

The Relationship between physical activity level and some risk factors of coronary heart disease in retired male teachers of Samen city

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Abstract

Purpose: Evidence shows that physical activity and exercise reduce the risk of coronary heart disease. However, this study was conducted with the aim of investigating the relationship between cardiovascular risk factors and physical activity of retired male teachers of Samen city. **Method:** This was a descriptive and experimental study. The statistical population of this study included the retired male teachers of Samen city. From the statistical population Using random sampling method, 55 retired teachers were selected as sample. The physical activity level of the subjects was done through the Beck questionnaire. The research measurements included determining body weight, height, body mass index, and determining some risk factors for coronary heart disease, total cholesterol, triglyceride (TG), low-density lipoprotein (LDL), high-density lipoprotein (HDL), and fasting blood glucose (FBG). For data analysis, appropriate descriptive and inferential statistics methods including Kolmogorov Smirnov test and Pearson correlation were used at a significance level of 0.05. **Results:** After examination, the results of this study showed that there was a negative and significant correlation between the level of physical activity with FBG, TC, LDL and a positive and significant correlation with HDL ($P < 0.05$). While, there was no significant relationship between physical activity level and triglyceride level. **Conclusions:** Considering the unfavorable situation of cardiovascular risk factors in elderly men, and considering the positive effect of physical activity and exercise in reducing

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these factors, it is necessary to take measures to emphasize regular exercise programs and improve their health.

Keywords: physical activity, coronary heart disease, Men, Elder.

INTRODUCTION

The coronary-artery diseases are one of the most common causes of mortality and morbidity in various societies. At least part of this risk is due to abnormal blood fat which consists of high triglyceride, low HDL, and high density LDL (Arazi, Shokouhi, Sayah, & Aboutalebi, 2018; Lasker, Evans, & Layman, 2008; Rippe & Angelopoulos, 2019). Many studies have shown that with increasing age, the prevalence of cardiovascular diseases and their risk factors, such as diabetes, hypertension, blood fats (cholesterol, triglycerides, LDL), reduced mobility and sports activity, stress and smoking increase (Arya et al., 2022; Nasi et al., 2019). An increase in cardiovascular risk factors is known as the most common factor in adults, which accounts for the majority of heart diseases with very dangerous problems (Yuyun, Sliwa, Kengne, Mocumbi, & Bukhman, 2020). The WHO report demonstrated that physical activity confers health benefits including, lowering weight and blood pressure, and improvements in glucose levels and blood lipid, and it has been proved that regular physical activity may reduce the risk of developing cardiovascular diseases including hypertension, stroke, type 2 diabetes mellitus, and coronary heart disease (Cleven, Krell-Roesch, Nigg, & Woll, 2020; Kempes et al., 2019). Although the exact mechanism of CHD risk reduction due to physical activity is not known, it seems to influence risk factors and reduces blood pressure, LDL-C, total cholesterol (Yang et al.), and triglyceride (TG), and increases HDL-C and some other physiological effects such as increased heart rate and coronary circulatory capacity (Çetin, Ece, Şen, Çetin, & Aydoğan, 2019). The positive effects of decreased LDL and increased HDL are increasing and independent; in therapies which aim to simultaneously reduce LDL and increase HDL, the risk of vascular diseases may be reduced by about 60-80% (Doewes, Gharibian, Zaman, & Akhavan-Sigari, 2022). Despite the fact that prescribing medications has reduced LDL and cardiovascular disease, the changes in lifestyle is the first line of treatment of most patients (Chapman et al., 2011). Therefore, it is inevitable to include a sports program in daily activities of patients and

healthy people. In the past two decades, a reduction in the number of deaths due to cardiovascular diseases has been observed in the USA. Therefore, the American Heart Association (AHA) included physically active lifestyles as 1 of the 7 goals for ideal cardiovascular health (Khan et al., 2023).

Although the mortality rate due to cardiovascular diseases is decreased in developed countries, the statistics shows its increase by 20 to 40 percent in Iran (Hajsheikholeslami, Hatami, Hadaegh, Ghanbarian, & Azizi, 2011). Azizi et al. (2013) examined the relationship between physical activity level and cardiovascular risk factors among 30 male students and concluded that there is negative significant correlation between physical activity level and blood cholesterol and LDL levels (Azizi & Hosseini, 2013). On the other hand, Gholipour et al. (2012) studied the prevalence of cardiovascular risk factors among students at Sharif University of Technology and concluded that the prevalence of overweight and obesity was 19.29% and prevalence of central obesity based on waist indicator was 21.97%. Also, high levels of triglyceride and blood pressure were observed in 12.21% and 14.8% of subjects, respectively. There were at least two cardiovascular risk factors in 87% of subjects (Salari et al., 2016). However, Iranian people have a low participation rate in physical exercise, and the intensity of physical exercise has markedly declined, which challenges health promotion, and the prevention and control of cardiovascular diseases in Iran (Sarrafzadegan & Mohammadifard, 2019).

By examining the target age groups in these studies, it was found that few studies have been conducted on aging due to the increase in their population. Considering that the lack of sufficient activity in aging increases the risk factors of heart-coronary disease. Therefore, identifying the level of physical activity of the elderly and factors predisposing to cardiovascular disease and providing suitable solutions and timely prevention of people, can take a step towards reducing disability and mortality caused by cardiovascular risk factors and ultimately improving the living standards of adults. The major purpose of the present study was to evaluate the effect of physical activity level on coronary heart disease risk factors among retired male teachers, in

order to provide evidence for the development of preventive and control strategies for cardiovascular diseases.

METHOD

This was a descriptive and experimental study. The statistical population of this study included the retired male teachers of Samen city. From the statistical population Using random sampling method, 55 retired teachers were selected as sample. Then they were given a consent form and a medical records questionnaire to complete. Examining the physical activity level of the subjects was done through the Beck questionnaire, which is an international standard questionnaire for assessing the level of physical activity and has been translated by scientific centers such as Iran University of Medical Sciences and Tehran University. This questionnaire is in the form of Likert scoring questions with three components: workplace, leisure and sports (Naghii, Aref, Almadadi, & Hedayati, 2011; Sharifirad, Mohebbi, & Matlabi, 2007). Cronbach's alpha test was used to determine the internal reliability of the questionnaires; the values obtained for Beck's physical activity questionnaire were (0.81), which confirmed the internal correlation of the questions. The height, weight, systolic blood pressure (SBP), diastolic blood pressure (DBP), and body mass index (BMI) were recorded for all patients. In addition, all participants were fasted for 8–12 h, and 5 mL of venous blood was collected from the cubital vein the following morning. The serum fasting blood glucose (FBG), triglycerides (TG), total cholesterol, high-density lipoprotein-cholesterol (HDL-C) and low-density lipoprotein-cholesterol (LDL-C) levels were sampled and tested. The mean, dispersion, and standard deviation indices were used to describe data. The Kolmogorov-Smirnov test was used to evaluate the distribution of data. Also, t-test was used to test hypotheses. The significance level was considered to be $p < 0.05$. The data were analyzed using SPSS software, version 20.

RESULTS

The anthropometric characteristics of the subjects are given in Table 1.

Table 1: Anthropometric characteristics of the subjects.

Variables	Mean \pm SD
Age (year)	67.42 \pm 7.23
Height (cm)	173.41 \pm 7.41
Weight (kg)	80.38 \pm 8.41
Body mass index (kg/m ²)	26.54 \pm 4.41

The measured features in this study included cardiovascular risk factors (cholesterol, triglycerides, high density lipoprotein, low density lipoprotein, systolic blood pressure, diastolic blood pressure, and fasting blood glucose). The results of the Pearson correlation coefficient test showed that there is an inverse and significant relationship between the level of physical activity with serum TC ($p=0.024$), LDL-C ($p=0.032$), BMI ($p=0.019$), FBG ($p=0.041$) and SBP ($p=0.038$). Also, there is a significant positive relationship between the level of physical activity and the amount of serum HDL-C ($p=0.012$). On the other hand, the results of the Pearson correlation coefficient test showed that there is an inverse relationship between the level of physical activity with serum TG ($p=0.140$) and diastolic blood pressure ($p=0.22$), but this relationship was not significant. Table 2.

Table 2: Relationship between physical activity level ((beck questionnaire scores) and some risk factors of coronary heart disease in retired male teachers.

Variables	Mean \pm SD	correlation coefficient
Cholesterol (mg/dl)	184.12 \pm 17.4*	-0.59
Triglyceride (mg/dl)	142.35 \pm 25.2	-0.66
High density lipoprotein (mg/dl)	40.22 \pm 5.15*	0.56
Low density lipoprotein (mg/dl)	111.41 \pm 16.31*	-0.79
Systolic blood pressure (mmHg)	13.41 \pm 1.21 *	-0.82
Diastolic blood pressure (mmHg)	8.08 \pm 2.21 *	-0.48
Blood glucose (mg/dl)	85.08 \pm 5.61*	-0.74

DISCUSSION

The purpose of the present study was to investigate the relationship between the level of physical activity and some cardiovascular risk factors among retired teachers in Samen city. The results of the present study showed that the level of physical activity has an inverse and significant relationship with total cholesterol, triglycerides and low-density lipoprotein and a positive and significant relationship with high-density lipoprotein. Several studies show that the increase in total cholesterol, triglycerides and low-density lipoprotein is less in active elderly people than in inactive ones (Arsenault et al., 2009; Crismaru et al., 2020). Noorbakhsh reported in his study under the title of investigating the relationship between physical activity and cardiovascular risk factors that there is a significant difference between total cholesterol, triglyceride and low-density lipoprotein levels of active and inactive managers; so that the amount of total cholesterol, Triglyceride and low-density lipoprotein in active managers were significantly lower than inactive managers (Vatan, Noorbakhsh, Nourbakhsh, & Nejad, 2017). Several studies have acknowledged the beneficial effects of aerobic exercise in reducing low-density lipoproteins. Considering the consumption of fat as fuel during activity and during the return to the initial state, it seems that Performing sports activity increases the amount of lipoprotein type A and increases the enzyme lipoprotein lipase LPL, and lipoprotein lipase causes the catabolism of the lipid part of lipoprotein lipase, so it is expected that low density lipoproteins will decrease (Nagayama et al., 2023). In the present study, with the increase in the level of physical activity, the amount of total cholesterol decreased significantly. Changes related to total cholesterol can be known by the response of lipoprotein lipase, which is one of the enzymes that regulate lipoproteins and break down cholesterol in cholesterol-rich lipoproteins. Yang et al. reported that subjects who had regular physical activity had significantly higher concentrations of plasma high-density lipoprotein than those who did not have such activity (Yang et al., 2023). The results of studies show that regular physical activity can have protective effects against heart disease by increasing high-density lipoprotein in various ways (Ceja-Galicia et al., 2023; Cho, Nam, Kang, Zee, & Park, 2023). Various factors affect the changes in the amount of high-density lipoprotein in the blood of people, among them; we can mention the gender of the subjects, diet, drug consumption, hereditary

characteristics of people and the duration of physical activity (Khurshida, 2023). The mechanism of high-density lipoprotein changes following physical activity can be attributed to the increased activity of the lipoprotein lipase enzyme through plasma triglyceride hydrolysis (Bradshaw, Koumanov, Berry, Betts, & Gonzalez, 2023). Therefore, according to the findings of this study, it is suggested that by increasing the level of physical activity in elderly men, the risk of cardiovascular disease can be reduced and a step can be taken to improve the health of the elderly. On the other hand, the results of this study showed that there is an inverse and significant relationship between the level of physical activity and body mass index. Rosen Green et al. reported that there is a significant inverse relationship between physical activity and body mass index (Hu et al., 2004). The results of this study showed that the average body mass index of 59.35% of the subjects was above 25 kg/m², which according to the classification of the World Health Organization, this value of the body mass index is in the range of overweight people. During exercise, the body uses fatty acids as fuel, or it can be effective in reducing the concentration of insulin during exercise due to changes in different hormones, such as the increase of growth hormone, epinephrine, and norepinephrine (Linder, Agostinelli, Bordonie, & Stute, 2023). Since the results of the studies have shown that regular exercise can reduce body fat percentage in different people, it is suggested that strategies be developed to increase the physical activity level of the elderly in order to increase their health. High blood pressure is one of the diseases that is very common in the old age and may cause a change in the quality of life of the elderly [36]. Also, the findings showed that there is no significant difference between the level of triglycerides in the blood of retired teachers and the level of physical activity. These findings are consistent with the results of Azizi et al. (2013) (Arazi et al., 2018), and Mirzaei et al. (2010) (Mirzaei & Haghghat, 2010). However, it is inconsistent with the findings of Baker et al. (2007). To explain the maintenance of TG levels in the normal range, it can be said that these elderly people may spend significant hours of the day and night in daily walking, and also probably their old age has prohibited them from consuming low-volume and high-calorie foods. Of course, lifestyle, diet and physical activity are also factors affecting people's health (Mominova & Ibragimova, 2021).

CONCLUSIONS

According to the findings of this study, sports activity may play an important role in improving the health of retired male teachers. Therefore, retirees are advised to do a regular exercise program in their daily schedule to improve their health and quality of life. This practice may also be beneficial in reducing the risk of cardiovascular disease and chronic diseases due to increased physical activity levels and reduced body fat. On the other hand, the authorities may also use various strategies such as holding workshops and lecture sessions to increase the awareness of retirees about the benefits of regular sports activities to increase the level of health and reduce the risk of cardiovascular diseases. They may also make recommendations for incorporating regular exercise into the retiree's life.

Conflict of interest

The authors declare that they have no any conflict of interests.

REFERENCES

- Arazi, H., Shokouhi, R. A., Sayah, A., & Aboutalebi, S. (2018). The cardiovascular risk factors and health-related physical fitness of employees at General Directorate of Youth and Sport of Mazandaran Province in Iran. *Turkish Journal of Kinesiology*, 4(1), 8-15.
- Arsenault, B. J., Rana, J. S., Stroes, E. S., Després, J.-P., Shah, P. K., Kastelein, J. J., . . . Khaw, K.-T. (2009). Beyond low-density lipoprotein cholesterol: respective contributions of non-high-density lipoprotein cholesterol levels, triglycerides, and the total cholesterol/high-density lipoprotein cholesterol ratio to coronary heart disease risk in apparently healthy men and women. *Journal of the American College of Cardiology*, 55(1), 35-41.
- Arya, J., Verma, P., Mathur, D., Tyagi, R., Pannu, V., & Anand, A. (2022). Yoga for Dyslipidemia. In *The Principles and Practice of Yoga in Cardiovascular Medicine* (pp. 223-241): Springer.
- Azizi, M., & Hosseini, R. (2013). Relationship between physical activity level and risk factors of cardiovascular disease in male college students. *Journal of Practical Studies of Biosciences in Sport*, 1(2), 110-123.

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- Bradshaw, L., Koumanov, F., Berry, S., Betts, J. A., & Gonzalez, J. (2023). The effect of exercise in a fasted state on plasma low-density lipoprotein cholesterol concentrations in males and females. *Experimental Physiology*.
- Ceja-Galicia, Z. A., Aranda-Rivera, A. K., Amador-Martínez, I., Aparicio-Trejo, O. E., Tapia, E., Trujillo, J., . . . Pedraza-Chaverri, J. (2023). The Development of Dyslipidemia in Chronic Kidney Disease and Associated Cardiovascular Damage, and the Protective Effects of Curcuminoids. *Foods*, 12(5), 921.
- Çetin, S., Ece, C., Şen, M., Çetin, H. N., & Aydoğan, A. (2019). The Effects of Pilates and Aerobic Exercise on Blood Pressure, Heart Rates, and Blood Serum Lipids in Sedentary Females. *Journal of Education and Training Studies*, 7(4), 229-235.
- Chapman, M. J., Ginsberg, H. N., Amarengo, P., Andreotti, F., Borén, J., Catapano, A. L., . . . Kuivenhoven, J. A. (2011). Triglyceride-rich lipoproteins and high-density lipoprotein cholesterol in patients at high risk of cardiovascular disease: evidence and guidance for management. *European heart journal*, 32(11), 1345-1361.
- Cho, K.-H., Nam, H.-S., Kang, D.-J., Zee, S., & Park, M.-H. (2023). Enhancement of High-Density Lipoprotein (HDL) Quantity and Quality by Regular and Habitual Exercise in Middle-Aged Women with Improvements in Lipid and Apolipoprotein Profiles: Larger Particle Size and Higher Antioxidant Ability of HDL. *International Journal of Molecular Sciences*, 24(2), 1151.
- Cleven, L., Krell-Roesch, J., Nigg, C. R., & Woll, A. (2020). The association between physical activity with incident obesity, coronary heart disease, diabetes and hypertension in adults: a systematic review of longitudinal studies published after 2012. *BMC public health*, 20(1), 1-15.
- Crismaru, I., Pantea Stoian, A., Bratu, O. G., Gaman, M.-A., Stanescu, A. M. A., Bacalbasa, N., & Diaconu, C. C. (2020). Low-density lipoprotein cholesterol lowering treatment: the current approach. *Lipids in health and disease*, 19, 1-10.
- Doewes, R. I., Gharibian, G., Zaman, B. A., & Akhavan-Sigari, R. (2022). An updated systematic review on the effects of aerobic exercise on human blood lipid profile. *Current problems in cardiology*, 101108.

- Hajsheikholeslami, F., Hatami, M., Hadaegh, F., Ghanbarian, A., & Azizi, F. (2011). Association of educational status with cardiovascular disease: Teheran Lipid and Glucose Study. *International journal of public health*, 56, 281-287.
- Hu, G., Barengo, N. C., Tuomilehto, J., Lakka, T. A., Nissinen, A., & Jousilahti, P. (2004). Relationship of physical activity and body mass index to the risk of hypertension: a prospective study in Finland. *Hypertension*, 43(1), 25-30.
- Kemps, H., Kränkel, N., Dörr, M., Moholdt, T., Wilhelm, M., Paneni, F., . . . Halle, M. (2019). Exercise training for patients with type 2 diabetes and cardiovascular disease: What to pursue and how to do it. A Position Paper of the European Association of Preventive Cardiology (EAPC). *European journal of preventive cardiology*, 26(7), 709-727.
- Khan, S. S., Brewer, L. C., Canobbio, M. M., Cipolla, M. J., Grobman, W. A., Lewey, J., . . . Wei, G. S. (2023). Optimizing Prepregnancy Cardiovascular Health to Improve Outcomes in Pregnant and Postpartum Individuals and Offspring: A Scientific Statement From the American Heart Association. *Circulation*, 147(7), e76-e91.
- Khurshida, E. (2023). FEATURES OF TEACHING A HEALTHY LIFESTYLE IN MEDICAL UNIVERSITIES. *INNOVATIVE DEVELOPMENTS AND RESEARCH IN EDUCATION*, 2(14), 328-333.
- Lasker, D. A. W., Evans, E. M., & Layman, D. K. (2008). Moderate carbohydrate, moderate protein weight loss diet reduces cardiovascular disease risk compared to high carbohydrate, low protein diet in obese adults: A randomized clinical trial. *Nutrition & metabolism*, 5, 1-9.
- Linder, B. A., Agostinelli, P. J., Bordonie, N. C., & Stute, N. L. (2023). Turn up and Burn up: Aerobic Exercise Training as a Strategy to Preserve Non-Shivering Thermogenesis on an Obesogenic Diet. *The Journal of Physiology*.
- Mirzaei, P. A., & Haghghat, F. (2010). Approaches to study urban heat island—abilities and limitations. *Building and environment*, 45(10), 2192-2201.
- Mominova, R., & Ibragimova, D. (2021). A healthy lifestyle and its importance. *The American Journal of Applied sciences*, 3(3), 1-6.

- Nagayama, S., Aoki, K., Komine, S., Arai, N., Endo, S., & Ohmori, H. (2023). Improvement of low-intensity long-time running performance in rats by intake of glucosyl hesperidin. *Physiological Reports*, 11(2), e15413.
- Naghii, M. R., Aref, M. A., Almadadi, M., & Hedayati, M. (2011). Effect of regular physical activity on non-lipid (novel) cardiovascular risk factors. *International journal of occupational medicine and environmental health*, 24, 380-390.
- Nasi, M., Patrizi, G., Pizzi, C., Landolfo, M., Boriani, G., Dei Cas, A., . . . Sisca, G. (2019). The role of physical activity in individuals with cardiovascular risk factors: an opinion paper from Italian Society of Cardiology-Emilia Romagna-Marche and SIC-Sport. *Journal of Cardiovascular Medicine*, 20(10), 631-639.
- Rippe, J. M., & Angelopoulos, T. J. (2019). Lifestyle strategies for risk factor reduction, prevention and treatment of cardiovascular disease. *Lifestyle Medicine*, 19-36.
- Salari, A., Hasandokht, T., Mahdavi-Roshan, M., Kheirkhah, J., Gholipour, M., & Tootkaoni, M. P. (2016). Risk factor control, adherence to medication and follow up visit, five years after coronary artery bypass graft surgery. *Journal of cardiovascular and thoracic research*, 8(4), 152.
- Sarrafzadegan, N., & Mohammadifard, N. (2019). Cardiovascular disease in Iran in the last 40 years: prevalence, mortality, morbidity, challenges and strategies for cardiovascular prevention. *Archives of Iranian medicine*, 22(4), 204-210.
- Sharifirad, G., Mohebbi, S., & Matlabi, M. (2007). The relationship of physical activity in middle age and cardiovascular problems in old age in retired people in Isfahan, 2006. *Internal Medicine Today*, 13(2), 57-63.
- Vatan, M. H., Noorbakhsh, M., Nourbakhsh, P., & Nejad, S. N. (2017). The effect of physical activity on resiliency and productivity and reducing staff absence based on public health of university's female staff. *PODIUM Sport, Leisure and Tourism Review*, 6(2), 294-309.
- Yang, D., Liu, M., Willey, J. Z., Khasiyev, F., Tom, S. E., Rundek, T., . . . Elkind, M. S. (2023). Physical activity is inversely associated with severe intracranial stenosis in stroke-free participants of NOMAS. *Stroke*, 54(1), 159-166.

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Yuyun, M. F., Sliwa, K., Kengne, A. P., Mocumbi, A. O., & Bukhman, G. (2020). Cardiovascular diseases in Sub-Saharan Africa compared to high-income countries: an epidemiological perspective. *Global heart*, 15(1).