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ORIGINAL PAPER (ARTIGO ORIGINAL)

EFFECT OF EXERCISE TRAINING ON HEALTH-RELATED PHYSICAL FITNESS FACTORS AND BLOOD LIPIDS PROFILE OF FORMER ADDICTED PERSONS

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ABSTRACT
BANITALEBI, E.; FARAMARZI, M.; NURI, R.; KHOSROZADEH, J.; GHAFOORIAN, M. Effect of exercise training on health-related physical fitness factors and blood lipids profile of former addicted persons. Brazilian Journal of Biomotricity, v. 4, n. 3, p. 190-197, 2010. Dysfunctional eating patterns and excessive weight gains have been observed during recovery from drug and alcohol addictions. The purpose of this study was to determine the effect of exercise training on health-related physical fitness factors and blood lipids profile of former addicted persons. Thirty seven males who were 23-49 years old, and had one-year quitting history were selected and randomized (exercise group, n= 18 and control, n= 19). Thirty eight individuals completed the entire study; 16 persons were in exercise group and 15 persons were in control group. Exercise training was consisted primarily of some game-based aerobic exercise. Exercise training duration progressed from 20 minutes at the baseline to 45 minutes at the end of weeks 12th, and intensity of exercise progressed from 50% of heart rate reserve of baseline to 70 % at 12 weeks. Weight, BMI and WHR were measured. Muscle endurance, flexibility and Vo_2Peak were measured using by pull up, Sit -and -Rich test and one-mile Rockport walk test, respectively. Body composition was assessed using the sum of three skin-fold measurement specific for males (chest, abdomen, and tight). Total cholesterol (TC), high-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholesterol (LDL-C) and triglyceride (TG) were measured enzymatically using diagnostic Pars kits. All variables were measured at baseline. Data analyzed by using ANCOVA analysis. There were no significant differences in weight (p=0.208), BMI (P=0.2631), CT (P=0.428), HDL (0.833), LDL (0.396), VLDL (P=0.169), TG (P=0.283), Vo_2peak (p=0.884), flexibility (P=0.923) and Pull-up (P=0.44) after 12 weeks exercise training between two groups, but there was significant difference in WHR (p=0.044). It appears that, exercise training can prevent weight gain after quitting drugs and substances.

Key words: Exercise training, Heart risk factor, Lipids, Quit drug.

INTRODUCTION

There is a meaningful increase in the number of persons admitted to recovery programs for drug abuse. Overweight and dysfunctional eating patterns have been observed among people in recovery from drug and alcohol addictions. Six progressive recovery stages has been suggested: (1) transition or pretreatment phase, in which the addicted individual recognizes the addiction problem; (2) stabilization, marked by detoxification and recuperation from acute withdrawal; (3) early recovery, in which the compulsion to use chemicals is reduced and the sober individual becomes more comfortable with being abstinent; (4) middle recovery, in which the individual begins to experience a balance and productive daily life; (5) late recovery, in which the addicted individual begins to move towards healthy living; and (6) maintenance, marked by an awareness for continued growth and development (COWAN and DEVINE, 2008). This study emphasized the differences in weight changes, meaningful use of food, and eating behaviors at different stages of recovery and the opportunities for nutrition interventions at each stage. The excessive weight gain that usually occurs in early recovery and the struggles to lose weight later on in the recovery process further highlight the importance of early nutrition and weight interventions in drug and alcohol treatment facilities. Clark et al (2006) illustrated that approximately half of females who are seeking smoking cessation treatment are weight concerned and that one quarter of male smokers are weight concerned (CLARK et al, 2006). Levine et al (2001) reported that although weight-concerned women smokers expected to gain large amounts of weight after quitting, they expressed a willingness to tolerate only minimal weight gain (LEVINE et al, 2001). The discrepancy between expected and tolerable weight gain may undermine efforts to quit smoking in this group of women.

Abrantes (2006) illustrated that there is some concern that substance abuse treatment may actually pose a risk toward unhealthy eating and weight gain. In a study examining the relationship between supervised drug abstinence and increased weight gain among 215 adolescents in a residential substance abuse treatment center, Hodgkins and colleagues (2004) found that neurotransmitter release in the nucleus accumbens use has been linked to self-administration and learning following drug use. This endogenous reward system is also activated following food intake or sex. Therefore, rebound hyperphagia following abstinence may be a mechanism to replenish the release of neurotransmitters in this reward system, leading to increased weight gain and a rise in Body Mass Index during recovery from substance abuse.

One area that has not been sufficiently explored among currently available adolescent drug use treatment programs is the effect of promoting healthy living integrating structured physical activity and nutritional intervention programs. Overweight and obesity are important lifestyle-related public health problems in the world. Overweight and obesity increase the risks of hypertension, type 2 diabetes, dyslipidemia, coronary heart disease, gout, osteoarthritis, gallbladder disease, endometrial and colon cancer, psychosocial problems, sleep apnea, disability and premature mortality (TIAN et al, 2009).There is growing evidence that a weight loss of between 5 and 10% of baseline weight will substantially reduce health risk. Exercise that expends at least 2000 kcal per week is effective to evoke a weight loss of at least 5% for men and will likely prevent weight gain (DONNELY et al, 2003).

Endurance exercise training improves plasma lipoprotein and lipid profiles and thus reduces CVD risk. Fifteen to 20 miles of brisk walking or jogging (energy expenditure of 5021-9205 kJ/wk) was associated with HDL-C increases of 2 to 8 mg/dl (HALVESRSTADT et al, 2007). A relatively high amount of regular exercise improved overall lipoprotein profiles, including an increase in total HDL concentration, large HDL particle concentration,

and HDL particle size, even without clinically significant weight loss (TIAN et al, 2009). Long-term restriction of energy intake has proven difficult and generally results in weight re-gain over time. Exercise has been shown to provide an energy expenditure that is not fully compensated with other components of the energy balance equation and thus provides a stimulus for weight loss and maintenance (DONNELY et al, 2003).

However, few well-controlled studies are available to determine whether regular exercise is indeed an effective weight management strategy for former addicted persons. Thus, the purpose of this istudy is to determine the effect of exercise training on health-related physical fitness factors and blood lipids profile of former addicted persons.

MATERIALS AND METHODS

Subjects

Subjects were recruited from the Behzisti Institution (a rehabilitation centre in Iran). They were referred there for quitting drugs or had quitted drugs. Sixty-two subjects who were 23–49 years old, and had more than one year of quitting history were recruited for the resent study. They were invited to an informational meeting where they received written and verbal information about the study protocol that was approved by exercise psychologist experts from Islamic Azad University of Shahrekord. The subjects were randomly allocated into either the exercise group (32 persons) or the control group (30 persons). Thirty one individuals completed the entire study with 16 persons in the exercise group and 15 persons in the control group. All subjects completed informed consent form. Before participating in the study, subjects completed a medical history questionnaire.

Procedures

Endurance exercise training consisted of 12 weeks of supervised endurance exercise including 3 sessions per week. Subjects were allowed to use various types of Game-based aerobic exercise training: badminton, walking, and jogging. Exercise training began with 20 minutes at 50% of heart rate reserve and progressed to 70% of heart rate reserve for 60 minutes where it remained for the final 12 weeks. The control group participated in psychological consulting sessions only. All exercise training was preformed under the direct supervision of research personnel throughout the exercise training sessions. Because exercise training intensity can not be controlled by observation, target heart rate was verified during each session by using pulse-meters that was used randomly by ten subjects at any time.

Measurements

Body mass index (BMI) was calculated by measuring height and weight at baseline and the end of 12 weeks. Body composition was assessed using the sum of three skin-fold measurements specific for males (chest, abdomen, and thigh) (ACSM, 2000). 10 ml of blood was drawn for each subject after 12 hours fasting from superficial forearm vein. Total cholesterol, high-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholesterol (LDL-C) and triglyceride (TG) were measured enzymatically using Diagnostic Pars Kits. Each subject performed a middle intensity Vo_2Peak test on a treadmill to determine the cardiovascular fitness (one-mile Rockport walking test) (ACSM, 2000). Flexibility and muscular endurance were assessed by Sit-and-Reach Test (HOEGER and HOEGER, 2007) and modified Pull-up Test (ACSM, 2000), respectively. Heart rate (HR) was recorded by using a Polar heart rate monitor belt. All variables were measured at baseline and end of weeks 12th.

Statistical analysis

Data were analyzed using SPSS (Version 13.0). For the description of data, mean and

standard deviation were used. Also, mean values of two groups in pre and post tests were compared by analysis of covariance (ANCOVA analysis) for measurements. The significance levels of this study was set at $p<0.05$.

RESULTS

Table 1 indicated that there were no significant differences between the exercise and control group for age, duration of without abusing drugs, duration of using drugs and number of cigarettes at baseline ($p>0.05$).

Table1 - Baseline characteristics of participants in the exercise group (EG) and control group (CG)

Variable	pretest		F	Sig	P-value
	CG	EG			
Number	15	16	-	-	-
Age(years)	35.60 ± 7.53	35.38 ± 6.71	0.456	0.505	0.931
Duration of without abusing (months)	21.46 ± 13.24	21 ± 1.18	0.90	0.351	0.916
Duration of using drugs (years)	13.40 ± 6.52	15.06 ± 7.14	0.000	0.993	0.505
Number of cigarettes per day	9 ± 10.36	11.25 ± 11.61	0.681	0.416	0.575
Height(cm)	177.40 ± 6.31	174.06 ± 4.71	1.737	0.198	0.105

Table2 - Effect of 12 weeks exercise training on variables in subjects

Variable	Changes		F	Sig
	CG	EG		
Weight (kg)	0.9 ± 3.18	-2.31 ± 2.44	1.655	0.208
BMI (Kg/m^2)	0.29 ± 1.04	-0.78 ± 0.80	1.303	0.263
WHR	0.013 ± 0.020	-0.04 ± 0.04	4.433	0.044*
CT ($mg.dl^{-1}$)	-1.40 ± 15.03	-9.87 ± 13.17	0.647	0.428
TG $mg.dl^{-1}$	0.93 ± 22.21	-1.81 ± 11.66	1.195	0.283
HDL- C ($mg.dl^{-1}$)	-1.133 ± 2.06	1.12 ± 2.06	0.045	0.833
LDL-C ($mg.dl^{-1}$)	0.80 ± 2.01	-2.62 ± 2.89	0.744	0.396
VLDL ($mg.dl^{-1}$)	0.93 ± 1.28	-0.75 ± 1.65	1.99	0.169
Pull- up (Modified test)	0.47 ± 2.23	3.06 ± 2.90	0.613	0.44
Sit- up	1.06 ± 2.76	6.62 ± 3.34	0.376	0.545
Flexibility (cm)	0.533 ± 2.06	3.125 ± 2.47	0.010	0.923
Vo_2peak(ml/kg/min)	-0.74 ± 1.55	1.49 ± 1.67	0.022	0.884

Furthermore, as indicated in table 2, there were no significant differences between post tests for weight (P=0.208), BMI (P=0.263), CT (P=0.428), TG (P=0.283), LDL-C (P=0.396), VLDL (P=0.169), HDL-C (P=0.833), Pull- up (P=0.44), Sit- up (P=0.545), Flexibility (P=0.923) and Vo_2peak (p=0.884) after 12 weeks. Statistically significant differences were found for WHR between pre and post test. Weight was decreased 1.781 kg and 0.8 kg in EG and CG, respectively

DISCUSSION

The aim of present study was effects of 12-week exercise training on health-related physical fitness factors and blood lipids profile of former addicted persons. The findings of this study showed that 12 week exercise training can not decrease weight. Cowan and Devine (2008) reported that there were three main stages (early, mid and later) following recovery from substance addiction. Men in early recovery (1-6months) described dysfunctional eating practices such as binge eating, the use of food as a substitute for drug use, and the use of food to satisfy cravings (COWAN and DEVINE 2008). The findings about weight gain (CG: 0.9 ± 3.18kg), increasing BMI (CG: 0.29 ± 1.04), WHR (CG: 0.013 ± 0.020) after quitting substances were similar to that of Williams (2003), Cowan & Devine (2008), Trinko et al (2007). Other studies have focused more on weight gain after quitting smoking (CLARK et al, 2006; COOPER et al, 200; KNAUSS et al, 2005; PISINGER and JO RGENSEN, 2007; PRAPAVESSIS et al, 2007; SCHOELLER and SAY, 1997; TOLL et al, 2008a; TOLL et al, 2008b, USSHER et al, 2007; and WHITE et al, 2007). One reason for the weight gain is that nicotine and drugs speed up body metabolism. After quitting, body metabolism slows down and it causes weight gain even if persons do not eat more. It is postulated that for these measurements (weight and BMI), increase is not evitable (TALCOTT et al, 1995). Exercise training had no significant effect on body weight, BMI, CT,TG, HDL, LDL and VLDL ($p<0.05$). Exercise training (180 minutes) of moderate intensity per week could not reduce the weight in compared to control group. As noted, dysfunctional eating patterns and weight gain have been observed during recovery from drug and alcohol addiction. In addition, Williams 2002 found that dieting to prevent this weight gain is ineffective and may actually interfere with quit efforts. Diet does not provide a long-term solution and over 50% of individuals who lose weights through diet eventually regain the weight they lost. Dietary restraint is difficult across time; it represents a state of deprivation, and runs counter to the current environment that provides enormous amounts of palatable, high energy, low cost foods, and beverages available at almost any location (DONNELY et al, 2004). Therefore, physical activity and exercise can prevent or manage overweight after quitting drugs, substances and smoking. ACSM recommended that individuals decided lose weight should participate in at least 150 minutes of moderate intensity exercise training per week, and to accumulate >200 minutes of moderate intensity exercise training per week when possible. Marcus et al (2006) reported that vigorous exercise facilitates short- and longer-term smoking cessation in women when combined with a cognitive-behavioral smoking cessation program (MARCUS et al 2006). Vigorous exercise improves exercise capacity and delays weight gain following smoking cessation. Data from the National Weight Control Centre (JAKICI et al, 1999; KLEM et al., 1997; SCHOELLER and SHAY, 1997) illustrated that prevention of weight regain is associated with 280 to 450 minutes of moderate intensity exercise training per week, while 180 minutes per week was used in the present study. In the EG, 180 minutes exercise per week result in no significant weight reduction. Thus, 180 minutes moderate-intensity exercise training per week can be as a guideline for the prevention of weight gain in persons who have quitted drugs and substances for more than one year.

In the present study, there was a significant increase in health-related physical fitness factors such as muscular endurance, flexibility and Vo_2peak in the EG after 12 week exercise training, but there was no significant change in the CG. Wilmore et al (1996) reported that physical activity and exercise training result in increased muscular strength and endurance through neuromuscular adaptations in early weeks, and in later weeks it was done by muscular mechanism (WILMORE et al., 1996). The finding of present study showed no significant increase in Vo_2pak after 12 weeks of exercise training, that similar to

others (Power and HOWLEY 199, WILMOR 1996, BABB et al (1997).

Also the findings of this study indicated significant increase in VLDL (p=0.014), and a significant decrease in HDL-C (p=0.025) in CG. There were no significant differences in CT, LDL, HDL and VLDL (p>0.05) in post test between two groups. As noted, there was no significant decrease in TG between post tests. Exercise training should be enough intense and long to decrease TG. In this study, because of condition of subjects, the exercise was not long enough and intense was lesser (~70% Vo_2peak). Enough intensity to decrease TG is 85% Vo_2max (HOGER and HOGER, 2007). Despite of only 1.78 kg weight lost, this is important because it demonstrates that individuals can acquire positive health benefits from moderate exercise (HALVERSTTADT et al, 2007).

In conclusion, our data can not provide evidence for the beneficial effects of moderate intensity endurance exercise training, independent of diet on weight, BMI, and plasma lipoprotein and lipid profiles in former addicted persons at risk for CVD. However, confirm this findings need to more studies with different intensity and duration of exercise training.

PRACTICAL APPLICATION

The findings of present study demonstrated that moderate intensity exercise training is a good training to manage weight gain in former addicted persons who have quitted drugs more than one year and to have loss weight they should exercise more intensity and long duration.

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