autogenic training, can lower elevated blood pressure by an average of 10 mmHg (systolic) and 5 mmHg (diastolic). As a "secondary effect" may also prompt the hypertensive to adopt a more health-conscious lifestyle. It

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is used as an alternative therapy in treating blood pressure problems in elderly in addition to treatment therapy

## SUBJECTS, MATERIALS AND METHODS

**Design of the study:** Three groups: pre-test and post-test randomized controlled design. The study was conducted from February 2021 to August 2021. The study protocol was explained in details for each patient before the initial assessment and enrollment in the study and all patients signed an institutionally approved informed consent form which was approved by

**The Ethics Committee of the Faculty of Physical Therapy Cairo University (NO:P.T.REC/012/003276) Subjects:** Forty five postmenopausal women were diagnosed clinically by physician as having moderate hypertension ranged from (160-179/100-109) Blocker *et al.*, (2020), and also moderate degree of stress based on PSS participated in this study. They were selected randomly from Outpatient Clinic of Obstetrics and Gynecology in Zagazig general hospital. Their age ranged from 45 to 55 years old and their body mass index (BMI) didn't exceed 35kg/m<sup>2</sup> with absence of menstruation for less than 12 month. Exclusion of women were done if they had history of neurological disorder, cigarette smoke and severe hypertension and musculoskeletal or cardiovascular disorder. They were assigned into three groups of equal numbers. Group (A) (Control group): 15 women received Captopril 25mg twice daily for 6 weeks. Group (B) (Study group): 15 women received Captopril 25 mg twice daily in addition to aerobic exercises for 30minutes/session, 3times/week for 6 weeks. Group(C) (Study group): 15 women received Captopril 25 mg twice daily in addition to aerobic exercises for 30minutes/session and autogenic training for 20 minutes 3times/week for 6 weeks.

## MATERIALS

- **Standard weight and height scale:** It was used to calculate the weight and height to calculate BMI for three groups.
- **Mercury sphygmomanometer and stethoscope:** They were used to assess systolic and diastolic blood pressure for all three groups pre and post treatment program.
- **Perceived stress scale (PSS):** It was used to detect level of stress for all three groups before and after treatment.
- **Treadmill:** It was used as a modality to conduct aerobic exercises for group B and C.
- **Plinth:** It was used during performing autogenic relaxation exercises for group C.

## Evaluation procedures

- **History taking:** Detailed medical history was taken from each woman in all three groups before starting the study.
- **BMI:** Standard weight and height scale was used to calculate the weight and height to calculate BMI for each participant in three groups.

$$\text{BMI (kg/m}^2\text{)} = \text{Weight (kg)}/\text{height(m}^2\text{)}.$$

- **Blood pressure:** Was measured in millimeter of mercury by a sphygmomanometer three times at the beginning of the treatment program then the mean of summation of three reading was recorded as a pre treatment reading. Also mercury sphygmomanometer and stethoscope were used to assess systolic and diastolic blood pressure for each woman after the treatment program in the same manner.
- **Stress level:** PSS was used to assess stress level for each woman in three groups before and after treatment. The German version of the PSS-10 was translated and standardized by Klein *et al* 2016. Respondents report the degree to which situations in one's life have been unpredictable, uncontrollable and overloaded in the past month on a 5-point Likert scale (0 = never, 1 = almost never, 2 = sometimes, 3 = fairly often, 4 = very often) Taylor, (2014).
- **Serum cortisol level:** Blood sample of about 5 cm was drawn in the morning at (8 A.M) before and after treatment for all women to determine plasma cortisol level.

## Treatment procedures

**Aerobic exercises:** Each woman in both groups (B&C) practiced aerobic exercise on the treadmill for 30 minutes including three phases. Warming-up phase which consisted five minutes, with low intensity (40% of maximum heart rate, MHR), actual phase which consisted of walking on the treadmill for 20 minutes with moderate intensity (60–75% of MHR) and cooling phase which consisted of walking on the treadmill for five minutes with low intensity (40% of MHR). MHR was calculated according to the equation (210-age in years). 3 time /week for 6weeks Whelton, (2002). The participants were advised to drink a plenty of water before and after the exercise session to avoid excessive loss of body water during the session.

**Autogenic relaxation:** Each woman in group C practiced aerobic as group B in addition to autogenic training. Autogenic relaxation training consists of six standard exercises that make the body feel warm, heavy, and relaxed. For each exercise, the patient gets into reclining, concentrates without any goal, and then used visual imagination and verbal cues to relax her body in some specific way. The program of autogenic relaxation training was performed for 20 minutes 3 session/week for 6 weeks and the position of woman was half lying position, with her back supported, both arms are relaxed at the sides Singh *et al.*, (2018) The woman was asked to bring her attention to her breathing, notice if it is shallow breathing, or short and quick breaths. Then, begin to picture an object in her mind. This object should be simple and pleasurable to her.

## Autogenic relaxation training was performed in two stages: Stage1-Deep breathing exercise with meditation

Woman was asked to close her eyes and take a deep breath from her nose and fill her abdomen like balloon fully and slowly to the count of 4 till her abdomen well full, then expire the air from her mouth. This procedure would be repeated four times: deep breaths to a count of 4 and expired at a count of 4.

## Stage 2- Imagination and affirmation stage

Following deep breathing with meditation the woman would be asked to give herself affirmations in six standard verbal steps as shown below .

### Step 1:

- My right arm is heavy, my left arm is heavy, both of my arms are heavy
- My right leg is heavy, my left leg is heavy, both of my legs are heavy
- My arms and legs are heavy

### Step 2:

- My right arm is warm, my left arm is warm, and both of my arms are warm.
- My right leg is warm, my left leg is warm, and both of my legs are warm.
- My arms and legs are warm.

### Step 3

- My right arm is heavy and warm, my left arm is heavy and warm.
- My right leg is heavy and warm, my left leg is heavy and warm.
- My heart is calm and regular.

### Step 4

- My heart beat is calm and regular.
- My forehead is cool.

### Step 5

- I'm calm and relax.
- I feel quiet.

### Step 6

- My whole body feels quiet, heavy, comfortable and relax.
- My mind is quiet and I can visualize my experience relax.

**Statistical analysis:** ANOVA test was conducted for comparison of subject characteristics between groups. Normal distribution of data was checked using the Shapiro-Wilk test. Levene's test for homogeneity of variances was conducted to test the homogeneity between groups. One-way MANOVA was performed to compare blood pressure, PSS and cortisol level between groups. Post-hoc using the Tukey test was carried out for subsequent multiple comparison. Paired t test was conducted for comparison between pre and post treatment in each group. The level of significance for all statistical tests was set at  $p < 0.05$ . All statistical analysis was conducted through the statistical package for social studies (SPSS) version 25 for windows (IBM SPSS, Chicago, IL, USA).

## RESULTS

**Subject characteristics:** Table (1) showed the subject characteristics of the group A, B and C. There was no

significant difference between groups in age and BMI ( $p > 0.05$ ).

**Table (1): Comparison of age and BMI between group A, B, and C:**

	Group A	Group B	Group C	Fvalue	pvalue	Sig
	±SD	±SD	±SD			
Age (years)	48.8 ± 2.93	47.66 ± 2.19	48.06 ± 2.86	0.68	0.51	NS
Mean BMI(kg/m <sup>2</sup> )	30.93 ± 1	31.84 ± 1.73	31.04 ± 1.16	2.06	0.14	NS

Mean SD: Standard deviation p value: Probability value NS: Non significant S: Significant.

**Effect of treatment on blood pressure, stress level and cortisol level:** There was a significant decrease in systolic and diastolic blood pressure, PSS and cortisol level of group A, B and C post treatment compared with that pre treatment ( $p < 0.01$ ) as shown in the following tables.

**Comparison Between group:** Between group comparison pre treatment revealed a nonsignificant difference in all parameters ( $p > 0.05$ ). There was a significant decrease in systolic and diastolic blood pressure, PSS and cortisol level of the group C compared with that of group A ( $p < 0.001$ ) and group B ( $p < 0.05$ ) post treatment. There was a significant decrease in systolic and diastolic blood pressure, PSS and cortisol level of the group B compared with that of group A (post treatment ( $p < 0.05$ )).

## DISCUSSION

This study was conducted to investigate if AT combined with aerobic exercises had more effect than aerobic exercises alone on treatment of postmenopausal HTN and stress, forty five postmenopausal women diagnosed with moderate HTN and moderate stress based on PSS, their age ranged from 45-55 years, their BMI didn't exceed 35 kg/m<sup>2</sup> were selected randomly from outpatient clinic of Zagazig general hospital. Women were divided randomly into three equal groups, group A (took antihypertensive drug): 15 patients, they were treated by Captopril 25 mg twice daily for 6 weeks, group B: 15 patients, they were treated by Captopril 25 mg twice daily & aerobic exercises on treadmill for 30 min/session 3sessions/week for 6 weeks and group C: 15 patients, they were treated by Captopril 25 mg twice daily & aerobic exercises for 30 min/session in addition to AT for 20 minutes 3sessions/week for 6 weeks.. Results of this study found that there was a statistically significant decrease in systolic&diastolic blood pressure, stress degree of PSS and cortisol level at post treatment than pre treatment in all three groups with p value= (0.0001\*). Between groups there was significant difference of the mean values of the post test between group A and B with ( $p=0.0001$ \*) & there was significant difference of the mean values of the post test between group B and C with ( $p= 0.01$ \*) this significant reduction in favour to group C than group B and group A. Concerning the significant effect of aerobic exercise training in relieving HTN and stress can be explained by improvements in BP, autonomic tone, baroreflex sensitivity, Oxidative stress(OS), Nitric oxide(NO) bioavailability, lipid profiles, cardiovascular function, and cardiorespiratory fitness Lin & Lee. (2018): The results of this study are supported by Da palma *et al.*, (2016) who proved three major insights. First, combining exercise reduces arterial pressure and heart rate at rest.

**Table 2. Comparison of pre and post treatment mean values of SBP between the three groups (A, B, and C)**

	SBP (mmHg)			F- value	p- value	s	Sig
	±SD						
	Group A	Group B	Group C				
Before ttt	168.26±3.88	166.06±4.03	166.86±2.94	1.31	0.28	NS	
After ttt	153.8 ± 8.53	146.73 ± 6.76	137.86 ± 5.23	19.63	0.0001	S	S
Multiple comparison (Tukey)							
	MD		p- value		Sig		
Group A - Group B post ttt	7.07		0.02		s		
Group A - Group C post ttt	15.94		0.0001		s		
Group B - Group C post ttt	8.87		0.003		s		

Mean SD: Standard deviation p value: Probability value NS: Non significant S: Significant MD: Mean difference.

**Table 3. Comparison of pre and post treatment mean values of DBP between the three groups (A, B, and C)**

	DBP (mmHg)			F- value	p- value	Sig
	±SD					
	Group A	Group B	Group C			
Before ttt	103.6± 2.5	102.8± 1.69	102.73± 1.53	0.91	0.41	NS
After ttt	97.53 4.94±	93.4 ± 2.97	87.93 ± 4.25	20.33	0.0001	S
Multiple comparison (Tukey)						
	MD		p- value		Sig	
Group A - Group B post ttt	4.13		0.02		s	
Group A - Group C post ttt			9.6		0.0001	
Group B - Group C post ttt			5.47		0.002	

Mean SD: Standard deviation p value: Probability value NS: Non significant S: Significant MD: Mean difference.

**Table 4. Comparison of pre and post treatment mean values of PSS between the three groups (A, B, and C)**

	PSS level			F- value	p- value	Sig
	±SD					
	Group A	Group B	Group C			
Before ttt	20.8± 5.14	20.06 ± 4.31	20.93± 5.5	0.13	.87	NS
After ttt	19.4 ± 4.51	15.73 ± 3.63	12.2 ± 3.09	13.49	0.0001	S
Multiple comparison (Tukey)						
	MD		p- value		Sig	
Group A - Group B post ttt	3.67		0.03		s	
Group A - Group C post ttt			7.2		0.0001	
Group B - Group C post ttt			3.53		0.03	

: Mean SD: Standard deviation p value: Probability value NS: Non significant S: Significant MD: Mean difference.

**Table 5. Comparison of pre and post treatment mean values of cortisol level between the three groups (A, B, and C)**

	Cortisol level(mcg/dl)			F- value	p- value	Sig
	±SD					
	Group A	Group B	Group C			
Before ttt	17.2± 1.47	17.6±1.55	17.93± 1.48	0.89	0.41	NS
After ttt	15.33 ± 2.09	13.46 ± 2.16	11.4 ± 1.12	16.85	0.0001	S
Multiple comparison (Tukey)						
	MD		p- value		Sig	
Group A - Group B post ttt	1.87		0.02		s	
Group A - Group C post ttt			3.93		0.0001	
Group B - Group C post ttt			2.06		0.01	

Mean SD: Standard deviation p value: Probability value NS: Non significant S: Significant MD: Mean difference.

Second, it promotes beneficial adaptation in baroreflex sensitivity and cardiovascular autonomic modulation. Third, decreasing cardiac inflammation and oxidative stress in hypertensive persons. Also, the results are supported by Pagonas *et al.*, (2014) who demonstrated that regular exercise reduce blood pressure without a decrease of blood pressure variability. Concerning the significant decrease in blood pressure, PSS and cortisol level in group who take combined interventions than group who take only aerobic exercise post treatment explained by AT combined with aerobic exercise-induced reduction of sympathetic tone that does not only affect beta—but also alpha adrenoceptors in addition to relieving OS and increasing parasympathetic activity.

Second, the reduction of sympathetic tone is only one of various antihypertensive mechanisms of exercise. Finally, regular exercise reduces cardiovascular risk by a multitude of factors: It induces a reduction of weight in obese patients, decreases LDL-cholesterol while increasing HDL-cholesterol Cao *et al.*, (2019). Elderly hypertensive women is less easy to control due to the loss of the protective effect of endogenous estrogen, which preserves NO bioavailability, HEW may present greater impairment in peripheral vasodilatation. It has been recommended that aerobic training is included in a global exercise program with other relaxation technique for older individuals, based on its effects on muscle function and relaxation, As relaxation more effective treatment option for

HTN among elderly women because it achieves significant increases in resting forearm blood flow, without concomitant increases in arterial stiffness Dantas, (2016). Also, the significant reduction in stress in group who take aerobic and AT than group who take aerobic exercise only might be explained by the effect of relaxation technique in reducing somatic and cognitive anxiety and improving self-confidence. relaxation decreases arousal of the autonomic nervous system and central nervous system, and increased parasympathetic activity, which does lowered musculoskeletal and cardiovascular tone and recovered normal neuroendocrine function Rizal *et al.*, (2019). The result of this study in agreement with the findings of Mansour & Amini, (2020) as they showed that relaxation could be effective as a non-pharmacological method in reducing perceived stress. Relaxation method is a safe, uncomplicated and low cost method and along with medication and other interventions can be effective in reducing stress, fear and anxiety. The result of this study runs in the same line with that of Li *et al.*, (2015) who found that “exercise is a cornerstone therapy for the prevention, treatment, and control of HTN. In people with HTN, aerobic and relaxation exercise promote general health and improvement in CV risk factors. The result of this study is also supported by Awad *et al.*, (2019) who reported that AT mechanism in reducing BP could be linked to its effect in lowering in the sympathetic response of the hypothalamus which was expected to decrease the BP. The release of tension in the skeletal muscles gained by relaxation raises the peripheral blood flow which will lead to the lowering of the BP and heart rate and lead to slower deeper breathing. On the other side, the results of this study stand in contrast with those of Seo and Kim, (2019) as they concluded that AT has atiny effecton stressed hypertensive persons. Although AT is increasingly used to treat HT and stress, recent studies have concluded that its efficacy still needs to be established. The results of this study also stand in contrast with those of Ferianto, (2020), who concluded that the relationship between the cardiovascular changes and stress reduction promoted by AT had been little explored. AT has favorable effect on BP, heart rate, and ambulatory blood pressure of hypertensive patients. However, the effectiveness between the duration of different treatments is still not clear, and although it is considered easy technique to apply in some conditions cases not able to understand practice and the way AT works is not fully understood

## CONCLUSION

It can be concluded from the result of this study that AT combined with aerobic exercises could be used as an effective treatment in reducing hypertension and stress after menopause ,as it safe and help in great role with drugs in decreasing HTN and stress.

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