

THE ASSOCIATION OF LEISURE TIME PHYSICAL ACTIVITY, WATCHING TELEVISION, OBESITY & LIPID PROFILE IN AN IRANIAN POPULATION

M. Saidie¹, K. Rabiei², R. Kelishadi³ & M. Sadeghi⁴

ABSTRACT:

Objective: Physical activity has good effects on cardiovascular disease(CVD) risk-factors while inactivity is an important CVD risk factor and watching TV as an inactivity predictor can influence on CVD risk factors. The present study shows the association of leisure time physical activity (LTPA) and watching TV with lipid profile & obesity in an Iranian adult population.

Methods: This cross-sectional study was performed on 2171 women and 2016 men in Isfahan-the second large city of Iran-in the first phase of Isfahan Healthy Heart Program(IHHP). The subjects were selected by random cluster sampling method. A standardized Beacke physical activity questionnaire was filled and height, weight, blood pressure, blood glucose and blood lipids of the participants were measured. Data were analyzed by SAS using the Student t, multiple regression, and logistic regression tests at P<0.05.

Results: Mean TV watching time among women living in urban and rural areas was not significantly different (954.59±647.84 vs. 949.22±665.34 minutes per week, respectively). Women in urban and rural areas had 262.89±475.86 and 200.08±451.30 MET-minutes per week of physical activity in their leisure time, respectively. Men in urban and rural areas had 519.46±681.82 and 460.51±663.32 MET-minutes per week of leisure time physical activity, respectively. Mean TV watching time among men in rural and urban areas was 900.58±564.26 and 892±547.72 minutes per week, respectively. Leisure time physical activity had a significant negative relation with waist circumference ($\beta=-0.002$), Body Mass Index ($\beta=-0.008$), cholesterol ($\beta=-0.01$), LDL-cholesterol(LDL-C) ($\beta=-0.07$) & diastolic blood pressure($\beta=-0.001$) in rural men. In women, leisure time physical activity had no significant relation with any of these variables. Neither in men, nor in women watching television was related to any of the variables. Odds ratio of obesity didn't relate to leisure time physical activity and watching TV neither in women nor in men.

Conclusion: Leisure time physical activity leads to improvement of lipid profile and reduction of obesity as a major atherosclerosis risk factor. It is therefore recommended to implement community-based interventions for promoting women's leisure time physical activity.

KEYWORDS: Physical activity, Leisure time, Watching television, Lipid profile, obesity.

Pak J Med Sci October-December 2005 Vol. 21 No. 4 476-481

1. M. Saidie
 2. K. Rabiei
 3. R. Kelishadi
 4. M. Sadeghi
- 1-4. Isfahan Cardiovascular Research Center
A WHO Collaborating Center in EMR
Isfahan University of Medical Sciences
Isfahan, Iran

Correspondence:

Marzieh Saeidi
Isfahan Cardiovascular Research Center
Isfahan University of Medical Sciences
P.O.Box: 81465-1148, Isfahan, Iran
E-mail: crc@mui.ac.ir

* Received for publication: January 10, 2005

Accepted: June 15, 2005

INTRODUCTION

Considering the higher mortality rates from cardiovascular diseases (CVD) in the developing countries compared to the developed world, preventing non-communicable diseases, including CVD constitutes a major health priority in such countries.¹ Earlier studies have estimated the prevalence of CVD in Isfahan 19.4%.² More than 75% of people in Isfahan have at least one CVD risk factor.³ Physical inactivity constitutes an important controllable CVD risk factor.⁴ Studies have shown the effectiveness of physical activity in reducing obe-

sity and improving the metabolism of glucose and lipids, lowering blood pressure (BP), and reducing overall mortality from CVD.⁵⁻¹³ Watching television is the most important indicators of inactivity and is related to obesity and other CVD risk factors.¹⁴⁻¹⁷ Studies have demonstrated that the prevalence of CVD risk factors and obesity can be reduced by preventing inactivity.¹⁸⁻²⁴ The present study was undertaken to assess the association of physical activity and watching TV risk factors in an Iranian adult population.

SUBJECTS AND METHODS

This study was based on data obtained from the first phase of Isfahan Healthy Heart Program, a 3-phase interventional study aiming to control CVD risk factors and reduce CVD-related morbidity and mortality which was conducted in 2000-2001 in Iran.²⁵

Sampling: The population under study (Isfahan) was divided into two groups, namely inhabitants of urban and rural areas. Each of the two groups was divided into clusters, which in turn were comprised of households. One person from every household was selected with men and women being placed in groups of roughly equal volumes. A total of 2171 women and 2016 men were studied. Becke questionnaire was used to evaluate the subjects' physical activity, after being modified and standardized for Iranian people and approved in respect of validity and reliability by the Center for Development and Medical Education of Isfahan University of Medical Sciences.²⁶ This questionnaire consisted of three parts: the first part included 15 questions assessing the responder's awareness of physical activity; the second part consisted of 12 questions which address the responder's attitude; and the third part comprises 27 questions evaluating the extent of the responder's physical activity. The 3rd part is used for this study. Individuals on anti-hypertensive and lipid-lowering medications and pregnant women were excluded.

Leisure time physical activity (LTPA) was measured, as MET^{*}-min/week.⁴ One MET is

the equivalent of 3.5 ml oxygen consumed by every kilogram of body weight per minute. For normal weight individuals, 1 MET is roughly equivalent to 1 kcal/kg per hour. The use of MET-min is preferred to kcal/min for measuring physical activity, because it is more or less independent of body weight, it reflects the intensity of physical activity and makes results easier to interpret.²⁷ TV watching time was recorded as minutes per week. The subjects were asked about cigarette smoking in questionnaires. The subjects' BP was measured in the sitting position. Height of subjects was measured in stocking feet to the nearest centimeter using a secured metal ruler while weight was measured in light clothing using calibrated portable Seca scales (made in Germany) and body mass index (BMI) was calculated as weight (kg) divided by height squared (m²). The waist-to-hip ratio was calculated for every individual, and values higher than 0.9 and 0.8 were considered as abnormal for women and men, respectively.

Total cholesterol (Chol), HDL-cholesterol (HDL-C), and triglyceride (TG) levels were measured using an Elan 2000 autoanalyzer. LDL cholesterol (LDL-C) was measured with Friedewald formula.²⁸

Blood glucose was measured using the enzymatic method. All laboratory analysis were performed at Isfahan Cardiovascular Research Center laboratory which has the criteria of the National reference laboratory and is under quality control of the University of St Rafael, Belgium. The 85th percentile of BMI (BMI >31.6 for women and >28.7 for men) was used to classify subjects as obese.²⁹

Statistical analysis: Data were analyzed with SAS software at $p < 0.05$. Chi square test was used to compare categorical variables (between inhabitants of urban and rural areas), and other variables were compared using t-test.

The relation between LTPA, watching TV, and risk factors was assessed with multiple regression analysis after excluding the effect of underlying variables such as smoking, age, education, and work-related physical activity, as well as the relationship between these vari-

ables. Logistic regression test was used to evaluate the effect of physical activity and TV watching on obesity.

RESULTS

We studied 2171 women with mean age of 38.11 ± 14.32 & 2016 men with mean age 38.11 ± 15.05 and their demographic characteristics are shown in Table-I (in a regression model we adjusted for age, sex, education level, smoking status & work related physical activity). The mean of LPTA was similar in rural & urban women (rural: 200.08 ± 451.30 , urban: 262.89 ± 475.86) as well as in rural & urban men (rural: 460.51 ± 663.32 , urban: 519.46 ± 681.82) (Table- II).

LPTA was not related to any variable in women but had a significant inverse relationship to BMI ($\beta = -0.0008$, $P = 0.007$), cholesterol ($\beta = -0.01$, $P = 0.003$), waist circumference ($\beta = -0.002$, $P = 0.008$), LDL-C ($\beta = -0.007$, $P = 0.01$) & diastolic blood pressure ($\beta = -0.001$, $P = 0.045$) inversely. The time spent for watching TV in urban & rural women was 954.59 ± 647.84 & 949.22 ± 665.34 minute/week respectively for urban & rural men. Watching TV was not related to any of variables neither in men nor in women significant (Table-III). The Odd's Ratio of obesity ($BMI \geq 31.6$ for women & $BMI \geq 28.7$ for men) was not significant neither in men nor in women (Table- IV). We did not found any

significant association of LPTA & watching TV with blood glucose, HDL-C and systolic blood pressure neither in men nor in women.

DISCUSSION

Leisure-time physical activity according to duration and intensity among Isfahanian people is lower than what is prescribed by WHO (moderate physical activity about 6 METs, 30 minutes/day) or 1260 MET-minute/week).³⁰ In this study maximum percentile of LPTA was 360MET-minute/week for women and 900 for men. The mean of TV watching time was about 2-2.5 hours/day in this study for men and women.

In this study after adjusting for work related physical activity, age, smoking, sex and education level, we analyzed the relationship between LPTA and watching TV with some of CVD risk factors, independently. Finding no association between LPTA and studied variables in women comparing to men could be discussed from two points of view: first because overall the sex male is a risk factor itself and the second because of lower level of LPTA in women comparing to men. In National Heart Lung Blood Institute(NHLBI), LPTA was related to anthropometric measures.⁴ In Framingham study also physical activity was significantly related to anthropometric measures, in that study HDL-C, BMI, BP, TG, Cho-

Table-I: Demographic characteristics of the study population

Variables	Women (n=2171)mean±SD	Men (n=2016)mean±SD
Age (years)	38.69±14.68	39.03±15.56
Cholesterol (mg/dl)	207.75±54.51	202.74±59.90
Triglyceride (mg/dl)	164.41±101.97	185.17±128.23
LDL-Cholesterol (mg/dl)	125.51±41.81	120.29±42.80
HDL-Cholesterol (mg/dl)	49.33±12.84	46.53±13.85
Waist Circumference (cm)	96.44±13.37	91.50±11.57
Waist/hip ratio	0.92±0.09	0.91±0.07
Body Mass Index (kg/m ²)	27.14±6.41	25.07±0.07
FBS (mg/dl)	86.09±42.85	84.68±28.45
SBP (mmHg)	113.38±20.65	115.82±18.40
DBP (mmHg)	72.94±12.53	73.95±11.25
Menopause (%)	23.5%	-
Current smoking (%)	2%	28.4%
*Education level(%)	8.3%	16.7%

* Diploma and more

Table-II: Leisure-time physical activity and TV watching in the study population

Variables	Women		Men	
	urban mean±SD	rural mean±SD	urban mean±SD	rural mean±SD
Leisure time physical activity (Met-Min. Week)	262.89±475.86 (0 0 360)*	200.08±451.30 (0 0 0)	519.46±681.82 (0 0 900)	460.51±663.32 (0 0 900)
Work physical activity (Met-Min. Week)	179.59±746.59 (0 0 0)	312.65±824.66 (0 0 0)	3621.68±2667.07 (0 4140 5400)	4498.91±2238.99 (3150 4500 5880)
TV watching (Min. Week)	954.59±647.84 (420 840 1260)	949.22±665.34 (420 840 1260)	900.58±564.26 (420 840 1260)	892.21±547.72 (420 840 1260)

*Quartiles & percentiles

Table-III: Influence of leisure-time physical activity and TV watching on atherosclerosis risk factors (multiple regression analysis)

Variables	Leisure time physical activity						TV watching			
	Women			Men			Women		Men	
	R ²	p	estimate	p	estimate	R ²	p	estimate	p	estimate
Body Mass Index(kg/m ²)	0.33	0.22	0.002	0.58	-0.0009	0.02	0.007	-0.0008	0.18	-0.005
Waist/hip ratio	0.11	0.11	0.0003	0.75	-0.000008	0.05	0.08	-0.000008	0.33	-0.000005
Waist circumference(cm)	0.15	0.13	0.005	0.94	0.0003	0.03	0.008	-0.002	0.15	-0.001
Cholesterol (mg/dl)	0.31	0.30	0.01	0.10	0.03	0.02	0.003	-0.01	0.46	-0.008
HDL-Cholesterol(mg/dl)	0.10	0.76	-0.0009	0.61	-0.002	0.008	0.15	0.001	0.61	-0.0004
LDL-Cholesterol(mg/dl)	0.33	0.10	0.02	0.10	0.02	0.01	0.01	-0.007	-0.40	-0.003
Triglyceride (mg/dl)	0.08	0.75	-0.01	0.97	0.002	0.01	0.10	-0.01	0.73	-0.003
FBS (mg/dl) ¹	0.07	0.55	0.02	0.24	0.06	0.01	0.23	-0.002	0.97	-0.00007
SBP (mmHg) ²	0.39	0.17	0.004	0.72	-0.001	0.05	0.11	-0.002	0.23	-0.001
DBP (mmHg) ³	0.15	0.96	-0.0002	0.62	0.002	0.02	0.045	-0.001	0.28	-0.0009

1-Fasting blood sugar 2- Systolic blood pressure 3- Diastolic blood pressure

Table-IV: Effects of Leisure-time physical activity(LPTA) & TV watching on obesity

Variables	Women						Men					
	Urban		Rural		Total		Urban		Rural		Total	
	P	B	P	B	P	B	P	B	P	B	P	B
TV watching (Minutes/ Week)	0.73	0.0003	0.96	0.005	0.67	-0.0004	0.72	0.00008	0.78	0.0001	0.78	0.00005
LTPA (Met-minute)	0.51	0.0005	0.95	0.01	0.49	0.0005	0.05	-0.0004	0.95	-0.00003	0.07	-0.0003

(logistic regression)

lesterol was assessed and after 16 years of follow up, they observed that association of risk factors with increasing weight was 37% and 20% in women and men respectively while with decreasing weight, it was 40% and 48% respectively that showed the importance of weight reduction in related to risk factors.³¹

In this study, watching TV was not related to any variable neither in men nor in women.

In America also several cross-sectional studies which evaluated effect of watching TV on obesity in children and young adults found significant associations in this regard.³¹⁻³⁵ Tucker showed that the probability of obesity in men that watched TV more than 3 hours/day and women watched TV more than 4 hours/day is twice compared to people who watched TV less than one hour/day.³⁶⁻³⁷ Watching TV more

than 4 hours/day was accompanied with Odd's Ratio over 4 in employees.³⁸ A prospective study showed that association of watching TV and weight was no more observed after 3 years follow up in comparing one year follow up.³⁹⁻⁴⁰ In CARDIA study also the prevalence of obesity increased by increasing TV watching time.¹⁵

Another cohort study on females showed high BMI and waist circumference was related to low level of their physical activity and high TV watching time.⁴¹

Several studies have showed the association of watching TV with lipid profile.^{4,11,42,43} Moreover, the effect of factors such as family history and genetics were not investigated in this study. Thus further investigations are recommended in which wider ranges of subjects from different age groups and with varying occupations and socioeconomic, cultural, and educational backgrounds, as well as a larger number of risk factors can be studied.

CONCLUSION

As demonstrated by the results of the present and other studies, increased leisure time physical activity is related to improvement of lipid profile and reduction of atherosclerosis risk factors, especially obesity. In the light of this and the limitations faced by women for engaging in leisure time physical activities, it is recommended that new strategies be adopted to encourage and promote culturally appropriate physical activities especially among women in our society, because it is a way to control obesity and lipid profile in treatment and preventing CVD.

REFERENCES

1. World Health Stat Q. Inter health steering committee. Demonstration projects for the integrated prevention and control of non communicable disease Inter health program: epidemiological background and rationale. 1991; 44: 48-504.
2. Sarraf Zadegan N, Sayed Tabatabaei FA, Bashardoost N. The prevalence of coronary artery disease in an urban population in Isfahan Iran. *Acta Cardiol* 1999; 54(5): 252-63.
3. Sarraf zadegan N, Boshtam M, Rafiei M. Risk factors for coronary artery disease in Isfahan Iran. *Eur J Pub Health* 1999; 1: 20-6.
4. Florian kronenberg, Mark A. Pereira, M. Kathryn H. Schmit Z, Donna K Arnett, Kelly R. Evenson, Robert O. Crapo, et al. Influence of leisure time physical activity and television watching on arteriosclerosis risk factors in the NHLBI Family Heart Study. *Atherosclerosis* 2000; 153(2): 433-43.
5. Physical activity and cardiovascular health. NIH Consensus Development Panel on Physical Activity and Cardiovascular Health. *JAMA*. 1996; 276: 241-6.
6. Dunn AL, Marcus BH, Kampert JB, Garcia ME, Kohl HW, Blair SN. Comparison of lifestyle and structured interventions to increase physical activity and cardio respiratory fitness: a randomized trial. *JAMA* 1999; 281: 327-34.
7. Anderson RE, Wadden TA, Bartlett SJ, Zamel B, Varde TJ, Franckowiak SC. Effects of lifestyle activity vs. structured aerobic exercise in obese women: a randomized trial. *JAMA* 1999; 281: 335-40.
8. Thune I, Njolstad I, Lochen ML, Forde OH. Physical activity improves the metabolic risk profiles in men and women: the Tromso Study. *Arch Intern Med* 1998; 158: 1633-40.
9. Mensink GB, Heerstrass DW, Neppelenbroek SE, Schuit AJ, Bellach BM. Intensity, duration, and frequency of physical activity and coronary risk factors. *Med Sci Sports Exerc* 1997; 29: 1192-8.
10. Eaton CB, Medalie JH, Flocke SA, Zyzanski SJ, Yaari S, Goldbourt U. Self-reported physical activity predicts long-term coronary heart disease and all-cause mortalities. Twenty-one year follow-up of the Israeli Ischemic Heart Disease study. *Arch Farm Med* 1995; 4: 323-9.
11. Wannamethee SG, Shaper AG, Walker M. Changes in physical activity, mortality, and incidence of coronary heart disease in older men. *Lancet* 1998; 351: 1603-8.
12. Kujala UM, Kaprio J, Sarna S, Koskenvuo M. Relationship of leisure-time physical activity and mortality: the Finnish Twin Cohort. *JAMA* 1998; 279: 40-4.
13. Fried LP, Kronmal RA, Newman AB. Risk factors for 5-year mortality in older adults: the cardiovascular Health Study. *JAMA* 1998; 279: 585-92.
14. Fitzgerald SJ, Kriska AM, Pereira MI, de Courten MP. Associations among Physical activity, television watching, and obesity in adult Pima Indians. *Med Sci Sports Exerc* 1997; 29: 910-5.
15. Sidney S, Sternfeld B, Haskell WL, Jacobs DR, Chesney MA, Hulley SB. Television viewing and cardiovascular risk factors in young adults: the CARDIA study. *Ann Epidemiol* 1996; 154-9.
16. Coakley EH, Rime EB, Colditz G, Kawachi I, Willett W. Predictors of weight change in men: results from the Health Professionals Follow-up Study. *Intern J Obes Relat Metab Disord* 1998; 22: 89-96.

17. Higgins M, province M, Heiss G. NHLBI Family Heart Study: objectives and design. *Am J Epidemiol* 1996; 143: 1219-28.
18. Jakes RW, Day NE, Patel B, Khaw KT, Okes S, Luben R, et al. Physical inactivity is associated with lower forced expiratory volume in 1 second: European prospective investigation in to cancer. Norfolk prospective population study. *Am J Epidermal* 2002 ; 156(2): 139-47.
19. HU FB, Leitzmann MF, stampfer MJ, Colditz GA, Willett WC, Rimm EB, et al. Physical activity and television watching in relation to risk for type 2 diabetes mellitus in men. *Arch Intern Med* 2001; 161(12): 1542-8.
20. Fung TT, HU FB, YU J, Chu NF, Spiegelman D, Tofler GH, et al. Leisure- time physical activity, television watching, and plasma biomarkers of obesity and cardiovascular diseases risk. *Am J Epidermal* 2000; 152(12): 1171-2.
21. Vioque J, Torres A, Quiles J. Time spent watching television, sleep duration and obesity in adults living in Valencia, Spain. *Intern J Obes Relat Metab Disord* 2000; 24(12): 1683-8.
22. Johnson RK. Change in eating and physical activity patterns of US children. *Proc Nutr Soc* 2000; 59(2): 295-301.
23. Salmon J, Bauman A, Crawford D, Timperio A, Owen N. The association between television viewing and overweight among Australian adults participating in varying levels of leisure-time physical activity. *Intern J Obes Relat Metab Disord* 2000; 24(5): 600-6.
24. Pomerleau J, Mckeigue PM, Chaturvedi N. Factors associated with obesity in South Asian, Afrocaribbean and European women. *Intern J Obes Relat Metab Disord* 1999; 23(1): 25-33.
25. Sarraf Zadegan N, Sadri Gh, Malek Afzali H, Baghaei A, Shahrokhi Sh, Tolooei M et al. Isfahan Healthy Heart Program, an integrated community-based interventional program. *Acta Cardiologica* 2003; 58(4)
26. Baecke JAH, Burema J, Frijters JER. A short questionnaire for the measurement of habitual physical activity in epidemiological studies. *Am J Clin Nutr* 1982; 36: 936-42.
27. American College of Sports Medicine. ACSM's Guidelines for Exercise Testing and Prescription. 6th ed. Philadelphia: Lippincott. Williams and Wilkins, 2000.
28. Ainsworth BE, Haskell WL, Leon AS, Compendium of physical activities: Classification of energy costs of human physical activities *Med Sci Sports Exerc* 1993; 25: 71-80.
29. Najjar MF, Rowland M. Anthropometric reference data and prevalence of overweight, United States, 1976-80. *Vital Health Stat* 11 October 1987; no 238 DHHS publication PHS 87-1688, 1987.
30. Friedewald WT, Levy RI, Fridrikson DS. Estimation of concentrations of low-density lipoprotein cholesterol in plasma without use of preparative ultracentrifuge. *Clin Chem* 1972, 18: 499-502.
31. Wilson PW, Kannal WB, Silbershatz HD, Agostino RB. Clustering of metabolic factors and coronary heart disease. *Arch Intern Med* 1999; 159: 1104-9.
32. Pate RR, Ross JG. The national children and youth fitness study II: factors associated with health- related fitness. *J Phys Educ Recreat Dance* 1987;58:93-5.
33. Dietz WH, Jr, Gortmaker SL. Do we fatten our children at the television set? Obesity and television viewing in children and adolescent. *Pediatrics* 1985; 75: 807-12.
34. Gortmaker SL, Must A, Sobol AM, Peterson K, Coldits GA, Diets WH. Television viewing as a cause of increasing obesity among children in the United States, 1986-1990. *Arch Pediatr Adolesc Med* 1996; 150: 356-62.
35. Anderson RE, Crespo CJ, Bartlett SJ, Cheskin LJ, Pratt M. Relationship of physical activity and television watching with body weight and level of fatness among children: results from the Third National Health and Nutrition Examination Survey. *JAMA* 1998; 279: 938-42.
36. Tucker LA, Friedman GM. Television viewing and obesity in adult males. *Am J public Health* 1991; 79: 516-8.
37. Tucker LA, Bagwell M. Television viewing and obesity in adult females. *Am J Public Health* 1991; 81: 908-11.
38. Ching PL, willete WC, Rimm EB, Coldits GA, Gortmaker SL, Stampfer MJ. Activity level and risk of overweight in male health professional. *Am J public Health* 1996; 86: 25-30.
39. Jeffery RW, French SA. Epidemic obesity in the United States: are fast foods and television viewing contributing? *Am J public Health* 1998; 88: 277-80.
40. Crawford DW, Jeffery RW, French SA. Television viewing. Physical inactivity and obesity. *Intern J Obes* 1999; 23: 437-40.
41. Rosmond R, Bjorntorp P. Psychosocial and socio-economic factors in women and their relationship to obesity and regional body fat distribution. *Intern J Obes Relat Metab Disord* 1999; 23: 138-45.
42. Hubert HB, Eaker ED, Garrison RJ, Castelli WP. Lifestyle correlates of risk factor change in young adults: an 8-year study of coronary heart disease risk factors in the Framingham off spring. *Am J Epidemiol* 1987; 125: 812-31.
43. Owens JF, Matthews KA, wing RR, Kuller LH. Can physical activity mitigate the effects of aging in middle-aged women? *Circulation* 1992; 85: 1265-70.