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Comparison of physical fitness and lipid profile in active and inactive middle-aged men

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ABSTRACT

The purpose of this study was to compare physical fitness (Vo_{2max}, endurance, power, agility and flexibility) and lipid profile (triglycerides, cholesterol, VLDL, LDL, and HDL) in active and inactive middle-aged men. 30 male volunteers who aged 40-60 years were assigned in active (n=15) and inactive (n=15) groups. Subjects of the active group participated continuously in at least one to three sessions of physical activity per week over the past 10 years, while subjects in inactive group had no specific exercises. Data Analysis was performed using independent t-test statistical method. Significance level of the test was considered $P \leq 0.05$.Research results showed significant differences in Vo2max, endurance, power, agility and flexibility between the active and inactive groups (p=0.0001), but no significant differences were observed between the two groups in lipid profile levels($p>0.05$).Lack of significant differences in lipid profile seems to be the result of active group's high-calorie and high-fat diets compared to the inactive group's low-fat and low-calorie diet, and participating in at least one session of physical activity per week increases physical fitness and reduces the risk of cardiovascular diseases.

Keywords: physical fitness, lipid profile, active and inactive middle-aged men.

INTRODUCTION

Cardiovascular diseases are the main death causes of men and women in many developed and developing countries. Assessment of cardiovascular disease risk factors helps people remain healthy [1,2].Cardiovascular diseases have genetic origins in childhood, although clinical signs may not appear until later in life. Cardiovascular diseases risk factors often occur due to sedentary lifestyles [3,4].

Physical inactivity is one of the independent risk factors of cardiovascular diseases e.g. atherosclerosis [5]. Sedentary lifestyle also increases the risk of stroke and some cardiovascular diseases risk factors such as increased triglycerides, cholesterol, vLDL, LDL, and HDL in middle-aged [6,7]. Physical activity alone or in combination with an active lifestyle is a key factor in lipid profile improvement. However one of the major challenges to remain healthy is adopting an active lifestyle [8].

Some changes in weight, body fat, abdominal fat, and lipid profile occur as people grow older. Participating in physical activities can prevent obesity and cardiovascular diseases [9], and help improve physical fitness in sedentary middle-aged [10,11].In some studies physical activity is reported improve middle-aged physical fitness and lipid profile; however, conflicting results have been reported in some studies [12].Martins et al (2010)in a study investigated the effect of moderate aerobic and strength training exercises on lipid profile of middle-aged men and observed significant differences in lipid profile levels after 16 weeks [10]. Banitalebi et al (2010)in a study examined the effect of aerobic training on physical fitness and lipid profile of23-49 years old men and did not observe significant differences in research variables after 12 weeks.

Cardiovascular diseases have genetic origins however their clinical signs may not appear until later in life [14]. Given that higher levels of physical activity may be associated with individuals' improved physical fitness and lipid profile [15].Therefore, this study compares physical fitness and lipid profile in active and inactive middle-aged men.

MATERIALS AND METHODS

Because of its purpose, this study was thought of as descriptive. The subjects were 30 volunteer middle-aged men. They were 40-60 years old men of Jahrom who were assigned into active (n=15) and inactive (n=15) groups. Subjects of the active group participated continuously in at least one to three sessions of physical activity per week over the past 10 years, while subjects in inactive group had no specific exercises. The criteria for participating in the study included having public health, lack of medication, smoking and a specific diet, lack of a regular training program for inactive group, and having a regular training program for the active group. After selection, purpose and methodology as well as the research applications were explained to the subjects. Then, they signed a medical health questionnaire and a written consent to participate in the study. The participants' height, weight and body mass index were measured at the day before blood sampling and they were all asked not to do any intense physical activity sincetwo days before the test. Table 1 presents the subjects' physical characteristics.

Table 1- Participant Characteristics at Baseline

Parameter	active	Inactive
Age (year)	46.22±4.43	46.13±5.16
Height (cm)	175.53±6.44	172.47±3.48
Body weight (kg)	74.56±11.92	77.47±8.79
Systole (mmHg)	116.67±8.16	114.67±10.08
Diastole (mmHg)	77.67±4.92	73.33±8.16
Body Mass Index (kg/m2)	29.22±3.93	29.15±3.30

Rockport Fitness Walking Test was used to estimate Vo2max, Sargent jump test to estimate explosive power, sit-ups test to measure abdominal muscle strength, Huger modified sitting and reaching test (HVGR) to measure flexibility, and finally 4×9 test was used to measure agility. Active and inactive groups subjects were asked to attend in a to compare their levels of triglycerides, cholesterol, VLDL, LDL, and HDL. Assay kit was used to measure lipid profile values.

Statistical analysis was performed using SPSS version 18. Data normality was determined by Kolmogorov-Smirnov test. Then, independent t-test was used for between-groups comparison of measured variables. The significance level of the test was also considered $p \leq 0.05$.

RESULTS

Table 2 shows comparison between the active and inactive groups measured means. The results shows statistical significant differences inVo_{2max} (p=0.0001), abdominal muscles endurance (p=0.0001), leg muscles power (p=0.0001), agility (p=0.0001) and flexibility (p=0.0001) but no significant differences in serum triglycerides (p=0.467), cholesterol (p=0.812), VLDL (p=0.459), LDL (p=0.405) , and HDL (p=0.500) between the two groups.

Table 2- Comparison of Mean Outcome Measurements between active and inactive

Groups / Variable	Active	Inactive	p-value
VO_{2max} (ml/kg/min)	42.21±3.79	33.27±4.20	0.0001
AME (Ns)	45.73±9.76	25.27±7.85	0.0001
LMP (cm)	57.00±5.01	35.67±7.59	0.0001
Agility (second)	10.25±0.63	14.58±2.73	0.0001
Flexibility (cm)	33.07±3.65	22.87±6.95	0.0001
TG (mg/dl)	135.80±49.08	150.33±58.46	0.467
TC (mg/dl)	193.93±39.94	191.00±25.45	0.812
VLDL (mg/dl)	27.20±9.66	30.13±11.66	0.459
LDL (mg/dl)	106.87±29.37	98.93±21.44	0.405
HDL (mg/dl)	59.87±9.11	61.93±7.34	0.500

AME = Abdominal muscle endurance.; Ns=number of Sit-up.; LMP = Leg muscle Power

DISCUSSION

This study was designed to compare physical fitness (Vo_{2max}, endurance, power, agility and flexibility) and lipid profile (triglycerides, cholesterol, VLDL, LDL, and HDL) in active and inactive middle-aged men. The results showed that the Vo_{2max} was higher in active group compared to inactive group, and this difference was statistically significant. These results were consistent with Askari et al (2013) and Tsimaras et al (2010), but did not match Tracy et al (2013). When people grow older a gradual reduction occurs in functional capacity of the cardiovascular system and one reason for the reduction in Vo_{2max} is age increase. Despite the inevitable decline in Vo_{2max} with increasing age, exercising can improve individuals' functional capacity [19]. Although aging lowers the functional capacity of the cardiovascular system participating in sports activities led to higher level of oxygen consumption in subjects of the active group compared to the inactive group.

The results showed that the abdominal muscles endurance in active group was higher compared to inactive group, and this difference was statistically significant. These results are consistent with Calders et al (2011), Ferreira et al (2012), and Weiss et al (2010) but did not match Salami et al (2003). Muscular endurance refers to the length of time in which a person can performs an action with certain intensity. Good endurance prevents premature fatigue and helps people keep on their activities even when they are tired. Just those people who are consistent with activity features can do this. Endurance depends on important factors such as speed, muscle strength, technical capability to perform the tasks, the ability to efficiently use physiological capacities and psychological conditions when performing activities [24]. Probably participating in sports activities led to increased endurance against fatigue in active group subjects and since these people are more qualified in speed, muscle strength, technical capability to perform the tasks, the ability to efficiently use physiological capacities and psychological conditions compared to inactive group subjects, they performed better in sit-up test and had better muscle endurance.

The results showed that the leg muscles power was higher in active group compared to inactive group and this difference was statistically significant. These results were consistent with Vaczi et al (2013) and Shaikh et al (2012), but did not match Mirkazemi et al (2001).Power is an important factor in the physical fitness programs. Anaerobic power refers to the individual's maximum ability to use two phosphagen and lactic acid systems to produce energy per unit of time [28]. Probably subjects in the active group were better able to use phosphagen system when running Sargent Jump test compared to the subjects of the inactive group.

The results showed that the agility was higher in active group compared to inactive group and this difference was statistically significant. These results were consistent with Milton et al (2008) and Lobo et al (2010), but did not match Eftekhari et al (2007). Factors which can influence agility include body type, age, sex, height, weight, speed, reaction time, balance, neuromuscular coordination, sight and necessary agility awareness [32,33]. Probably factors such as body type, height, weight, and learn more awareness about agility test led to active subjects' better results compared to inactive subjects.

The results showed that flexibility was higher in active group compared to inactive group and this difference also was statistically significant. These research results were consistent with Wang et al (2007) and Tracy et al (2013), but did not match Thomas et al (2004) and Milton et al (2008). Joints Shape, form and structure, ligaments and tendons influence flexibility. The greater is the flexibility, the greater is the range of motions. The muscles which cross joints or are adjacent to them influence their flexibility [24].Given that the joints form, type and structure, ligaments and tendons affect flexibility and since more flexibility leads to more range of motions; these factors probably cause differences in flexibility of active participants compared to passive ones in this study.

Levels of triglycerides, cholesterol, VLDL, LDL, and HDL in the active group were not significantly different compared to the inactive group and were not statistically significant. These results were consistent with Jorgea et al (2011), Ho et al (2012), and Vincent et al (2013) but did not match Akcakoyun et al (2012), Gelecek et al (2006), and Gualano et al (2008), Martins et al (2010), and Bemelmans et al (2012).Sedentary individuals are exposed to the risk of cardiovascular diseases. Triglycerides are the most abundant body fat, form the main kind of stored fat and more than 95 percent of body fat is as triglycerides produced through diet or by the liver [42,43].VLDLcontains large amounts of triglycerides and a modest amount of phospholipids and cholesterol. Physical activity is accompanied by activation of lipoprotein lipase enzyme which exists in muscle fibers type I and in myocardium. Exercise also appears to increase this enzyme storage in muscle fibers. Also the decrease in very low density lipoproteins production by the liver is due to the reduction of its precursor materials in plasma [44].During exercise body's endocrine system can increase lipolysis and use fatty acids as fuel by increasing epinephrine, norepinephrine, growth, and cortisol hormones. It is well identified that at least two key enzymes in lipoprotein metabolism are associated with individuals' physical activity and increase with exercise [42,43].Increased levels of HDL are due to its increased production by the liver and changes in various enzymes, such as increased lipoprotein lipase activity and decreased hepatic lipase activity due to exercise [43].Given that individuals' diet was not controlled in this study probably active subjects lack of control on their own diet which mostly was fat- and calorie-rich caused their lipid profile values not to be different with that of inactive subjects. Since the subjects in the active group were physically fit and since they performed regular exercises, they kept on eating high-fat foods with no worries.

CONCLUSION

As was mentioned, physical activity influenced active subjects' physical fitness but did not affect their lipid profile so much in the present study. Given that physical activity is effective in improving community health, it should be noted that in order to enhance life quality and lifestyle, physical activities should be performed regularly, and special importance should also be given to adults' nutrition and mental states, so suitable and regular physical activity can enhance individuals' health in the society.

REFERENCES

[1] Rackley C, *Cardiol Rev*,**2004**, 12, 157.
[2] Shokravi F, Rajabi R, Ziaee N,*Asian J Sports Med*, **2011**, 2, 43.
[3] Gidding S, *Am J Lifestyle Med*, **2007**, 1, 505.
[4] Petibois C, Cassaigne A, Gin h, *J ClinEndocrinolMetab*, **2004**, 89, 3384.
[5] Thijssen D, Maiorana A, Driscoll D, Cable N, Hopman M, Green D, *Eur J ApplPhysiol*, **2010**, 108, 875.
[6] Cordova A, Villa G,Sureda A, Rodriguez-Marroyo AG, nchez-Colladoe SP, *Rev EspCardiol*, **2012**, 65, 626.
[7] Szymanska J, Wozniak E, Piatkowska I, Malara M, *Bio Human Kinet*, **2011**, 3, 5.
[8] From S, Liira H, Leppavuori J, Remes-Lyly T, Tikkanen H, Pitkala K,*BMC Public Health*, **2013**, 13, 125.
[9] Hayes L, Grace F, Sculthorpe N, Herbert P, Ratcliffe J, Kilduff L, Baker J, *Springerplus*, **2013**, 2, 5.
[10] Martins R, Verissimo M, Silva M, Cumming S, Teixeira A, *Lipids Health Dis*, **2010**, 9, 6.
[11] Sakuta H, Suzuki T, *Industrial Health*, **2006**, 44, 189.
[12] Akcakoyun F, *African J Pharma Pharmacology*, **2010**, 4, 833.
[13] Banitalebi E, Faramarzi M, Nuri R, Khosrozadeh J, Ghafoorian M, *Brazilian J Bio*, **2010**, 4, 197.
[14] Thomas N, Williams D, *Scand J Med Sci Sports*, **2008**, 18, 556.
[15] Monda K, Ballantyne C, North K, *J Lipid Res*, **2009**, 50, 1690.
[16] Askari A, Askari B, Mahdivand A, Samavati M, *Iranian J Health Physical Activity*, **2013**, 4, 36.
[17] Tsimaras VK, Kyriazis DA, Christoulas KI, Fotiadou EG, Kokaridas DG, Angelopoulou NA,*J Strength Cond Res*,**2010**, 24, 1058.
[18] Tracy B, Hart C,*J Strength Cond Res*,**2013**, 27, 830.
[19] Lemura LM, von Duvillard SP, Mookerjee S, *J Sports Med Phys Fitness*,**2000**, 40, 10.
[20] Calders P, Elmahgoub S, Roman de Mettelinge T, Vandenbroeck C, Dewandele I, Rombaut L, Vandevelde A, Cambier D, *ClinRehabil*, **2011**, 25, 108.
[21] Ferreira ML, Sherrington C, Smith K, Carswell P, Bell R, Bell M, Nascimento DP, Pereira LS, Vardon P, *J Physiother*, **2012**, 58, 156.
[22] Weiss T, Kreitinger J, Wilde H, Wiora C, Steege M, Dalleck L, Janot J, *J ExercSci Fit*,**2010**, 8, 122.
[23] Salami F, *J Movement Sci Sport*, **2003**, 4, 60.
[24] Bompa T, *Periodization Theory and Methodology of Training*, Kordi M, Faramarzi M, Samt,**2008**, pp 564.
[25] Vaczi M, Tollar J, Meszler B, Juhasz I, Karsai I, *J Hum Kinet*,**2013**,36, 26.
[26] Shaikh A, Mondal S, *J HumanitSocSci*,**2012**, 1, 5.
[27] Mirkazemi A, Hematinezhad M, Ramezaninezhad R,*J motion*, **2001**, 8, 126.
[28] Amirsasan R, Karimi A, Sari V, Nourozi H,*Olympic quarterly*, **2011**, 4, 51.
[29] Milton D, Porcari, J, Foster R, Gibson M, Udermann M, *Gundersen Lutheran Med J*,**2008**, 5, 8.
[30] Lobo A, Carvalho J, Santos P, *Int J Family Med*, **2010**, 10, 10.
[31] Eftekhari F, Rajabi H, Shafizadeh M, *J Movement Sci Sport*, **2007**, 9, 28.
[32] Mirzaei B, Sadeghi M, *Olympic quarterly*, **2007**, 2, 89.
[33] Moghadasi M, Naser K, Ghanbarzadeh M, Shakeriyan S, Razavi A, *Iranian J Endo Metabolism*, **2010**, 5, 476.
[34] Wang T,Belza B, Thompson F, Whitney J, *J AdvNurs*, **2006**, 57, 152.
[35] Thomas M, Petra B, Kristin F, Melissa F, *Californian J Health Promot*, **2004**, 2, 98.
[36] Jorgea ML, Oliveiraa VN, Resendea MN, Paraisoa FL, Diniza AC, Resendea SE, Ropelle RE, Carvalheira BJ, *MetabClinExp*,**2011**, 15, 9.
[37] Ho SS, Dhaliwal SS, Hills PA, Pal S, *BMC Public Health*,**2010**, 12, 10.
[38] Vincent OB, Adesina MO, *Euro Sci J*,**2013**, 12, 98.
[39] Gelecek N, Pinar L, Ozdirenc M, Bediz C, Akan P, Kozan O, Altun S,*FizyoterapiRehabilitasyon*,**2006**, 17, 46.
[40] Gualano B, Ugrinowitsch C, Artioli GG, Benatti BF, Scagliusi BF, Harris CR, Junior LA, *J IntSoc Sports Nutr*,**2008**, 5, 8.

[41] Bemelmans R, Blommaert P, Wassink A, *BMJ Open*,**2012**, 2, 8.
[42] Gorzi A, Aghaalinezhd H, Rajabi H, Azad A, Molanori M, Hedayati M, *Iranian J Endo Metabolism*, **2011**, 6, 620.
[43] Souri R, Khosravi N, Rezaeiyan N, Taleghani H, *Iranian J Endo Metabolism*, **2011**, 2, 189.
[44] Esfahani N, *J motion*, **1998**, 2, 92.