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ORIGINAL ARTICLE

Association between Physical activity, Body composition and Cardiovascular Diseases in Non-athlete Male students

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ABSTRACT
Cardiovascular diseases are major cause mortality and morbidity in Iran. Epidemiology studies have shown that non activity and obesity are the main factors for cardiovascular diseases (CVD). So study purpose is relationship between physical activity (PA), body composition and CVD risk factors in non-athlete students. Two Hundred non-athlete male students (age 21.33 ± 2.50yr, height 171.4 ± 6.44cm, Weight 70.80 ± 23.33kg) in Islamic Azad University–Dezful branch were require to filed out consent form, health history and Bouchard questionnaire. In this study Body weight (BW), body mass index (BMI), Body Fat (PBF), Waist hip ratio index (WHR), systolic blood pressure (SBP), diastolic blood pressure (DBP) was measured. Daily physical activity estimated with Bouchard questionnaire. To determine the serum lipid profiles, blood samples were obtained in fasting state. Statistical analyses were performed through the Statistical Package for the Social Sciences (SPSS/10). The association between PA, BW, BMI, WHR, PBF and the select CVD risk profile were performed using Pearson product moment coefficient of correlation. All data expressed as mean±sd. Statistical significance was set at the P< 0.05 levels.
The results showed relationship between PA, body composition and some of coronary heart diseases risk factors. The results indicated that student's health effected than PA and body fat because there was relation between PA, BFP and coronary heart disease risk factors.
Keywords: *physical activity (PA), aerobic power, cardiovascular disease (CVD), lipoproteins*

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INTRODUCTION

Cardiovascular diseases (CVD) are one of the most important causes of death in the world [1]. CVD are also reported to be the leading cause of death in the eastern Mediterranean region in clouding the Iran. The proportion of deaths due to CVD reached around 38% in 1989 year [2]. Epidemiological studies have showed fat sedentary life and obesity are related to coronary heart disease (CVD) [3]. In numerous studies, inverse association has been demonstrated between physical activity, obesity and CVD [4, 5, 6, 7]. Physical activity associated with serum lipids in youth [8, 9]; but results remain equivocal.

Active males had lower triglyceride (TG) and Low-density lipoprotein (LDL) while active females had lower TG levels than inactive females [10]. There was a negative correlation between percent body fat (PBF) and TC level [11]. Several studies indicated a strong inverse correlation between physical education (PA) and CVD [7, 12, 13, 14]. Active males had a systolic and diastolic blood pressure (SBP&DBP) [15]. More than forty studies examine that aerobic activity reduced blood pressure [16].

PA has inverse association with body composition index [17, 18, 19]. The promotion of active living is important in prevention of obesity and premature CVD [20, 21, 22]. On the other hand general knowledge of coronary heart risk factors in young (college students) is the most important in movement for health. The purpose of the present study was to examine the relationship between energy expenditure, body composition and CVD risk factors in male students. To reduce the incidence of CVD measures were initially addressed mainly to middle aged and elderly population groups, but for effective prevention of CVD measures addressed to younger age groups are also necessary(star-12) in the effort to understand whether lifestyle modification during youth could lower CVD risk.

METHODS

Subjects: Two hundred young men with an age average 21.33 ± 2.50 years were randomly selected from 14000 students of University. The protocols were approved by the Islamic Azad University of Dezful Committee on Human Research. Then, Subjects were made fully aware of the risks, benefits and stresses of the study and given both verbal and written instruction outlining the experimental procedure, and their informed consent was obtained before screening. Then tacked the personal and medical information of the participants as well as previous exercise history by questionnaire. A pre-participatory exercise screening questionnaire [Physical Activity Readiness questionnaire (PARQ)] was administered [23].

Measurement: All data were collected in three visits in the morning.

Body weight was measured through calibrated clinical scale and height was measured through stadiometer while the participants wearing light clothing with no shoes. Body Mass Index (BMI) was calculated as weight in kilograms divided by height in squared meters ($kg.m^{-2}$). The subcutaneous fat thickness was measured according to the procedures of the Airlie conference on the standardization of anthropometric measurement. Percentage of Body Fat (PBF) was calculated form multicomponent predication equation using skin-fold thicknesses [24]. Skin-fold thicknesses were measured with a Lafayette Caliper (Model 01127) at three sites (Chest, abdominal and thigh). WHR index calculated with abdominal/hip circumference (with a plastic type meter measured). All measures were made in duplicate on the right site of the body, with subject standing and breathing normally. Energy expenditure (EE) can be a good indicator for the determination of physical activity. So a physical activity record that covered 3days (one of which is a weekend day) was used to estimate daily energy expenditure (EE) [25]. This method is factorial in nature and divides the day into 96 15-minperiods. Each subject was asked to indicate, by way of an intensity code, the dominant activity for each 15-min period throughout the day. A list of activity and their associated intensity codes, ranked on a scale from 1 to 9, was provided as a guide. The activity scores were summed over the entire day and converted o energy expenditure equivalent [25]. The daily estimates were then averaged over 3days and were subsequently expressed per kilogram of body mass ($kcal.kg^{-1}.day^{-1}$). The questionnaire has been tested for reliability of our knowledge (0.94). Resting Blood Pressure was measured with this method**.** While the subjects were in a sitting position a standard pressure cuff was placed around the left upper arm. With a Sphygmomanometer systolic and diastolic blood pressure were measured. Blood pressure was measured in the morning after 12-14 hours fast and a 10 minute rest period, with the participant in a supine position. After 5minute, a second reading was taken and mean of the tow measurement was used for the analyses. Five ml of venous blood sample were collected after a 12-14 hours fast into vacationer tubes without anticoagulant. Blood was allowed to clot at room temperature for 30 min before being centrifuged. Serum and red blood cells were separated by centrifugation at 1500gr for 20 min. serum was transferred and stored at-80º for analysis of lipids and lipoproteins. Total cholesterol measured by the CHOD-PAP method. TG by the GPO-PAP method, high density cholesterol (HDL) was determined after separation with phosphotungstic acid and magnesium chloride, all using established kit methods from Boehringer (Mannnheim, Germany). Low density lipoproteins (LDL) was then estimated by using the Friedeweald equation [26].

Statistical analyses

Statistical analyses were performed through the Statistical Package for the Social Sciences (SPSS/10**)**. The association between energy expenditure, body weight, BMI, percentage of body fat and the select CVD risk profile were performed using Pearson product moment coefficient of correlation. All data expressed as mean±sd**.** Statistical significance was set at the $P< 0.05$ levels.

RESULTS

Table1 show demographic and descriptive for cardiovascular risk factors variable for the 200 participants. Table 2 provides a descriptive statistics of correlation energy expenditure, body weight, percentage of body fat, body mass index, and waist-hip ratio and CVD risk factors. Negative strong correlation was found between EE and body composition variables (PBF, BMI and BW), LDL level ($P< 0.05$). Some sort of correlation was found between BW and SBP, DBP; between PBF and levels of TC, LDL. Correlation among EE and levels of TC, TC/HDL, DBP; were positive ($P< 0.05$).

In this analysis there were no significant interaction between EE, Body composition and levels of TG, HDL.

DISCUSSION

Comparison of data means with standard norms

Comparison of table 1 with standard norms showed that: subject's weight means (70.80kg) near to over weigh [27]. PBF mean (15.33 %) was high [14] and WHR (0.86) was middle [28]. SBP (120.40mmhg) and DBP (80.55mmhg) were around normally limitation [10]. EE mean (2774 $kcal.day^{-1}$ equal 39.18 kcal.kg-

^{1}.day^{-1}) was down to Dornin data (2930 kcal.day^{-1} equal 45.07 kcal.kg^{-1}.day^{-1}) [11] and data of National Academy of science in 1974 (2700-3000 kcal.day^{-1}) [29]. Serum lipids and lipoproteins were normal [30].

Table 1: Descriptive and characteristics of the subjects.

Variable	*Mean ± SD*	*Minimum*	*maximum*
Age(yr)	*21.33 ± 2.50*	*19*	*32*
Height (m)	*171.4 ± 6.44*	*162*	*187*
Weight (kg)	*70.80 ± 23.33*	*58*	*106*
WHR	*0.86 ± 0.15*	*0.74*	*1.02*
BMI (kg.m^{-2})	*23.76 ± 4.85*	*20.01*	*46.35*
PBF	*15.33 ± 7.36*	*5.03*	*37.15*
EE (Kcal.kg-1.day-1)	*39.18 ± 7.43*	*23.82*	*58.16*
EE (kcal . day-1)	*2774 ± 569*	*2056*	*4329*
TC (mg . dl-1)	*171.47 ± 27.43*	*91*	*231*
TG (mg . dl-1)	*106.51 ± 27.37*	*52*	*185*
HDL-c (mg . dl-1)	*47.71 ± 15.26*	*31*	*69*
LDL-c (mg . dl-1)	*96.27 ± 41.67*	*28*	*171*
SBP(mm Hg)	*120.52 ± 7.28*	*110*	*140*
DBP(mmHg)	*80.55 ± 8.65*	*70*	*100*

Values are mean **±** SD (n= 200). WHR (waist-hip ratio); BMI (body mass index); PBF (percentage of body fat); EE (estimate daily energy expenditure); TC (total cholesterol); TG (triglycerides); HDL (high-density lipoprotein); LDL (low-density lipoprotein); TC/HDL (total cholesterol/HDL ratio); SBP (systolic blood pressure); DBP (diastolic blood pressure).

Table 2: Correlation between CVD risk factors variables and body weight, WHR, body mass index, percent body fat and energy expenditure.

	TC	**TG**	**HDL**	**LDL**	**SBP**	**DBP**
EE	**-0.278***	**-0.057**	**0.124**	**-0.371****	**-0.041**	**-0.317***
BW	**0.071**	**-0.074**	**-0.034**	**0.081**	**0.415****	**0.387****
WHR	**0.113**	**-0.027**	**-0.168**	**0.081**	**0.021**	**-0.082**
BMI	**0.155**	**0.013**	**-0.021**	**0.185**	**0.139**	**0.210**
PBF	**0.387****	**0.230**	**-0.077**	**0.382****	**0.071**	**0.205**

*(P< 0.05)

** (P< 0.01)

EE and serum lipids and lipoproteins

Several studies have suggested that regular physical activity can improve plasma lipid and lipoproteins metabolism [9, 30, 31, 32]. In the present study, similar to the previous ones revealed correlation between EE and TC, LDL, TC.HDL^{-1} ratio, in college man [16, 33]. EE was not related to other factors, significantly. High EE associated of decrease TC level [33]. TC had direct relation with CVD [5].

EE and Blood pressure

In this study a negative correlation was found between EE and Blood pressure, but it was significant just between EE and DBP. Although persons with higher EE had lower SBP and DBP [15], but blood pressure decrease after moderate activities [4, 34, 35]. Some studies find no signification between physical activity and blood pressure [8, 36].

Body composition indexes and serum lipids and lipoproteins

In more study indicated a relationship between PBF and CVD risk factors [37, 38, 39, 40, 41]. In this study we found similar correlations among PBF with TC and LDL. Our data support that recommendation of late studies confirm the PBF is adequate to CVD prediction, although a few study rejected it [42]. Results supported that diminish body fat can be a factor to reduce CVD risk factors.

Body composition indexes and Blood pressure

Increasing body weight made awkward alternations in CVD risk factors [43]. In present study achieved a strong relationship between BW and blood pressure (SBP&DBP). Results demonstrated reduce body weight affected on blood pressure or risk it in male students.

CONCLUSIONS

The results of the present study confirm numerous pre studies that energy expenditure and fatness are important determinants of CVD risk in college men; but energy expenditure related with more CVD risk factors. Primary prevention of CVD should therefore focus on increase average of energy expenditure per week. We know that high physical activity can continue for short time, but long moderate activity (60%

HR) available to active the fat metabolism for reduce body fat [44]. These aims can easily be obtained by following the current public health guidelines for physical activity, which recommend 30 minutes of aerobic activity in must days of the week [34, 35, 45, 46, 47, 48]. Results of present study recommended important of physical activity for prevailed CVD risk factors similar than other studies [8, 18, 49]. In youth, additional energy needs for growth; But Obesity is the result of a mismatch between energy intake and energy needs. Resulting in net accumulation of energy stores in the body and development of body fat and obesity. Whether obesity is caused by excess energy intake or a reduction in energy expenditure or physical activity. However in this article, observed relationship among EE, PBF and BW with CVD risk factors. Proper energy intake and weight control possibly as important as EE for reduce CVD.

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