Iran J Public Health, Vol. 45, No.1, Jan 2016, pp.41-47

Original Article

Seven-Year Changes of Leisure-Time and Occupational Physical Activity among Iranian Adults (Tehran Lipid and Glucose Study)

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(Received 25 Apr 2015; accepted 11 Aug 2015)

Abstract

Background: Considering the lack of data available on changes of physical activity over time in Iran, this study was designed to evaluate changes in physical activity levels among Iranian adults over a median 6.5 yr period.

Methods: In this population-based cohort study, 3515 participants, aged ≥ 20 yr (2100 females and 1415 males) were followed from phase II (2002-2005) to phase IV (2008-2011) of the Tehran Lipid and Glucose Study. Information on physical activity, both leisure time (LTPA) and occupational (OCPA), was collected using the Modifiable Activity Questionnaire. Scores ≤600 METs-min/wk were considered as having low physical activity. Wilcoxon test was performed for comparing MET values between the two phases. McNemar test was used to evaluate differences between paired qualitative data.

Results: In both phases, 59.8% of adults were women, with mean±SD age 44.3±14.6 and 50.9±14.6 yr, in phases II and IV respectively. The prevalence of low physical activity decreased significantly in the follow up period (from 45.9% in phase II to 42.6% in phase IV, *P*=0.004). In both genders, a non-significant decrease in OCPA was observed, However, there was a significant decrease in LTPA among women (*P*=0.031), but not in men.

Conclusion: Despite the high levels of physical activity in Tehranian adults, a decreasing trend was observed. Significant decrease in LTPA among women indicates the urgent need to target women for prevention and implementation of public educational programs to promote physical activity levels and LTPA in particular, to compensate the reduction in OCPA.

Keywords: Physical activity, Trend, Leisure time, Occupational, Iran

Introduction

Physical inactivity is one of the main risk factors for chronic diseases, which are responsible for 5.3 million deaths annually worldwide (1). In 2009, the global prevalence of inactivity was 17% (2), with more than 30% of the world population not meeting the minimum recommendations for physical activity (3). In Iran, 40% of adults (31.6% men and 48.6% women) are reported to be in the low physical activity category, while about 15% (4.7 million people) do not have any physical activity (4). To reduce the burden of diseases like cardiovascular disease, cancer, diabetes mellitus, obesity, and depression, it is strongly recommended that individuals engage in regular physical activity of at least moderate intensity (5).

Given this scenario, information on changes in health-risk behaviors like physical activity over time is vital to planning effective programs and policies. Hence, evaluating changes in physical activity levels of populations over time has become a public health priority (3, 6). Since no data are available on time changes of physical activity in Iran, this study was designed to evaluate

changes in physical activity levels over a median follow up of 6.5 yr among Tehranian adults.

Materials and Methods

The Tehran Lipid and Glucose Study (TLGS) is a prospective population based study performed on a representative sample of Tehran's population, with the aim of determining the prevalence of noncommunicable disease (NCD) risk factors and developing a healthy lifestyle to improve them (7). The baseline survey was performed from 1999 to 2001 and 4751 families, which included over 15000 residents of district 13 of Tehran, aged ≥ 3 yr were selected by cluster random sampling method. After this cross-sectional prevalence study of NCD risk factors, subjects were enrolled into a cohort and a prospective interventional study and were followed every three years. Data on the physical activity status of subjects were collected using the Modifiable Activity Questionnaire (MAQ) from phase II of TLGS. Considering the high numbers of missing physical activity data in phase III, in the current paper, subjects were examined just for phases II (from 2002 to 2005) and IV (from 2008 to 2011) i.e. a 6.5 yr-follow up.

The study was approved by the Ethics Committee of the Research Institute for Endocrine Sciences of Shahid Beheshti University of Medical Sciences. All participants provided written informed consent.

Study population

From 7268 subjects who completed the follow up period, participants who took part in lifestyle intervention through community education (n=3753) were excluded; the data of 3515 subjects aged ≥ 20 yr (2100 females and 1415 males) were analyzed to determine the changes of physical activity levels over a median follow up of 6.5 yr.

Physical Activity Assessment

Information on physical activity was collected using the MAQ (8). High reliability (98%) and moderate validity (47%) were found for the MAQ translated into Persian (9). Intra-class correlation coefficients between the two pretest and post-test MAQs for all activity domains in the past year, including leisure time, occupational, and total (leisure and occupational combined) physical activity were 0.94, 0.98, and 0.97, respectively.

Data were collected by participants, assisted by trained interviewers when needed. Participants were asked to report the activities that they had participated in (at least 10 sessions) during the past 12 mo in their leisure time and then identified the frequency and duration for each LTPA. Total numbers of minper year, calculated for every physical activity were summed up and then divided by 52 to estimate the minper wk of total leisure time physical activity. The calculation of MET-min/wk is summarized as MET-min/wk = (MET × mo per year × sessions per mo × minper session) / 52.

MET-min/wk of leisure time activity was calculated by multiplying the number of minper wk of each leisure time activity to its metabolic equivalent (MET). One MET is set at 3.5 ml of oxygen consumed per kg of body weight per min and represents the resting metabolic rate. The numbers of METs corresponding to each activity were calculated using the average metabolic cost for each activity (10).

Employed persons were asked to indicate how many h a wk they usually worked. According to the questionnaire, individuals had to identify the number of mo and h they participated in physical activity at work (standing, housework, work activities more intense than standing) over the past year. The assessment of occupational activity was based on summing up the number of h per wk of light, moderate and hard intensity activities, multiplying the sum by 60 in order to express minper wk of occupational activity over the past year. Final occupational (MET-min/wk) activity was calculated by multiplying the number of minper wk of each of the three categories of occupational activity by MET values (10).

Definition of Terms

total physical activity was expressed in MET-min/wk by adding leisure time to occupational activity; scores < 600 METs-min/wk were considered as low physical activity (11).

Statistical Analysis

Data are summarized as median (IQR). Paired Wilcoxon test was performed for comparison of average values between the two phases. McNemar test was used to evaluate differences between paired qualitative data. Analyses were carried out using SPSS software version 20.0 (SPSS, Chicago, IL, USA). *P*<0.05 was considered statistically significant.

Results

In both phases, 59.8% of adults were women and the mean ± SD of age was 44.3 ± 14.6 years in phase II and 50.9 ± 14.6 yr in phase IV. After 6.5 years, a significant decrease in LTPA was observed among women, but not among men (Fig. 1).

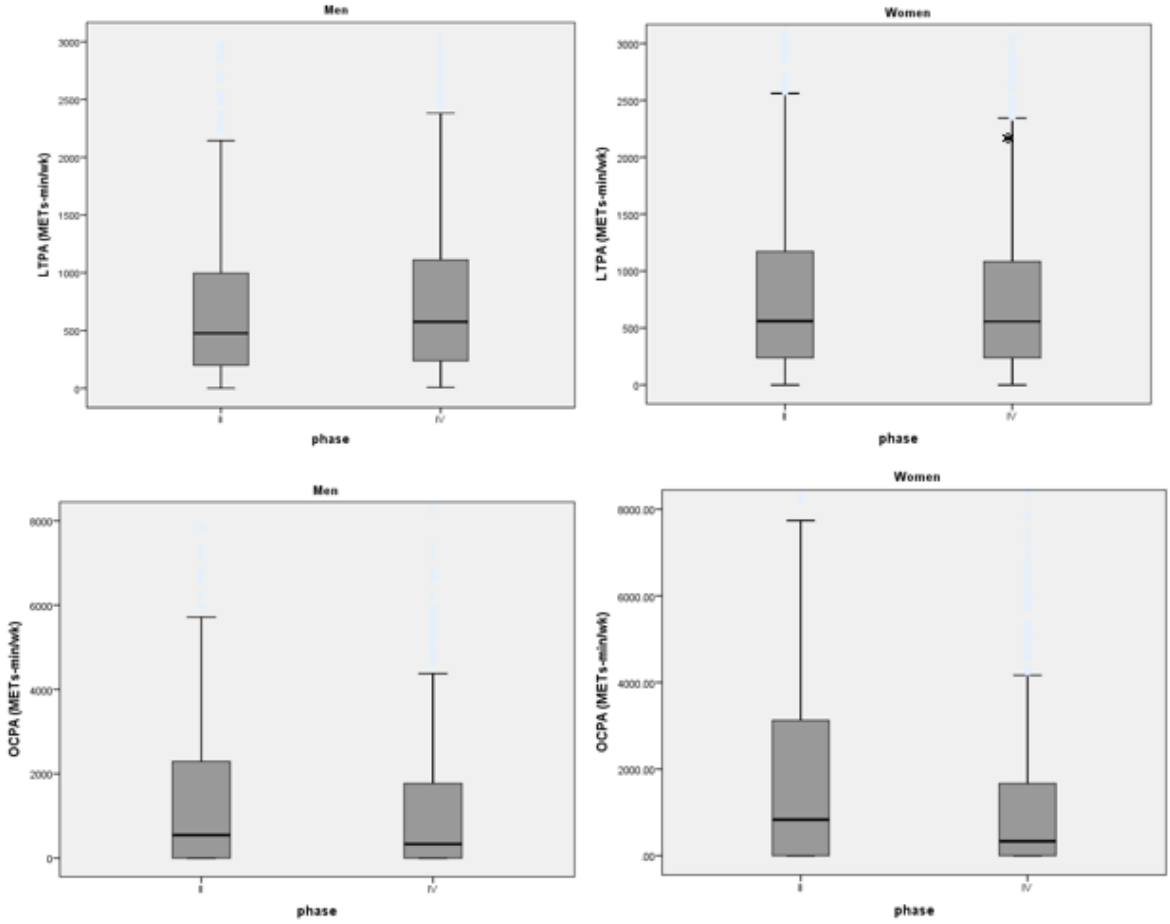

Fig. 1: Levels of physical activity domains (METs-min/wk) in Tehranian men and women in phases II and IV of Tehran Lipid and Glucose Study
LTPA, Leisure Time Physical Activity level; OCPA, Occupational Physical Activity level
* *P*<0.05 between phases

The prevalence of low physical activity in the total population decreased significantly between phases II and IV, being 45.9% and 42.6% respectively (*P*<0.05). As shown in Table 1, the decrease was significant in men, but not in women. Regarding age groups, this table also indicated that the prevalence of low physical activity has decreased significantly among older men (≥60 yr).

Table 1: Prevalence of low physical activity (<600 METs-min/wk) stratified by sex and age groups in phases II and IV of TLGS

Sex	Age groups (yr)	Phase II n (%)	Phase IV n (%)
Men	20-39	87 (53)	104 (45.6)
	40-59	139 (48.6)	177(42.5)
	≥60	113 (48.7)	122 (40.4)*
	All	339 (49.7)	403 (42.6)*
Women	20-39	130 (45.6)	170 (40.7)
	40-59	197 (43.3)	301 (43.5)
	≥60	110 (41.2)	167 (43.3)
	All	110 (48.2)	167 (43.3)

TLGS, Tehran Lipid and Glucose Study
*P<0.05 by McNemar test

Regarding the activities in LTPA, there was a significant increase in proportion of individuals participating in swimming, aerobics/dancing, martial arts, and football/handball; however, there was a significant decrease in jogging/walking (Table 2).

Table 2: Comparison of LTPAs in phases II and IV of TLGS

Activities	Phase II n (%)	Phase IV n (%)	*P*-value*
Jogging/walking	1012 (48)	813 (36.2)	<0.001
Running	78 (3.7)	64 (2.8)	0.225
Swimming	175(8.3)	239 (10.4)	0.001
Mountain climbing	73 (3.5)	62 (2.8)	0.324
Aerobics/dancing	427 (20.3)	503 (22.4)	0.003
Martial arts	13 (0.6)	35 (1.6)	0.002
Wrestling	12 (0.6)	14 (0.6)	0.832
Body building	102 (4.9)	182 (8.1)	<0.001
Skipping	23 (1.1)	13 (0.6)	0.134
Bicycling	24 (1.1)	21 (0.9)	0.749
Football/Handball	88 (4.2)	115 (5.1)	0.044
Volleyball	25 (1.2)	34 (1.5)	0.272
Basketball	8 (0.4)	6 (0.3)	0.791
Badminton/Table tennis	33 (1.6)	31 (1.4)	0.694
Skiing	2 (0.1)	2 (0.1)	1.00
Others	6 (0.3)	112 (5)	<0.001

TLGS, Tehran Lipid and Glucose Study; LTPA, Leisure Time Physical Activity.
*McNemar test for differences between proportions in two phases.

Discussion

The results of present study indicated a 3.3% decrease in the prevalence of low physical activity during a 6.5 yr follow up from 45.9% to 42.6%, among a Tehranian adult population. Although this is encouraging, it is difficult to estimate the clinical impact of such superficial changes, al-

though, on a population level they may lead to decrease in morbidity; i.e., recently, from the NHANES data it has been indicated that each additional min daily of high intensity activity lod the odds of obesity by 2% for men and by 5% for women (12).

Similar to our findings, a Brazilian and a peri-urban Nepalese population showed a high prevalence of low physical activity, i.e. 43.3% and >50%, respectively (13, 14). Although most studies indicated a decreasing trend in physical activity levels of populations (15-17); recently, in an urban Swiss population, a significant increasing trend was reported in physical activity levels from 1999 to 2009 (18), indicating a shift from low intensity physical activity towards moderate/high or vigorous physical activity among this population. Surprisingly, this increasing change occurred outside the occupational setting, demonstrating an increase in LTPA.

With respect to OCPA, our results indicated a decrease over time, which is a result of the greater automation in the workplace, a problem that most populations are facing (19-23). Similar to our findings, in the Madrid region, a decrease in LTPA, which mainly resulted in increased physical inactivity, was accompanied by a decreased OCPA (17), demonstrating a shift from occupations that need moderate to high intensity physical activity to occupations that mostly include sedentary and sitting behavior. The same results were reported in the peri-urban Nepalese population (13) i.e., the reduction in OCPA was not compensated by an increase in LTPA. Hence, concerns for public health are increasing since OCPA is a major portion of total physical activity and as long as the decrease in OCPA is not counteracted by increase in LTPA, the approach mentioned above that led to increase physical activity levels in the Swiss population (18), overall physical activity will most likely declined.

Another main finding of the current study was that LTPA decreased significantly among women during a median follow up of 6.5 years. The association between employment and LTPA reports earlier in this population (24) indicated higher prevalence of inactivity among those employed compared to the unemployed. These findings can be easily explained by less leisure time among employed individuals, which is often reported as a barrier to participate in physical activity and exercise programs. Again, in another study of this population (25), the prevalences of obesity and abdominal obesity in women were found to be higher than in men, indicting the urgent need to target women for prevention and implementation of public educational programs to promote physical activity levels and LTPA in particular, to curtail the rising trend in obesity and abdominal obesity.

Physical inactivity is responsible for 6-10% of the major non-communicable diseases includes coronary heart disease and type 2 diabetes (1). Taking into account that, regarding coronary heart disease risk, about one-quarter of Tehranian adults are reported to be eligible for therapeutic interventions (therapeutic lifestyle changes and/or additional drug therapy) (26) and also there is a marked increase in the prevalence of obesity and abdominal obesity (25), significant importance given to our results. Furthermore, since the increasing trend in abdominal and general obesity is also observed in Tehranian adolescents (27) and taking into account that sports activities in Iran is publicized mostly through physical education classes, schools can play an important role in promoting physical activity in younger groups of this society.

The increasing proportion of individuals participating in physical activities such as swimming and aerobics/dancing reflects a preference shift in the type of physical activity performed by adults in leisure time. Such preferences in types of activities may be a result of the growing number of gyms, increased knowledge and awareness about the beneficial effects of physical activity for health, and achieving a desirable body shape. Similar to our findings, in the Madrid region (17), activities which mostly contribute to the decrease in LTPA were those of low and moderate intensity, like walking and jogging, implying that a significant decrease in the proportion of subjects participating in these activities can be responsible for decrease in overall LTPA in this population.

The major strength of current study is its large and diverse population, which is representative of

Tehranian adults. Moreover, the reliability and convergent validity of the Persian version of questionnaire used for physical activity assessment (MAQ) had been confirmed before. However, some limitations may have affected accuracy; first, the questionnaire we used (MAQ) differs to those of other studies, and any comparison of physical activity domains between studies using different methods is problematic; second, it cannot be overlooked that health promotion publicity induces a tendency for socially desirable answers; lastly, in such studies, the clinical significance of the changes in physical activity is difficult to determine.

Conclusion

Our analysis of physical activity level changes over a 6.5 yr follow up in Tehranian adults indicates a decreasing trend in the proportion of subjects with low physical activity. However despite these encouraging findings, approximately fifty percent of Tehranian adults still have physical activity levels below the minimum level recommended, emphasizing the necessity to implement programs encouraging increase in physical activity levels of Tehranian adults. Moreover, significant decrease in LTPA among women indicates the urgent need to target women for prevention and implementation of public educational programs to promote physical activity levels and LTPA in particular, to compensate the reduction in OCPA.

Ethical considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

Acknowledgement

The authors wish to acknowledge the staff and participants in the TLGS for their important contribution and Ms. Niloofar Shiva for critical editing of English grammar and syntax of the manuscript. The authors declare that there is no conflict of interests.

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