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Effects of Workplace Based Exercises on the Lipid Profile, Systemic Blood Pressure, and Body Fat of Female Workers

Ana Claudia V. Osiecki[1], Raul Osiecki[2] , Luciana S. Timossi[2], Liliana Laura Rossetin[3], Thais do Amaral Machado[1], Suelen Meira Góes[1], Neiva Leite[1]

[1]Life Quality Nucleus / Postgraduate Program in Physical Education / Federal University of Paraná, Brazil, [2]Center for the Studies on Human Performance / Postgraduate Program in Physical Education/Federal University of Paraná, Brazil

ABSTRACT

Osiecki ACV, Osiecki R, Timossi LS, Rossetin LL, Machado TA, Góes SM, Leite N. Effects of Workplace Based Exercises on the Lipid Profile, Systemic Blood Pressure, and Body Fat of Female Workers. **JEPonline** 2013;16(3):69-75. The purpose of this study was to assess the effects of a 12-wk workplace based exercise program on total cholesterol (TC), high density lipoprotein (HDL), low density lipoprotein (LDL), triglycerides (TG), anthropometric profile (weight, waist circumference, fat percentage, BMI, and skin-fold thickness), systolic blood pressure (SBP), and diastolic blood pressure (DBP) on female workers. The subjects were placed in two groups: intervention (n = 24; age = 42.50 ± 11.35 yrs) and control (n = 26; age = 48.77 ± 9.27 yrs). The 12-wk intervention group engaged in gymnastics and relaxation for 15 min·d^{-1} 5 times·wk^{-1}. The statistical findings indicate that the intervention group had significant reductions in TC, LDL ($P<0.001$), HDL, diastolic blood pressure, and body fat ($P<0.05$), and waist circumference ($P<0.01$). The findings support the importance of a workplace based physical activity program in the improvement of cardiovascular risk factors.

Key Words: Gymnastics, Heart Diseases, Workplace, Risk Factors

INTRODUCTION

The sedentary lifestyle is a major challenge to public health (9,11). Based on this perspective, one should search for lifestyle changes to help in the prevention of chronic diseases (6). In particular, regular physical activity is acknowledged as a scientifically proven method to prevent or decrease the negative effects of many pathological conditions, including but not limited to, hypertension, heart disease, type 2 diabetes mellitus, and osteoporosis (14,18).

Although physical activity is an important method to improve health and well-being, an extremely high percentage of society does do not adhere to this thinking (19). They understand that there are benefits from regular exercise, especially when maintained for a long period of time (2). Yet, such benefits are understood in terms of adults spending one-fourth of their lives within the work environment (12) with high stress and anxiety. The work conditions greatly affect their lifestyles, which leads to inactivity, overweight, and obesity.

Obesity has become such a global issue (4,7) that the work environment is recognized as a place where a large percent of the population will require systematic and guided instructions in physical activity (19). Exercise programs should be provided by exercise physiologists who are fully qualified to promote health through safe exercise prescriptions to improve quality of life for the workers (10,13). However, given some concerns regarding the quantification of the female adult population and their type of exercise, intensity, volume, frequency, and age specificity (8), this study was designed to assess the effects of the workplace based program of physical activity on Lipid Profile (i.e., total cholesterol – TC, low density lipoprotein – LDL, high density lipoprotein – HDL, and triglycerides – TG) as well as the anthropometric body fat profile (weight, waist circumference, fat%, BMI, and skin-fold thickness), systolic blood pressure (SBP), and diastolic blood pressure (DBP) of female workers.

METHODS

Subjects

The subjects consisted of 50 women who worked in administrative roles of a university setting. They were randomly divided into two groups: the intervention group with 24 subjects (42.50 ± 11.35 yrs old) and the control group with 26 subjects (48.77 ± 9.27 yrs old). All subjects were submitted to an initial medical evaluation that classified them as in good health. The criteria for inclusion in the study were: (a) nonsmokers; (b) non diabetic; (c) absence of known cardiovascular disease; and (d) absence of any orthopedic pathology or any other known impediment for participation in physical activity. Each subject read and signed a consent form to participate, which was approved by the ethics committee of the Health Department of the Federal University of Paraná (UFPR) and formalized under the registration: CEP/SD: 1159.084.11.06; CAAE 0082.0.091.000-11.

Procedures

The subjects' blood lipid profile was obtained after fasting for 12 hrs with no prior hydration. Body weight was measured with the subjects wearing shorts and t-shirt with no shoes while standing on the center of the platform of an electronically calibrated scale. Height was measured while the subjects continued standing in the erect posture with the feet together without shoes. Percentage of body fat was estimated by bio-impedance (Maltron BF-906). Eight areas of skin-fold thickness were assessed (triceps, biceps, sub-scapular, thigh, calf, abdominal, supra-iliac, and mid-axillary) with a Harpenden Skinfold Caliper. Waist circumference (WC) was measured in the standing position with a relaxed abdomen. The feet were together with the arms hanging alongside the body. With the use of an anthropometric tape, the waist circumference was measured at the middle point from the last rib to the iliac crest. Blood pressure was assessed in the morning with a Mercury column sphygmomanometer after the subject was seated and rested for no less than 10 min. The intervention group consisted of female workers who took part in an exercise program for 12 wks, 15 min·d^{-1} 5 times·wk^{-1} at 8:45 am. The classes included gymnastics and relaxing activities. At the end of the program, all the workers were again submitted to blood, anthropometric, and blood pressure analyses.

Statistical Analysis

The data are presented as means ± standard deviations. The Kolmogorov-Smirnov test was used to test for normality in the data. Statistical comparison between pre and post-test was obtained with a Student´s *t* test for pair samples with a P<0.05 level of significance. Data analysis was carried out in the SPSS 20.0 for Windows (SPSS statistical package).

RESULTS

The comparative data related to the lipid profile of the exercise group (24 subjects) and the control group (26 subjects) are presented in Table 1. Total Cholesterol (TC, P=0.0001), low density lipoprotein cholesterol (LDL, P=0.0001), and high density lipoprotein cholesterol (HDL, P=0.029) decreased significantly from the Pre-Test to the Post-Test in the Exercise Group. The Control Group also demonstrated a significant decrease (P=0.022) in HDL from the Pre-Test to the Post-Test. There were no significant changes in triglycerides (TG) for either group.

Table 1. Lipid Profile for the Subjects in the Exercise Group and the Control Group.

Conditions	Pre-Test	Post-Test	P
Total Cholesterol - Exercise	214.54 ± 34.37	185.62 ± 30.58	0.0001*
Total Cholesterol - Control	208.23 ± 37.49	212.23 ± 38.07	0.419
LDL - Exercise	139.33 ± 31.03	115.33 ± 23.98	0.0001*
LDL - Control	130.38 ± 34.56	136.31 ± 34.20	0.224
HDL - Exercise	54.50 ± 10.15	50.58 ± 8.40	0.029*
HDL - Control	50.88 ± 13.13	48.54 ± 12.00	0.022*
Triglycerides Exercise	103.33 ± 37.63	100.37 ± 37.22	0.690
Triglycerides Control	140.46 ± 80.45	136.61 ± 48.07	0.742

P<0.05*; values expressed in mg·dL^{-1}

Table 2 presents a comparison of the systolic and diastolic blood pressure values for both groups. Systolic blood pressure (SBP) was not significantly different (P=0.178) in the Exercise Group from Pre-Test to Post-Test. The Control Group demonstrated a significant increase in SBP, P=0.003).

There was a significant decrease (P=0.049) in diastolic blood pressure (DBP) in the Exercise Group while DBP remained unchanged in the Control Group.

Table 2. Blood Pressure for the Subjects in the Exercise Group and the Control Group.

Conditions	Pre-test	Post-test	P
SBP Exercise	112.50 ± 8.47	110.42 ± 10.59	0.178
SBP Control	109.30 ± 14.28	118.08 ± 13.57	0.003*
DBP Exercise	71.96 ± 6.84	68.71 ± 7.94	0.049*
DBP Control	70.77 ± 10.78	73.08 ± 12.25	0.265

SBP = systolic blood pressure; DBP = diastolic blood pressure (mmHg)

Table 3 shows the anthropometric data. Body weight and BMI were unchanged from Pre-Test to Post-Test in both groups. Skinfold thickness was significantly (P=0.044) decreased in the Exercise Group, but not in the Control Group. Percent body fat increased slightly in the Control Group. The Exercise Group demonstrated a significant decrease (P=0.009) in waist circumference from the Pre-Test to the Post-Test measurements while no significant change was observed in the subjects that made up the Control Group.

Table 3. Anthropometry for the Subjects in the Exercise Group and the Control Group.

Conditions	Pre Test	Post Test	P
Body Weight - Exercise	67.22 ± 14.14	67.52 ± 13.39	0.445
Body Weight - Control	69.51 ± 20.13	72.93 ± 15.26	0.226
BMI - Exercise	25.13 ± 4.81	25.11 ± 4.65	0.936
BMI - Control	26.76 ± 6.90	28.08 ± 4.38	0.198
Skinfold Thickness Sum - Exercise	189.74 ± 16.73	174.63 ± 19.82	0.044*
Skinfold Thickness Sum - Control	221.49 ± 61.33	227.10 ± 66.40	0.349
Body Fat (%) - Exercise	29.73 ± 9.42	28.51 ± 9.41	0.433
Body Fat (%) - Control	35.27 ± 8.25	36.50 ± 8.80	0.014*
Waist Circumference - Exercise	86.97 ± 3.90	85.04 ± 2.38	0.009*
Waist Circumference - Control	91.84 ± 12.91	89.93 ± 13.78	0.148

Body weight (kg); BMI=body mass index ($kg \cdot m^{-2}$); Skinfold thickness sum (mm); Waist circumference (cm); P<0.05*

DISCUSSION

The findings from this study demonstrate the positive effects of an intervention program of physical activity on the anthropometric, lipid, and blood pressure in female administrative workers. The results are consistent with the role regular physical activity plays in the reduction of risk factors for cardiovascular disease in human subjects.

Lipid Profile

The exercise “intervention” program of 5 times·wk^{-1} 15 min·d^{-1} for 12 wks had a significant “positive” influence on the subjects’ concentrations of total cholesterol and LDL. These findings are in agreement with Guo and colleagues (5) and Thorndike et al. (17) who reported that exercise led to an improvement in lipid profiles in their subjects. Although it seems clear that workplace based exercise programs can successfully initiate reductions in cardiovascular risk, it is unclear why the subjects in the Exercise Group demonstrated a reduction in HDL cholesterol. An increase in HDL cholesterol is considered a positive response to regular exercise.

Blood Pressure

Although the exercise intervention did not result a significant decrease in SBP at Post-Test, it is important to point out that the subjects’ blood pressure values in the Exercise Group (and the Control Group as well) were in the normotensive range to begin with. While physical activity resulted in a significant reduction in DBP in the Exercise Group, the difference is very small. By comparison, improved blood pressure has been verified in workers who have taken part in a program of physical activity at their workplace in small and medium-sized companies (1,15,16). Interestingly, there was a significant increase in SBP in the Control Group (i.e., 71 to 73 mmHg, which is not important in terms of a hemodynamic risk to the cardiovascular system).

Anthropometric Characteristics

In the Pre-test and Post-test comparisons, it was noted that the Exercise Group had significant reductions in their skinfold thickness and abdominal circumference. Similar results in other studies have been observed following the subjects’ participation in a program of physical activity at their workplace (15). Similarly, Christensen et al. (3) reported that a program of exercises and diet at the healthcare professionals’ occupational setting resulted in positive healthcare results, including a decrease in body fat, waist circumference, and blood pressure.

CONCLUSIONS

The findings in this study indicate that the Exercise Group with gymnastics and relaxation exercises demonstrated positive changes in metabolic (Total Cholesterol and LDL Cholesterol), anthropometric (sums of skinfold thickness and waist circumference), and hemodynamic (DBP) responses. The results demonstrate that a program of systematic and daily exercises for as few as 15 min a day can impact positively in risk factors that can help prevent coronary arterial disease. These results suggest that larger and more elaborate studies should be undertaken to determine the exact benefit that may arise from workplace based physical activity and relaxation exercises.

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Adress for correspondence: Osiecki ACV, Universidade Federal do Parana – Departamento de Educação Física. Adress: Rua Coração de Maria . N^{o} 92 – Jardim Botanico CEP: 80210-132. Curitiba, Paraná, Brazil. Email: ana.osiecki@gmail.com

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