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STRESS CONTROL TRAINING FOR WOMEN WITH METABOLIC SYNDROME

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ABSTRACT

Metabolic syndrome (MetS) is characterized by the concurrent presence in one individual of at least three of the following: abdominal obesity, glucose intolerance/insulin resistance, dyslipidemia and hypertension. Inadequate diet, sedentariness, tobacco usage, alcoholism and excessive stress are risk factors in the development of MetS. The aim of this study was to ascertain if Stress Control Training (SCT) would promote beneficial alterations in these risk factors in a group of 32 women with MetS; 15 of them in the Experimental Group (EG) , subjected to SCT, and 17 in the Control Group (CG). After SCT, it was found for the EG a significant reduction in: stress (p=0.005), total Cholesterol (p=0.012), LDL (p=0.0133), consumption of Linseed (p=0.03) and a reduction in the consumption of Kcal (p=0.028). SCT reduced the risk factors, stress and inadequate diet, and so contributed to reduction in MetS components such as total Cholesterol and LDL cholesterol. If the present data are confirmed in future studies performed on a larger number of participants, SCT will be a psychological treatment model of great use as a prophylactic measure for coronary diseases inasmuch as it could reduce the risk factors involved in MetS.

Keywords: Stress, Metabolic Syndrome, Risk Factors.

1. Introduction

Metabolic syndrome (MetS) is a disorder associated with a significant increase in cardiovascular mortality, approximately 2.5 times higher according to the 1st Brazilian Directive for the Diagnosis and Treatment of Metabolic Syndrome (SBP, 2006). According to the International Diabetes Federation (IDF) (2006), estimates suggest that it afflicts around 20% to 25% of the world's adult population. The high prevalence of MetS in the global population and the fact that this syndrome is a risk factor for cardiovascular diseases (CVD), the main cause of death in the country (Brazil, 2009), bear witness to the need for studies that can propose forms of treatment for reducing the associated morbi-mortality. Interventions which seek to improve quality of life are seen as a necessary part of the prevention and treatment of MetS and, consequently, CVD. The proposition of the present study was to investigate if Stress Control Training, developed by Lipp (1991), would contribute to a reduction in the risk factors associated with the components of MetS through changes in the lifestyle of the participants.

1.1 Metabolic Syndrome

According to the 1st Brazilian Directive for the Diagnosis and Treatment of Metabolic Syndrome, published in 2005 (SBP, 2006), the diagnosis of MetS involves the presence of at least three of the following components in one individual: Abdominal obesity, through the calculation of the abdominal circumference (men > 102cm and women > 88cm), Triglycerides ≥ 150 mg/dL; HDL cholesterol in men < 40 mg/dL and in women < 50 mg/dL; Blood pressure ≥ 130 mmHg or ? 85 mmHg and fasting blood glucose (≥ 119 ng/dL). The International Diabetes Federation (IDF, 2006), based on studies performed with South Asian individuals based in Southern and Central America, proposes a reduction in the borderline values for fasting blood glucose from 110 mg/dL to a value greater than or equal to 100 mg/dL and for the waist, a reduction from 88 cm to 80 cm in women and 102 cm to 90 cm in men.

A study conducted by Salaroli, Barbosa, Mill and Molina (2007), involved the collection of sociodemographic, biochemical, anthropometric and hemodynamic data from 1,663 individuals living in the city of Vitória (in the Brazilian state of Espírito Santo). The authors found that 29.8% of the sample suffered from MetS, there being no difference between sexes. In the sample, a high prevalence was even found amongst younger people (15.8% in people aged between 25 and 34; 48.3% in the 55 to 64 age range). Schneider, Manolopoulos and Klein (2007) state that, in Germany, it is estimated that 23.8% of the population could be suffering from MetS and they believe that this percentage will grow due to the increase in obesity amongst children

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and adolescents in the country. Prevalence can thus be observed, albeit lower, close to that noted in the aforementioned Brazilian study.

When considering the components of MetS, it is important to emphasize the risk factors associated with these components: inadequate diet, excessive use of salt, sedentariness, smoking, alcohol and stress (SBC, 2006). These factors reveal a negative lifestyle and it is important that the treatment of MetS should involve strategies that are drug based and non-drug based, as argued by the 1st Brazilian Directive on MetS (SBC, 2006). The project entitled Directives on Non-Pharmacological Treatment for the Reduction of MetS (AMB, & CFM, 2006) proposes lifestyle change as the primary form of intervention, comprising healthy diet, the regular taking of physical exercise, combating tobacco usage and the excessive use of alcohol, in addition to stress control.

1.2 Stress as a risk factor in MetS

The concept of stress in the area of health emerged out of studies conducted Hans Selye, in the 1920's, who noticed that patients suffering from a variety of diseases shared various pathological alterations. His observations led to the conclusion that the process of stress occurred in three phases: alarm (alert), resistance and exhaustion, each one of them related to specific reactions (Selye, 1965). Later studies, conducted in Brazil by Lipp, led to the establishment of a new stress phase between the resistance and the exhaustion stages, which Lipp called the near-exhaustion phase (Lipp, 2000; Lipp, 2003). The near-exhaustion phase comes at the end of the resistance phase cited by Selye and provides the opportunity for the development of pathologies which precede exhaustion. Each stress phase embodies specific symptoms and progression through the phases indicates a worsening picture, eventually leading to the development of diseases to which the individual has a predisposition.

The influence of stress on MetS can be demonstrated through studies that focus on stress and its relationship with its component parts. Lambert, Dawood, Straznicky, Sari, Schlaich, Esler and Lambert (2010) investigated the relationship between sympathetic activation and psychological stress in patients with MetS and high blood pressure, concluding that mental stress regulates sympathetic activity and could amount to a high cardiovascular risk in these individuals. According to the authors, the study was justified by the evidence that stress is related to obesity, hypertension (HTN) and metabolic dysfunctions. A total of 25 individuals took part in the study, comprising 8 women and 17 men with MetS and high blood pressure, who were assessed for sympathetic activity by means of the microneurography technique (both multi-unit and unitary smooth muscle activity were recorded[1]), for anxiety by way of Spielberger's State Trait Anxiety Inventory (Spielberger, 1992) and for symptoms of depression through the Beck Depression Inventory (Beck, 1961).

[1]Multi-unit smooth muscle: comprising separate, discrete muscle fibers that may contract independently; Unitary smooth muscle: a mass of hundreds and thousands of smooth muscle fibers that contract together, as one unit (Guyton & Hall, 2006)

According to the results, women had higher levels of cholesterol and a greater number of depressive symptoms than men. The multi-unit activation of the sympathetic nervous system was shown to be similar in men and women; however there was a high incidence of multiple spikes (peaks) in women. Sympathetic unitary activation in the sample as a whole did not reveal a relationship with a metabolic profile, but it was significant for anxiety and depressive affective symptoms. The high incidence of multiple activation (more than two peaks) during sympathetic neural activation was associated with a high anxiety trait score and an elevated volume of depressive affective symptoms, but no link was found between somatic symptoms and sympathetic activation.

As for HTN, an important component of MetS, Fonseca, Coelho, Nicolato, Mally-Diniz and Silva Filho (2009) performed a review of the bibliography with regard to the relationship between emotional factors and HTN, through a search of the Virtual Health Library, Medline database (1997-2008). The authors concluded that there were some inconsistencies in the findings, having found references to both positive and negative relationships of anger, hostility, anxiety and stress with HTN and cardiovascular diseases. As for the HTN-stress relationship, the authors came across studies that revealed the validity of this relationship. They initially quote the study by Vrijkotte, Van Doornen and De Geus (2000) which investigated the effects of stress working in a blood pressure clinic, cardiac rate and its variability. This study comprised 109 men, all white-collar workers, with an average age of 47. These workers were monitored, during two days at work and on one of their days off, for blood pressure, cardiac rate and its variability. The results showed that the harmful effects of stress can be measured through the increase in cardiac reactivity, the increase in systolic pressure and by the low vagal tone found in the evaluation carried out during the two working days.

Fonseca *et al* (2009) quote a study carried out in England by Sheffield, Carroll, Shipley and Marmot (1997) involving 1,259 men, in which they evaluated the blood pressure and cardiac rate during periods of rest and in response to a work-related stressor. The authors found some association between blood pressure when confronted with work-related stress and with the period of rest and concluded that emotional stress was most likely the most important trigger in the reactivity observed in the sample.

Also quoted in the review by Fonseca *et al* (2009) are the studies conducted by Lipp, on a Brazilian sample. Lipp, Pereira, Justo and Matos (2006) studied cardiovascular reactivity in people with HTN, seeking to understand the various effects of the expression and inhibition of emotions during moments of interpersonal stress. Taking part in Lipp's study were 80 adults, aged between 21 and 65, who were diagnosed as having moderate HTN (systolic pressure between 140 and 159 mmHg and diastolic pressure between 90 and 99 mmHg). The procedure involved the participation of subjects in role playing sessions in which social interaction took place. The results of Lipp *et al* (2006) revealed that expressing emotions rather than inhibiting them elicited a significantly higher cardiovascular reactivity

when the participants responded to negative scenes than when responding to positive scenes. Also found were increases in blood pressure during the periods of instruction, for both conditions (faced with positive and negative scenes). It was concluded that socially demanding situations signify a stressor and their effects could be different depending on the way a person expresses his/her emotions. Moreover, the authors suggested that the difficulty in expressing emotions, already seen in some individuals with HTN, could play a role in controlling or reducing the reactivity of blood pressure as a self-protection mechanism.

Malagris, Brunini, Moss, Silva, Esposito and Mendes Ribeiro (2009), emphasizing the relationship between stress and HTN, conducted an experimental study with cellular transport of the amino acid L-arginine. The aim was to evaluate if the Stress Control Training developed by Lipp (Lipp, 1991) could lead to alterations in the transport of the aforementioned amino acid in stressed women with HTN. It should be remembered that individuals with HTN, irrespective of stress, exhibit a reduction in the cellular transport of L-arginine, already confirmed in previous studies (Moss *et al*, 2004). Results showed that after the Stress Control Training, cellular transport of L-arginine reverted to levels similar to those of patients with HTN, but without stress. It is worth emphasizing that L-arginine is a semi-essential amino acid that is a precursor to the production of Nitric Oxide, a vasodilatory gas that has been shown to be deficient in people suffering from HTN. So the study demonstrates that in the studied sample, stress was seen to be associated with HTN via a reduction in the transport of L-arginine, accentuating the deficit in the transport of L-arginine already found with HTN, and that it reverted to normal after the stress levels were reduced.

1.3 Stress Control Training

The proposition of Lipp's Stress Control Training is one of lifestyle change and as such it could be useful in the treatment of MetS. Created by Lipp in 1991, it has been used in numerous studies and has proved to be effective in the control of stress and the treatment of pathologies such as psoriasis, ulcerative rectocolitis and HTN (Lipp, 1991a, Brasio, 2003, Malagris *et al*, 2009). Stress Control Training consists of 12 weekly sessions of 90 minutes each. Professionals from the spheres of nutrition, medicine and physical education may be invited to participate in some of the sessions, since guidance on diet and physical exercise is part of the Stress Control Training. It is a cognitive-behavioral treatment that seeks to reduce the effects of stress, which involves making patients aware of their external and internal sources of stress and the learning of diaphragmatic deep breathing techniques (Lipp, & Rocha, 2008), Jacobson's progressive relaxation (Jacobson, 1939), and cognitive-behavioral strategies to control stress. With this training, patients receive strategies on coping and the reduction of sources of stress (Lipp, 1989; Lipp, 1991; Alcino, 1996; Lipp *et al,* 1998; Lipp, 2003).

2. Objectives and Hypotheses

The objective was to ascertain if Lipp's Stress Control Training could reduce the base risk factors which constitute MetS through the control of stress in a group of women afflicted with the syndrome. The risk factors investigated were as follows: presence of stress (stress in its phases of resistance, near-exhaustion and exhaustion were taken into consideration), inadequate diet (absence of daily intake of fruit and vegetables), excessive use of salt (above 6g daily), sedentariness (exercise less than 3 times a week), smoking, use of alcoholic beverages above the established limit (over 30g alcohol for men and half of this for women). Other objectives of this study included: investigation into alterations in the composition of MetS, making comparisons before and after the Stress Control Training: abdominal obesity, glucose intolerance/insulin resistance, dyslipidemia and HTN. The hypothesis that permeated the study is that, after the Stress Control Training, there should be a reduction in the base risk factors for the components of MetS and, consequently, favorable changes in these components in themselves.

3. Method

3.1 Participants

The participants in the study comprised female patients attending the day clinic at the São Francisco de Assis College Hospital (HESFA - UFRJ) in Rio de Janeiro, including 67 patients referred by three doctors[2]. After analysis of the medical histories and psychological evaluations to check the levels of stress, 39 patients were selected who met the inclusion criteria listed below. The top 20 who met the aforementioned criteria were assigned to the Experimental Group (EG) and the other 19 were assigned to the Control Group (CG). During the Stress Control Training, five EG patients dropped out before the end of the intervention and two CG patients did not return for reassessment, leaving 15 patients in the EG and 17 in the CG, a total sample of 32 patients. The inclusion criteria for participating in the study were as follows: 1. to be aged between 35 and 65; 2. to have stress in the resistance, near-exhaustion or exhaustion phase; 3. to meet the criteria for MetS diagnosis; 4. not to suffer from a known serious mental illness; 5. not to have previously suffered a CV, and 6. not to suffer from chronic renal disease.

3.2 Instruments

1- Lipp's Stress Symptom Inventory for Adults (Lipp, 2000) - Instrument created based on the author's wide experience in the area of stress, in clinical practice and in her research, with the aim of accomplishing the following objectives: to identify the presence, detectable via the inventory, of increased levels of stress; to identify the stress phase in which the individual is situated: alert, resistance, near-exhaustion or exhaustion, and to identify the most frequent type of symptom (physical or psychological) as a manifestation of stress in that patient.

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Dr. Joana Dantas (Endocrinologist)

2- International Physical Activity Questionnaire (IPAQ) (Matsudo, Araújo, Matsudo, Andrade, Andrade, Oliveira, & Braggion, 2001) - This questionnaire was proposed by the WHO in 1998 and serves as a global tool for determining the level of physical activity in the population. It consists of a long-form questionnaire and also a short-form questionnaire that is quick and therefore easier to apply. It investigates day-to-day physical activity and also, more specifically, at work, at home and as a means of transport. Matsudo *et al* (2001) performed a study to validate the tool with a sample comprising 257 men and women. For reasons of convenience and time, the short version was used in this study, as other instruments had also been used.

3- Psychological Interview - The Interview sought to trace the sociodemographic profile of the participants and investigate the presence of risk behavior for the development or aggravation of the MetS components, such as tobacco usage and the intake of alcoholic beverages in excess of the limits recommended by the 1st Directive on MetS.

4. Recording of the Technique of Relaxation with Deep Breathing - This record was prepared with the objective that patients would note how they were feeling before the relaxation and deep breathing exercises and then again afterwards. The patients were instructed to carry out the exercise once a day and were to record this before starting and then after they have finished. They were presented with three options to record their answers, in the form of "smiley faces": one in red (meaning "tense"), one in yellow ("more or less tense") and one in green (meaning "calm"). Each state was assigned a score: red=2; yellow=1 and green=0.

5. CD containing the relaxation technique (Jacobson, 1939) and diaphragmatic deep breathing (Lipp, & Rocha, 2007) recorded by the study's author.

6. Laboratory material for the total cholesterol, fractions, triglycerides and glucose examinations and **Sphygmomanometer** to check Blood Pressure.

3.3 Procedure

After receiving the consent of the board of the São Francisco de Assis College Hospital (*HESFA - UFRJ*) and other sectors involved in performing the study, the project was submitted to the Ethics Committee at the Anna Nery School of Nursing, and was approved (File no. 07/2009) on April 29th, 2009. The professionals, who would be referring patients, as well as the researchers and research assistants[3], were informed about the objectives of the study and the inclusion/exclusion criteria. The patients' records were analyzed and the selected patients were contacted. Before commencing, the Free and Informed Consent Document was read out, the objectives were explained and any queries answered. After individual psychological assessment, including the application of the LSSI, IPAQ and the psychological interview, the patients were referred to an *HESFA* nutritionist and assistant so that the nutritional evaluation could be performed[4]. After selecting the patients who met the criteria, appointments were made for laboratory examinations (levels of total cholesterol and fractions, triglycerides and fasting glycemia). The EG patients were submitted to Stress Control Training and the CG patients were informed that they would subsequently receive the same type of intervention if the results
of the study revealed they were effective in reducing the risk factors of MetS.

Lipp's original Stress Control Training proposal was for 12 sessions lasting 90 minutes each, however, due to patient absences and the need to reinforce some of the concepts, the Stress Control Training, adapted for MetS, consisted of 14 two-hour sessions. As Stress Control Training is a multidisciplinary study, it involved one session with the presence of an *HESFA* doctor, as well as an endocrinologist[5], a nutritionist[6] and a physical education instructor[7]. The information and suggestions provided by the doctor, nutritionist and physical education instructor were reinforced in all subsequent sessions in order to ensure adherence to these practices.

At the beginning of each session, blood pressure was measured twice, at intervals of one minute apart. The patients were instructed to carry out the deep breathing technique and relaxation every day and note down, before and after, how they were feeling, on their individual forms. Each participant was offered a CD with a recording of the relaxation technique to help them to adhere to it.

After the Stress Control Training, all the participants, in both the EG and the CG, were reassessed by way of a medical consultation, research study tools, nutritional evaluation and laboratory examinations (triglycerides, fasting glycaemia, total cholesterol and fractions). The CG participants did not receive the Stress Control Training intervention; they were simply evaluated before and after the period of EG participation in the Stress Control Training. However, after analysis of the results and a check of the effectiveness of the Stress Control Training, the CG patients were called back and the Stress Control Training was offered to those who turned up.

3.4 Data Analyses

For a comparison of category variables between the groups, Pearson's Chi-Squared test was used, or the Fisher exact test in cases where the predicted values were less than five. To compare continuous variables between the two groups, the Mann-Whitney test was used due to the absence of Normal distribution in the variables. To compare the category variables between the before and after Stress Control Training evaluations, the *McNemar* test (for two categories) and the *Bowker* symmetry test (for three or more categories) were applied. With the aim of comparing numeric variables between the two evaluations and the two groups, the Repeated Measures Analysis of Variance (rANOVA) was

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[4]*HESFA* nutritionist: Dr. Sueli Rocha Assistant: Undergraduate in Nutrition at the UFRJ: Fernanda da Rocha M. Gonçalves
[5]Dr. Joana Dantas
[6]Dr. Alessandra da Rocha Pinheiro Mulder
[7]Dr. Érica Federici

employed, with the variables transformed into ranks due to the absence of Normal distribution. The comparative analysis of the variables, related to the nutritional evaluation before and after the intervention (Stress Control Training), was carried out via the *Wilcoxon* test. The level of significance employed was 5%, i.e. $p<0.05$. The statistical analysis was carried out using a software program called *SAS System for Windows* (*Statistical Analysis System*), version 8.02. S*AS Institute Inc*, 1999-2-1, *Cary, NC, USA*.

4. Results

An analysis of the results revealed that, as far as age range is concerned, the average age of the participants in the EG was 55.07 ± 5.40, the CG 54.71 ± 6.35 and the overall sample 54.88 ± 5.84. The 50 - 59 age range was the most predominant in both groups with 60% in the EG and 64.71% in the CG. As for HTN, there were 16 (94.12%) participants in the CG with hypertension at the beginning of the study and 13 (86.67%) in the EG, numbers which remained flat as they continued to suffer from the disease. As for the stress variable, it was found that at the beginning of the study, in the CG, only one of the patients ceased to have stress while in the EG there were 8 (53.33%). Insofar as the stress phase is concerned, it was found that the CG, which had had 8 participants (47.06%) in the resistance phase and 9 (52.94%) in the near-exhaustion phase, changed to having 1 (5.88%) in alert, remained at 8 (47.06%) in the resistance phase and now had 7 in the near-exhaustion phase (41.18%). The EG, which had had 11 (73.33%) in the resistance phase and 4 (26.67%) in the near-exhaustion phase, changed to 2 (13.33%) in the alert phase, 5 (33.33%) in the resistance phase and none in the near-exhaustion phase. As far as the type of symptoms is concerned, there were 3 in the CG (17.65%) with a predominance of physical symptoms, 12 (70.59%) with predominantly psychological symptoms and 2 (11.76%) with both types simultaneously. At the end of the study, the CG had 7 (43.75%) with predominantly physical symptoms and 9 (56.25%) psychological. As for the EG before the Stress Control Training, there were 7 (43.75%) participants with predominantly physical symptoms and 9 (56.25%) psychological. After the Stress Control Training, this changed to 4 (57.14%) with a predominance of physical symptoms and 3 (42.86%) with psychological symptoms (Table 1).

Table 1. Statistics for the Major Study Variables Pre and Post-Treatment

		CG		EG		Total Sample	
Variáveis		Pre %	Post %	Pre %	Post %	Pre %	Post %
Hipert	Yes	94.12	94.12	86.67	86.67	90.63	90.63
	No	5.88	5.88	13.33	13.33	9.38	9.38
Stress	Yes	100	94.12*	100	46.67	100	71.88
	No	0	5.88	0	53.33*	0	28.13*
Stress Stage	A**	0	13.33	0	13.33	0	9.38
	R***	47.06	47.06*	73.33	33.33	59.38	40.63
	NE****	52.94	41.18*	2667	0	40.63	21.88
	E*****					0	0
Symptom nature	Fís	17.65	43.75	13.33	57.14	15.63	47.83*
	Psic	70.59	56.25	53.33	42.86	62.5	52.17
	Fís/Psic	11.76	0	33.33	0	0	0

* p<0,05 ** Alarm *** Resistance **** near-exhaustion *****Exhaustion

The comparative statistical analysis between the groups (CG and EG) demonstrated that there was a significant difference in the stress variable post-Stress Control Training, with a higher rate of stressed individuals in the CG ($p=0.005$) and a significant reduction in stress in the EG ($p= 0.005$). As for the post-Stress Control Training stress phases, stress was more severe in the CG, denoted by the greater number of people in the resistance and near-exhaustion phases ($p<0.05$). As for the number of stress symptoms at the end of the study, higher values were also found in the CG with a significant difference between the groups ($p=0.007$), the lowest value appearing in the EG after the Stress Control Training. In addition, there was a significant intra-group difference for each groups between the beginning and end of the study, a steeper reduction for the EG ($p<0.001$) (Table 2).

Table 2. Risk Factors Pre and Post-Treatment

Variable	CG				EG				Total Sample			
	Pre		Post		Pre		Post		Pre		Post	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	DP
Total Cholesterol	214.82	57.59	204.88	46.67	232.73	53.47	190.53	60.13	223.22	5.84	198.16	53.01
HDL	44.35	6.86	46.13	9.73	46.13	9.73	44	5.96	45.19	8.24	43.03	6.34
LDL	124.87	44.61	122.15	30.98	153.4	52.97	116.33	54.49	139.13	50.26	119.04	44.44
Glucose	115.65	68.76	121.53	47.53	128.93	72.23	109.33	20.4	121.88	69.58	115.81	37.12
Triglycerides	292.12	373.64	232.35	172.22	169.6	58.08	150.67	66.9	234.69	278.28	195.13	138.31
Abdominal Circumference	95.71	8.95	94.53	9.59	97	5.77	94.87	7.57	96.31	7.54	94.69	8.57
% stress stage	54.94	24.43	45.53*	24.58	44.47	19.39	10.87	13.68	50.03	22.5	29.28	26.56
Total Stress Symptoms	26.94	10.76	22.88*	9.71	22.07	8.69	11.13	6.01	24.66	10	17.38	10.02
Weekly vigorous Activity(min)	36.18	69.18	142.06 *	170.21	125.67	240.87	52	141.38	78.13	175.3	99.84	161.45
Score in Relaxation	0	0	0	0	1.07	43	18	12	1.07*	43	0.18*	12

*p<0,05

When considering the percentage obtained in the stress phase in which the participant was to be found, a significant difference was observed between the groups at the end of the study, with the highest value in the CG (start 54.94 ±24.43 and end 45.53 ±24.58), the lowest value in the EG (start 44.47 ±19.39 and end 10.87 ±13.68) (p<0.001) and a reduction only in the EG (p=0.001) indicating the effects of the treatment. The same occurred for the total number of symptoms in the LSSI where, in the CG, the average was 26.94 ±10.76 at the beginning and 22.88 ±9.71 at the end. In the EG the number of stress symptoms moved down from 22.07 ±8.69 to 11.13 ±6.01. The difference between the groups was significant (p=0.007), with highest values in the CG and lowest values in the EG at the end of the study. Inter group analyzes found a significant reduction for both groups between the beginning and end of the study (<0.001), with a more accentuated reduction for the EG (p<0.034) (Tables 2 and 3).

Table 3. Risk Factors: Comparisons between EG and CG Pre and Post- Treatment (Repeated Measures ANOVA)

Variable*	Comparison between EG x CG	Comparison between Pre and Post- treatment	Interactions Groups vs Times
		P values	
Total Cholesterol	0.902	0.012*	0.103
HDL	0.439	0.247	0.759
LDL	0.518	0.033*	0.062
Glucose	0.565	0.019*	0.185
Triglycerides	0.308	0.23	0.272
Abdominal Circumference	0.614	0.058	0.152
% stress stage	0.001*	<0.001*	0.004*
Total Stress Symptoms	0.007*	<0.001*	0.034*
Weekly vigorous Activity(min)	0.181	0.908	0.071
Relaxation	---	<0.001*	---
SBP	---	1	---
DBP	---	0.476	---

* Variables were transformed into ranks in the analyses due to the lack of Normal Distribution.
* < 0,05

With regard to total Cholesterol, the CG average at the beginning of the study was a little higher (214.82 mg/dL ±57.59) than in the EG (232.73 mg/dL ±53.47), but both were in the Borderline High category which varies between 200 and 230 mg/dL, per the ATP III classification (2001). After the Stress Control Training, the EG average for total Cholesterol was 190.53 mg/dL ±60.13, this average falling within the recommended levels, while the CG average was 204.88 mg/dL ±46.67, which remained above the recommended levels. The ANOVA analyses (Table 3) revealed significant differences (p=0.012) for total Cholesterol, there being a reduction between the start and end of the study only in the EG. Similarly to LDL, the ANOVA analyses showed that there was a reduction between the start and the end of the study only in the EG (p=0.013), closely approximating the desired levels (100 to 129 mg/dL): at the beginning 153.4 mg/dL ±52.97 and at the end 116.33 mg/dL ±54.49 (Table 3). As for HDL, the averages of the two groups, EG (before the Stress Control Training 46.13 mg/dL ±9.73 and after 44 mg/dL ±5.96) and CG (start 44.35 mg/dL ±6.86 and end 46.13 mg/dL ±9.73), maintained less than desirable values both at the beginning and at the end of the study, as they should be ? 50 mg/dL for women, according to ATP III (2001). The HDL average at the end was "near optimal/above optimal" according to the ATP III classification. With regard to the CG, the average at the end remained above desired levels (start 124.87 ±44.61 mg/dL and end 122.15 mg/dL ±30.98) (Table 2).

As far as Glucose is concerned, there was a reduction in the EG (start 128.93 mg/dL ±72.23 and end 109.33 mg/dL ±20.4) to borderline values (? 110 mg/dL, as per the ATP III, 2001), which did not occur with the CG, for which the average at the end continued to be above the recommended value (start 115.65 mg/dL ±68.76 and end 121.53 mg/dL ±47.53). The ANOVA analysis showed a significant increase between the start and the end of the study for the CG only (p<0.019) (Tables 2 and 3). As for Triglycerides, it was observed that the averages of the two groups, at the end of the study, were higher than the level recommended in the ATP III, namely ? 150mg/dL. However, it should be noted that in the EG, the value was quite close to the recommended value (start 169.6 mg/dL ±58.08 and end 150.67 mg/dL ±66.9). As for the CG (start 292.12 mg/dL ±373.64 and end 232.35 mg/dL ±172.22), at the end of the study the average remained well above the recommended benchmark values.

As for the measurement of the abdominal circumference, there was no significant reduction in either group. The starting average in the CG was 95.71 cm ±8.95 compared with an ending average of 94.53 cm ±9.59 while the respective averages in the EG were 97 cm ±5.77 and 94.87 cm ±7.57, although there was a tendency towards a reduction in the EG. All averages were higher than the ATP III recommendation of ? 88 cm for women, but there was no significant difference between groups or between before and after treatment (Tables 2 and 3).

With regard to physical activity, it was found that with vigorous activity there was a significant difference between the groups at the end of the study. In the CG (start 36.18min ±69.18 and end 142.06min ±170.21), there was a significant increase in the time devoted to physical activity compared with the EG (start 125.67 min ±240.87 and end 52min ±141.38) (p= 0.038) (Table 2).

The blood pressure averages at the beginning and the end of the study were only computed in the EG, whose pressure was measured every week before each Stress Control Training session. It was noted that for systolic pressure, at the beginning of the Stress Control Training, the average was 12.21 mmHg ±0.55 and diastolic pressure was 7.85 mmHg ±0.44 and, at the end of the study, the systolic average was 12.22 mmHg ±0.53 and diastolic 7.99 mmHg ±0.55. No significant difference was found before and after the Stress Control Training using ANOVA analysis (Table 3). As for relaxation, a variable that was also evaluated in the EG, an average of 1.07 ±0.43 was obtained before performing the technique at home during the week (the average takes into account the days of the week on which the technique was carried out) and 0.18 ±0.12 after carrying out the technique during the week (Table 2). A significant reduction in the tension score was observed between the start and end of the study, but only in the EG because the CG was not subjected to this intervention (p<0.001) (Table 3).

With regard to the results of the nutritional evaluation, it was observed that there had been an increase in the consumption of Linseed by the EG after the Stress Control Training, given that at the beginning of the study the average for the CG was 0.29 ±0.69 and at the end 0.41 ±0.71, while in the EG it was 0.27 ±0.7 at the start and 1.1 ±0.97 (p=0.03) at the end. In addition, a reduction in Kcal consumption after the Stress Control Training was only found in the EG which had an average of 1549.27 ±503.27 at the beginning and 1179.13 ±372.38 at the end (p=0.028). As for sodium consumption, a significant reduction was found in both groups after the Stress Control Training (p<0.001).

5. Discussion

The present study produced results which, in part, confirmed the hypothesis proposed at the start, that is to say, after the Stress Control Training there was a reduction in some risk factors involved in MetS and, consequently, favorable alterations in these components in themselves. The comparative analysis between the groups and between periods of evaluation revealed that, in terms of age and stress (including the phase, phase percentage, number and type of symptoms) the groups were similar at the beginning of the study, which enhances the validity of the results found.

The results on stress, taken as a whole, make it clear that there is a perceived improvement in respect of this factor, both in terms of diagnosis and the level of stress in those who continued to be stressed, by observing the higher value in the CG for the percentage and number of symptoms. In other words, the results showed that there was an improvement in the stress picture in the EG and a worsening in the CG, results which corroborate the findings in the studies by Lipp (1991ª), Brasio (2003) and Malagris *et al* (2009).

The importance of the reduction in stress in the treated group should be emphasized here as the literature has been increasingly showing a relationship between stress and MetS and other chronic diseases (White, 2001; Lipp, & Malagris, 2001, 2011; Lipp, Malagris, & Novais, 2007; Lipp, & Rocha, 2007). So, keeping stress under control, combined with other changes in habits, could significantly contribute to quality of life in patients with MetS. Stress and its psycho-physiological alterations contribute to the aggravation of chronic diseases and, in the case of MetS, to the development and worsening of several of the components of MetS.

As for HTN, there was no alteration in the diagnosis in any of the groups, which was to be expected as the aim of the treatment of HTN is to control the disease and not to cure hypertension. However, it is interesting to note that the participants in the study, taken as a group, made regular use of medication prescribed by their doctor, keeping it under control. As for physical activity, after the period of the Stress Control Training, an increase was noted in the time spent on vigorous activity by the CG. This outcome is in contradiction with what would normally be expected as the EG was instructed on a weekly basis about the importance of physical activity, and even included the collaboration of a physical education instructor who was present at one of the sessions, teaching stretching techniques and explaining why practicing regular physical exercise is so essential. It may be supposed that the patients in the EG have devoted more time to other strategies such as relaxation and deep breathing techniques, changes in eating habits and cognitive techniques, ignoring the part about regular physical exercise, perhaps because of a reduction in the time available to them. The CG, before the study, had already had medical and nutritional instruction as part of their regular hospital treatment, which included an emphasis on the importance of physical activity, instruction which had also been received by patients in the EG. The fact that patients in the CG did not have weekly monitoring (Stress Control Training) and knowing the importance of physical activity (including that perceived through the application of the IPAQ), may perhaps have instilled in them a feeling of responsibility, so that when returning for re-evaluation (14 weeks later), they would present a certain investment in the control of MetS. Hypotheses which seek to explain such an outcome may be proffered, however it is recommended that fresh studies be carried out with greater emphasis on this practice. It is important to emphasize that during the Stress Control Training sessions, it was noticeable that the patients allowed themselves to rest more, enjoy more leisure time and, combined with the assertiveness training, they managed to say no to members of the family that used to leave the responsibility for domestic chores to them. Accordingly, certain activities which they performed previously came to be divided with other members of the family, which could have had an influence on the responses given in the IPAQ.

Considering the levels of total cholesterol, LDL, HDL the abdominal circumference at the end of the study, the comparison between the groups only showed a significant reduction in cholesterol and LDL between the beginning and the end with the EG. This outcome is interesting since it

demonstrates that participation in the Stress Control Training seems to have made the participants aware of the need for changes in diet, which could be one of the factors responsible for this reduction. It is important to remember that the role of cholesterol in the MetS is fundamental, as emphasized by the ATP III, (NIH, 2001, page 3), which has as its main goal in the treatment of Coronary Artery Disease (CAD) the reduction of LDL cholesterol, offering up-to-date clinical guidance to test and manage it. It is worth emphasizing that excessive stress could also be a culprit in the higher rates of cholesterol (Hotopf, Rosch, & Hart, 2002; Carvalho, 2008) and that, in addition to changes in dietary habits, the reduction in the level of stress may have contributed to alterations in these measures. It is worth quoting Carvalho (2008) who, in a study of coronary patients who felt themselves to be stressed, aimed to ascertain the effects of cardiac rehabilitation by way of educational counseling sessions and relaxation techniques with patients after an evaluation of the perceived stress, the level of cholesterol, BMI and the level of physical activity. The author divided the sample into two groups - EG with intervention and CG without intervention - and found a reduction in all factors in both groups, but in the EG the benefits remained after 3 months, which was not the case with the CG.

The results of the study presented here revealed that the profile of the CG worsened in respect of glucose, in other words, there was a significant increase between the beginning and the end of the study, just for this group. This piece of data demonstrates that, even though the EG may not have seen a significant reduction in levels of glucose, there was a reduction which resulted in the group average becoming borderline (109.33 mg/dL), i.e. slightly below the maximum limit of the ? 110 mg/dL recommended in the ATP III. Glucose in excess of recommended levels is an important component of MetS, according to ATP III (NHI, 2001), IDF (2006), OPAS (2006) and SBC (2006), and its increase demonstrates a worsening of the MetS picture in the patients of the CG. The EG was instructed by the nutritionist on the use of sweeteners and control of sugar and this was reinforced in the majority of the sessions, which probably contributed to the improvement witnessed.

It is important to emphasize the effects of the use of the relaxation and deep breathing techniques that were taught at the beginning of the Stress Control Training, practiced at the end of each session and encouraged to be used on a daily basis by the patients. An analysis of the outcome showed a significant reduction in the score before and after the use of the technique on a daily basis, for the EG, as the CG did not receive this intervention, in other words, the relaxation technique was effective in producing a sensation of calm and wellbeing in the patients that practiced it. Various studies have been carried out using relaxation training and they have demonstrated very interesting results such as in the study conducted by Carvalho (2008) which reduced the levels of perceived stress, cholesterol, amongst other risk factors, in patients with coronary problems. A study conducted by Chicayban and Malagris (2012, at press) also used this procedure in women with hypertension and discovered a reduction in the rate and symptoms of stress in participants in the EG, before and after the intervention.

The evaluation carried out by the HESFA nutritionist at the beginning of the study revealed, in the EG, an increased consumption of Linseed, a product which is enjoying the increasing acceptance of the experts. In the present study, Linseed came to be a part of the daily routine of the majority of the patients in the EG. Moreover, a reduction was found in Kcal and Sodium in the EG, the latter also seeing reduced consumption in the CG. The results are consistent with the benefits found in the EG in terms of the reduction in total Cholesterol and LDL, as well as the higher Glucose values in the CG.

Turning to the measurement of the abdominal circumference, although there was no significant difference, the reduction that occurred in the EG (initial average of 97 ±5.769 and ending average of 94.93 ±372.384) cannot be ignored, which leads to the consideration that perhaps, if the number of participants had been greater, the outcome might have been significant. Moreover, it is possible that with time and the continuous practice of healthy habits and stress control, the patients in the EG might achieve further reductions in the abdominal circumference.

6. Conclusion and recommendations for further studies

It was concluded that Stress Control Training has provided a variety of positive changes for patients subjected to it, with regard to MetS, thereby contributing to the control of the risk factors associated with it, and its components. Although, the findings seem promising and add to the studies on the efficacy of tailored interventions in the treatment of MetS, larger samples need to be evaluated. There is also the need for prospective studies that monitor the patients over time in order to ascertain the consolidation of the gains. Furthermore, qualitative studies emphasizing the subjective aspects demonstrated during the sessions which, in addition to the objective data, could reveal a great deal about the starting and ending conditions of patients in terms of the diverse variables utilized. If studies with larger samples corroborate the data in the current study, Stress Control Training could become a psychological treatment model of great value in the reduction of MetS risk factors and consequently in the prevention of coronary artery disease.

References

1. Alcino, A.B. (1996) Stress Social e Reatividade Cardiovascular infantil: Um estudo psicofisiológico. In: M.N. Lipp. (Ed.) *Pesquisas sobre stress no Brasil*. SP: Papirus, I(2): 35-46.

2. Associação Médica Brasileira (AMB) & Conselho Federal de Medicina (CFM) (2006). Síndrome Metabólica: Tratamento Não Farmacológico para Redução do Risco Cardiovascular. *Projeto Diretrizes. São Paulo:Brazil.*

3. Beck, A.T, Ward C, & Mendelson M. (1961). Beck Depression Inventory (BDI). *Archives of General Psychiatry*, 4 (6), 561-571.

4. Ministério da Saúde, Brasil (2009) Escola Nacional de Saúde Pública Sérgio Arouca. First Published in 24/04/2009. Retrieved February 22, 2010, from http://www.ensp.fiocruz.br/portal-ensp/informe/materia/index.php?matid=16175.

5. Brasio, K.M. (2003) O Treino de Controle do Stress aplicado à Retocolite Ulcerativa Inespecífica. In M.N. Lipp (Ed.) *Mecanismos Neuropsicofisiológicos do Stress: Teoria e Aplicações Clínicas*. Campinas, São Paulo, Brazil: Casa do Psicólogo, 193-197.

6. Carvalho, A.M.M.C.N.A. (2008) *Efeito de um Programa de Reabilitação Cardíaca com Terapia de Relaxamento no Stress Percebido de Pacientes Coronários*. Unpublished master´s thesis, Universidade do Porto, Instituto de Ciências Biomédicas Abel Salazar da Chicayban, Portugal.

7. L. M., & Malagris, L.E.N. (in press). Treino de Relaxamento e Respiração em pacientes com HA e stress. *Estudos de Psicologia, Campinas*, São Paulo, Brazil.

8. Fonseca, F.C.A., Coelho, R.,Z., Nocolato, R., Malloy-Diniz, L.F., & Silva Filho, H. C. (2009) A influência de fatores emocionais sobre a HA arterial [Electronic version], . *Jornal Brasileiro de Psiquiatria*, vol.58, n.2, pp. 128-134. ISSN 0047-2085. Retrieved from http://dx.doi.org/10.1590/S0047-20852009000200011

9. Hotopf, M.; Rosch, P. J. & Hart, C. (2002).Psychological Stress And Cardiovascular Disease, *Bmj*, 325-337.

10. International Diabetes Federation (IDF) (2006). The IDF consensus worldwide definition of the Metabolic Syndrome. Retrieved February 2, 2013 from http://www.idf.org/webdata/docs/IDF_Meta_def_final.pdf.

11. Jacobson, E. (1939) *Progressive Relaxation*. Chicago: University of Chicago Press.

12. Lambert, E., Dawood, T., Straznicky, N., Sari, C., Schlaich, M., Esler, M., & Lambert G. (2010) Association between the sympathetic firing pattern and anxiety level in patients with the metabolic syndrome and elevated blood pressure. *Journal of Hypertension*, 28(3), 543-550.

13. Lipp M.E.N. (1991) O Valor do Controle do Stress como Terapêutica da Hipertensão Arterial In: M. Nobel (Ed.) *Psicossomática* Campinas, São Paulo, Brazil: NEP, 86-163.

14. Lipp MEN. (1991a) *Estudo Experimental de duas condições de tratamento médico-psicológico a pessoas portadoras de psoríase*. Campinas, São Paulo, Brazil: NEP.

15. Lipp, M.E.N. (2000) *Inventário de Sintomas de Stress de Lipp*. São Paulo, Brazil: Casa do Psicólogo.

16. Lipp, M.E.N. (2003) O Tratamento Psicológico do Stress. In: M.N. Lipp (Ed.). *Mecanismos Neuropsicofisiológicos do Stress: Teoria e Aplicações Clínicas*. São Paulo: Casa do Psicólogo: 187-192.

17. Lipp, M.E.N. et al. (1989) *O Valor do Controle do Stress no Tratamento da HA*. Unpublished Report, Universidade Católica de Campinas, São Paulo, Brazil.

18. Lipp, M.E.N., Alcino, A.B., Bignotto, M.M., & Malagris, L.E.N. (1998) O treino de controle do stress para hipertensos: uma contribuição para a medicina comportamental. *Estudos de Psicologia*; 15 (3): 59-66.

19. Lipp, M.E.N., & Malagris, L.E.N. (2001) O Stress Emocional e seu tratamento. In: B. Rangé (Org.), *Psicoterapias Comportamental e Cognitiva: Um diálogo com a psiquiatria*.(475-490) Porto Alegre, Brazil: Artmed.

20. Lipp, M.E.N., & Malagris, L.E.N. (2011) Estresse: aspectos históricos, teóricos e clínicos. In: B. Rangé, P*sicoterapias Cognitivo-Comportamental: um diálogo com a psiquiatria (pp. 617-632). Porto Alegre, Brazil: Artmed*,

21. Lipp, M.E.N., Pereira, M.B., Justo, A.P., & Matos, T.M.G. (2006) Cardiovascular Reactivity in Hypertensives: Differential Effect of Expressing and Inhibiting Emotions during Moments of Interpersonal Stress. *The Spanish Journal of Psychology*, 9 (2), 154-161.

22. Lipp, M.E.N., Malagris, L.E.N., & Novais, L.E. (2007) *Stress ao longo da vida*. São Paulo, Brazil:Ícone.

23. Lipp, M.E.N., & Rocha, J.C. (2007) *Pressão alta e stress: o que fazer agora? Um guia de vida para o hipertenso*. Campinas, São Pualo, Brazil: Papirus.

24. Luna, R.L. (2007) S*índrome Metabólica. Arquivos Brasileiros de Cardiologia*, 88(5), 124-126.

25. Malagris, L.E.N., Brunini, T.M.C., Moss, M. B., Silva, P.J.A., Espósito, B. R., & Ribeiro, A.C.M.(2009) Evidências biológicas do treino de controle do *stress* em pacientes com HA. *Psicologia: Reflexão e Crítica*, 22(1), 1-9.

26. Matsudo, S., Araújo, T., Andrade, D., Andrade, E., Oliveira, L.C., & Braggion, G. (2001) Questionário Internacional de Atividade Física (IPAQ): estudo de validade e reprodutibilidade no Brasil. *Revista Brasileira de Atividade Física & Saúde*, 6(2), 5-12.

27. National Institutes of Health (NIH) (2001) Third Report of the National Cholesterol Education Program (NCEP) Expert Panel on Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III). *National Cholesterol Education Program's (NCEP's)* Publication No. 01-3670. Retrieved March 7,2009. From http://www.nhlbi.nih.gov/guidelines/cholesterol/atp3xsum.pdf.

28. Organização Mundial de Saúde (2008) Informe sobre la salud en el mundo 2008: La atención primaria de salud, más necesaria que nunca. Retrieved February 2, 2013 from http://www.who.int/whr/2008/es/index.html.

29. Organização Pan-Americana de Saúde (OPAS) (2006) Trabalhando Juntos pela Saúde: Relatório Mundial de Saúde. Retrieved February 5, 2013 from http://www.opas.org.br/gentequefazsaude/documento/resumo.pdf.

30. Saad, M.J.A., Zanella, M.T., & Ferreira, S.R.G. (2006) Síndrome Metabólica: ainda indefinida, mas útil na identificação de alto risco cardiovascular. *Arquivos Brasileiros de Endocrinologia e Metabolismo*, 50(2), 161-162.

31. Salaroli, L.B., Barbosa, G.C., Mill, J.G., & Molina, M.C.B. (2007) Prevalência de Síndrome Metabólica em Estudo de Base Populacional, Vitória, ES-Brasil. *Arquivos Brasileiros de Endocrinologia e Metabolismo*, 51/7, 1143-1152.

32. Selye, H. (1965). *Stress: A tensão da vida*, SP: IBRASA.

33. Sociedade Brasileira de Cardiologia (SBC) (2006) Projeto Diretrizes. *Revista da AMRIGS*, Porto Alegre, Brazil. 50 (1), 65-106.

34. Sheffield D., Smith G.D, Carroll D, Shipley M, & Marmot M.G. (1997). The effects of blood pressure resting level and labiality on cardiovascular reactions to laboratory stress. *International Journal of Psychophysiology*; 27(2), 79-86.

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35. Spielberger, C.D. (1992). *Inventário de Expressão de Raiva como Estado e Traço (STAXI)*. Translated and validated by A. Biaggio. São Paulo, Brazil: Vetor Editora Psicopedagógica.

36. Vrijkotte, T.G., Van Doornen L.J., & De Geus, E.J. (2000). Effects of work stress on ambulatory blood pressure, heart rate, and heart rate variability. *Hypertension*. 2000; 35(4), 880-886.

37. White, C.A. (2001) *Cognitive Behaviour Therapy for Chronic Medical Problems. A guide to Assessment and treatment in practice*. NY: Wiley.

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