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Original Article

Association of Socioeconomic Factors and Sedentary Lifestyle in Belgrade's Suburb, Working Class Community

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Abstract

Background: Sedentary lifestyle represents a growing health problem and considering that there is already a range of unhealthy habits that are marked as health risk factors and the increasing prevalence of sedentary lifestyle worldwide, we aimed to investigate association of sedentary way of living in suburb, working class local community with socioeconomic determinants such as educational level, occupation and income status.

Methods: In this community-based cross-sectional study, 1126 independently functioning adults were enrolled into the study. The study protocol included a complete clinical and biochemical investigation revealing age, gender, lipid status, height, weight and blood pressure. Trained interviewers (nurses) collected information from patients about current state of chronic diseases (diabetes mellitus, arterial hypertension) smoking, medication and other socioeconomic data. Descriptive analysis, Chi-square and logistic regression were performed as statistical calculations.

Results: Patients with elementary school were seven times more likely to be classified in category with sedentary lifestyle compared to patients with college or faculty degree. Being retired and reporting low income were significantly associated with higher odds of sedentary behavior when compared with students and patients with high-income status, respectively.

Conclusions: The significance of this study lies in the fact that our results may help to easier identification of patients who may have a tendency towards a sedentary lifestyle.

Keywords: Physical activity, Health risk behaviors, Primary care, Exercise

Introduction

In recent years, sedentary living and physical activity have become an important topic of research. Sedentary lifestyle presents a significant risk factor for human health (1-3). On the other hand, it was proven that habitual physical activity or exercise causes not only a reduction of the incidence of obesity, cardiovascular diseases and diabetes, but also improves daily functioning of elderly people (4-6). Moreover, even moderate-intensity activity, such as half an hour of walking, can reduce postprandial glucose and insulin levels in overweight and obese patients (7).

Researches of sedentary lifestyle are well documented and available in developed countries but data for developing countries are scarce (8-10). According to data for 2006, more than two-thirds of our country's adult population is physically inactive (11). Although national data are valuable for public health interventions, it does not provide enough information about the social and economic specificities of particular communities and their combined effect on sedentary lifestyle over time. Educational level, occupation and income status are important components in the socioeconomic sense. Recognizing relationships of a full range of sedentary lifestyle in members of the predominantly working class community is necessary to develop efficient preventive *intervention* procedures in order to reduce sedentary behavior and health risk it represents.

Public health systems in developing countries are often limited in terms of personnel and funding. Reducing the number of patients who have health problems related to lack of regular physical activity and reduction of total time they spent in leisure-time sedentary activities (such as TV viewing, computer use, reading, sitting or sleeping) could considerably reduce the utilization of public health resources.

Therefore, we hypothesized that sedentary lifestyle in suburb, working class local community were associated with socioeconomic determinants. We aimed to narrow focus and to characterize populations most appropriate to target where we expect sedentary behavior.

Materials and Methods

Subjects

A total of 1126 consecutive attenders at a general practice were enrolled into this cross-sectional study. They were independently functioning adults who regularly attended annual medical check-ups at Rakovica Health Center in Belgrade. Data collection lasted one year, from January 2013 to December, 2013. There are four branches of Community Health Center in the municipality of Rakovica in which medical examinations, interviews and measurements were performed. All data were entered in the integrated health information system. We restricted our analysis to adult patients aged 18 yr or older and excluded patients who were hospitalized in last twelve months. Patients whose general condition did not allow any kind of physical activity and patients who were taking chemotherapy were also excluded from the study.

The study protocol included a complete clinical and biochemical investigation revealing age, gender, lipid status, height, weight and blood pressure. The questionnaires were used for collection of the following data: income status, educational level, occupation and level of physical activity. The questionnaires were based on the standard questionnaires, which were used in similar types of surveys but adapted for this study (12, 13). Interviewers collected information from patients about current state of chronic diseases (diabetes mellitus, arterial hypertension) smoking, medication and other socioeconomic data. Each interview was conducted by two interviewers who were health care professionals. Smoking habits and diabetes were reported and dichotomized before the variables were entered into the analysis (Smoker vs. Non-smoker, Diabetic vs. Non-Diabetic respectively). Educational attainment was categorized into three groups: elementary school, high school and college or faculty. Patients were asked to describe their physical activities.

Patients who stated that they have excessive amount of daily sitting, watching television, computer use or reading were categorized as Group 1 - patients with sedentary lifestyle. Patients who reported to have some kind of exercise during the day such as light walking, stretching or non-exercise physical activities such as standing, washing dishes, doing laundry or cooking, were designated as Group 2- low light-intensity physical activity. Moderate-to-vigorous physical activity includes exercise such as brisk walking, biking on level ground and sports involving catch and throw (such as volleyball) and activities such as stair climbing, mopping the floor, car washing or gardening. All patients who have been involved in such activities were categorized as Group 3. Patients in group 4 practiced exercise regularly (14).

The variables reflecting individual socioeconomic status were income status, occupation and education level of the respondent.To determine income status, respondents were asked to report real income they had during the past year: Responses were coded as: low income: 320 USD or lower, average income: 320 – 590 USD and

high income: higher than 590 USD (Statistical Office of the Republic of Serbia, 2013).
Educational attainment was categorised into three groups: elementary school, high school and college or faculty. Information about the occupation are obtained by asking respondents: „What is your occupation"? The answer included: workers, entrepreneurs, retirees, unemployed, students or other. Because of the small sample size, participants whose answer was „other" (n = 4) were included in the category of workers; this did not cause any significant changes in the statistical analysis. At the point of study entry all patients underwent height and weight measurement for determination of body-mass index [BMI measured as weight (kg)/squared height (m2)] and waist and hip measurements for waist-to-hip ratio (WHR). Anthropometric characteristics were collected with patients wearing only underwear. Patients' height was measured by using anthropometer (Sieber Hegner, Switzerland), with an accuracy of 0.1 cm. Body mass was recorded using F 150 S02-A balance (Sartorius, Germany), with an accuracy of 0.1kg. Waist circuimference was measured to the nearest centimetre at the level of the umbilicus and hip circumference was measured to the nearest centimeter at the level of the iliac crest. All anthropometric measurements were performed by a single health care professional.
The whole study was planned according to the ethical standards detailed in the Declaration of Helsinki (as revised in 1983) and according to local institutional guidelines. All patients enrolled into the study gave written informed consent to participate in the study. This study was approved by the Ethical Committee of the Community Health Center Rakovica in Belgrade.

Laboratory investigations

Blood sampling took place under standard conditions between 7 and 8am after a 12-h overnight fast. Venous blood was collected into evacuated tubes (Vacutainer, Becton Dickinson, CITY, USA) from the antecubital vein with minimal stasis. Quality control was provided by using quality control samples. Total cholesterol, high-density lipoprotein (HDL-C), low-density lipoprotein (LDL-C) and triglycerides were assayed by standard laboratory procedures using an ILAB 600 analyzer (Instrumentation Laboratory, Milan, Italy). The concentration of LDL-C was calculated using the Friedewald formula.

Statistical analysis

Gaussian distribution was tested using the Kolmogorov–Smirnov test. All data were non-parametrically distributed and the Kruskal-Wallis H test was employed to compare differences in medians between patients in four experimental groups of patients. Mann-Whitney U test was used in two-group comparisons. Analysis of categorical variables was performed using the Chi-square test. We used multivariate logistic regression analyses to calculate the odd ratios (OR) and 95% confident intervals (95% CI) of having sedentary lifestyle for education, ocupation and income status as covariates. Physical activity was therefore dichotomised into two groups (patients who were engaged in sedentary lifestyle (Group 1) and patients who were engaged in any type of physical activity (Groups 2, 3 and 4)) before entered into the regression analysis. Sample size was calculated using the G-Power 3.1.0 software. A power calculation showed that a sample of 297 participants was necessary to detect effect size w = 0.3 with 99 percent power and with alpha of 0.05. To ensure representative sample for our study, stratification with equal allocation was applied and number of patients was selected geographically to correspond with the population data for four community areas (in each area there is a health center branch). To ensure that sufficient participants were recruited from all socio-economic groups, the number of patients included in the study was significantly higher than the minimum required. All statistical analysis were carried out using SPSS 16.0 for Windows (SPSS Inc., Chicago, IL, USA), and results were considered statistically significant where two-tailed P value was <0.05.

Results

Classification and general characteristics of the patients are shown in Table 1.

Table 1: Classification and general characteristics of the study groups

Parameters	Group 1 n=595	Group 2 n=409	Group 3 n=62	Group 4 n=60
Age, years	53 (43 - 70) [a,b,c]	45 (29 - 57)[d,e]	32 (26 - 48)	25 (23 - 38)
Men*	272 (45.7%)	200 (48.9%)	35 (56.5%)	45 (75.0%)
Women*	323 (54.3%)	209 (51.1%)	27 (43.5%)	15 (25.0%)
Body height, m	1.72 (1.68 - 1.81)[b,c]	1.71 (1.62 - 1.85)[d,e]	1.81 (1.70 - 1.86)	1.81 (1.89 - 1.90)
Body weight, kg	82.1 (75.2 - 95.3) [a,b,c]	79.2 (63.4 - 88.1)[d,e]	74.2 (60.3 - 83.1)[f]	70.5 (63.2 - 84.4)
Body mass index	28.6 (25.4 - 31.6) [a,b,c]	25.4 (22.5 - 28.1)[d,e]	22.6 (21.7 - 26.0)	22.2 (20.6 - 23.9)
Waist, cm	95.2 (84.1 - 102.1) [a,b,c]	87.3 (73.1 - 91.9)[d,e]	79.1 (66.3 - 91.5)	78.3 (69.3 - 87.5)
Hips, cm	102.3 (96.0 - 109.2) [a,b,c]	97.2 (92.0 - 102.3)[d,e]	96.4 (90.2 - 98.1)	93.6 88.0 96.3
Systolic BP, mm Hg	140 (130 - 145) [a,b,c]	125 (120 - 135)[e]	125 (120 - 135)[f]	120 (110 - 125)
Diastolic BP, mm Hg	85 (80 - 90) [a,b,c]	80 (75 - 85)[d,e]	75 (70 - 80)	70 (70 - 80)
Cholesterol, mmol/L	5.8 (4.9 - 6.8) [a,b,c]	4.9 (4.3 - 6.1)[d,e]	4.6 (4.0 - 4.9)[f]	4.1 (4.0 - 4.8)
Triglycerides, mmol/L	2.1 (1.3 - 3.1) [a,b,c]	1.4 (1.0 - 1.9)[d,e]	1.1 (0.8 - 1.4)	1.2 (0.9 - 1.4)
HDL- C, mmol/L	1.50 (1.03 - 1.78) [a,b,c]	1.59 (1.12 - 1.87)[d,e]	1.78 (1.63 - 1.88)	1.87 (1.73 - 1.92)
LDL - C, mmol/L	3.51 (2.43 - 4.18) [a,b,c]	2.70 (1.89 - 3.80)[d,e]	2.08 (1.79 - 2.41)	1.73 (1.44 - 2.43)
Smoker*	308 (51.8%)	172 (42.1%)	33 (53.2%)	0 (0.0%)
Non-smoker*	287 (48.2%)	237 (57.9%)	29 (46.8%)	60 (100.0%)
Diabetic*	69 (11.6%)	25 (6.1%)	0 (0.0%)	0 (0.0%)
Non-Diabetic*	526 (88.4%)	384 (93.9%)	62 (100.0%)	60 (100.0%)

Continuous variables are shown as median (25th–75th percentiles), categorical variables are shown as *absolute* and *relative* frequencies. [a]*P*<0.01 Group 1 vs. Group 2; [b]*P*<0.01 Group 1 vs. Group 3; [c]*P*<0.01 Group 1 vs. Group 4; [d]*P*<0.01 Group 2 vs. Group 3; [e]*P*<0.01 Group 2 vs. Group 4; [f]*P*<0.01 Group 3 vs. Group 4; *Significant differences according to Chi-square test (Men vs. Women, Smokers vs. Non smokers, Diabetic vs. Non-Diabetic)

To determine whether there was a statistically significant difference between the four groups of patients we used Kruskal-Wallis H test. This test indicated significant differences between four experimental groups (*P*<0.001). To investigate particular differences between groups we employed *Mann-Whitney U test*. Patients with *sedentary* lifestyle were significantly older than members of other three groups, especially when compared to Group 3 and Group 4. Patients in Group 1 had a significantly higher body weight, body mass index, waist, hips, systolic and diastolic blood pressure, cholesterol, triglycerides and LDL – cholesterol levels compared with group 2 (*P*<0.001). Moreover, in Group 3 and Group 4 all aforementioned parameters were significantly lower compared with parameters measured in group of patients with *sedentary* lifestyle (*P*<0.001). The HDL- C was significantly lower in group with *sedentary* lifestyle compared to patients in other three groups (*P*<0.001).

In addition, the results obtained with patients in Group 2 were significantly different compared to group 3 and group 4. Patients in Group 2 had a significantly higher body weight, body mass index, waist, hips, diastolic blood pressure, cholesterol, triglycerides and LDL- cholesterol levels compared with group 3 and group 4 (*P*<0.001). The HDL- C was significantly lower in patients who were members of Group 2 compared with patients in group 3 and group 4 (*P*<0.001). Systolic blood pressure in Group 2 was significantly higher only when compared to patients who were members of Group 4. In addition, patients in Group 2 were significantly older when compared to Group 3 and Group 4.

When we compared data obtained in Group 3 and Group 4, there were no significant differences between these two groups, with the exception of body weight, systolic blood pressure and total cholesterol levels, which were all higher in Group 3 (*P*<0.001). There was a significant difference between gender distribution in the four groups of patients with different habits in exercise or physical activity (Chi-square=20.180; *P*<0.001). Additionally, significant differences were found between distribution of smokers and non-smokers (Chi-square=62.945; *P*<0.001) and diabetic and non-diabetic (Chi-square=21.931; *P*<0.001) in the four experimental groups.

In order to define causes of the high number of patients with sedentary lifestyle, we further investigated factors such as education, occupation and income status. Educated patients had sedentary lifestyle than patients of college or faculty level of education (Che-Square=57.965; *P*<0.001). Sedentary lifestyle was most prevalent in retirees and workers in contrast to the unemployed, students and entrepreneurs when compared according to occupation (Che-Square=126.387; *P*<0.001). Patients who have high or average incomes were more physically active when compared to patients who had low income (Che-Square=103.165; *P*<0.001).

We used multiple binary logistic regressions to determine whether the socioeconomic indicators (educational level, occupation and income status) had potential to predict risk of sedentary behavior (Table 2).

Table 2: Logistic regression analysis for the association of sedentary lifestyle and socioeconomic status of patients

Parameters	**OR**	**95% CI**	***P***
Education			
Elementary school	7.00	4.12 - 11.90	<0.001
High school	2.16	1.56 - 2.99	<0.001
College or faculty	1.00	Ref.	<0.001
Income status			
Low	5.53	3.52 - 8.69	<0.001
Average	1.82	1.114 - 2.961	0.017
High	1.000	Ref.	<0.001
Occupation			
Workers	25.22	7.86 - 80.90	<0.001
Entrepreneurs	17.42	4.91 - 61.88	<0.001
Retirees	71.38	21.64 - 235.38	<0.001
Unemployed	13.80	3.91 - 48.74	<0.001
Students	1.000	Ref.	<0.001

OR, odds ratio; Ref, reference category; ORs were calculated with multivariate logistic regression analysis. All variables presented in the table were included in the models

For education, the reference category was college or faculty degree, for occupation students and for income status patients with high-income status (categories with the lowest number of sedentary patients). Patients with elementary school level of education were seven times more likely to be classified in the category with sedentary lifestyle (OR=7.00; 95%CI=4.12-11.90; *P*<0.001) compared to patients with college or faculty degree. Being retired (OR=71.39; 95%CI=21.64-235.38; *P*<0.001) and reporting low income (OR=5.53; 95%CI=3.52-8.69; *P*<0.001) were significantly associated with higher odds of sedentary behavior when compared with students and patients with high-income status, respectively. Considering multi-morbidity that occurs later in life, elderly were the most common patients in general practice on the primary care level. Patients in Group 2 were significantly older when compared to Group 3 and group 4 (*P*<0.01). When the group 3 and 4 were compared, statistically significant differences were not found. Furthermore, the distribution of men and women differed significantly between the four experimental groups (*P*<0.01). Moreover, patients with high school degree were 2.16 times more likely to be classified in the category with sedentary lifestyle (OR=2.16; 95%CI=1.56 - 2.99; *P*<0.001) when compared to patients with college or faculty degree. Higher odds of sedentary behavior also were found in workers (OR=25.22; 95%CI=7.86-80.90; *P*<0.001), entrepreneurs (OR=17.42; 95%CI=4.91-61.88; *P*<0.001) and unemployed (OR=13.80; 95%CI=3.91-48.74; $P<0.001$) when compared with students.

Discussion

Sedentary lifestyle is a term used to describe activities commonly associated with sitting, sleeping, lying down and the other actions that are performed in these states of low energy consumption. Recent studies have revealed a clear role of sedentarism in development and progression of chronic diseases and disabling conditions (15, 16). Taking into consideration that understanding the health risks of sedentary lifestyle is important for general population health, our challenge was to investigate the impact of social determinants to this kind of behavior.

Old age has been commonly recognized as a time of inevitable increase in chronic diseases and conditions. In addition, sedentary lifestyles are more prevalent in elderly. Over the past 32 years, the older adult population has significantly increased in the Republic of Serbia. In 1981, only 10.8% of the population was aged 65 or older and by 2013, the percent had increased to 17.8% (Statistical Office of the Republic of Serbia, 2013). Sedentary lifestyle has been considered a factor that severely impacts human health and our findings were consistent with studies that have addressed this issue (17,18). Therefore, when we compared the four experimental groups, the differences were as we had expected. Patients with sedentary lifestyle were significantly older than members of the other three groups were. When compared to Group 2, patients in Group 1 had a significantly higher body weight, body mass index, waist, hips, systolic and diastolic blood pressure, cholesterol, triglycerides and LDL – cholesterol levels. And if the patients in Group 2 were engaged in low light-intensity physical activity (such as light walking), it was enough to affect the anthropomorphological and biochemical parameters, which were better in Group 2 when compared to sedentary patients. The lipid status, anthropomorphological characteristics and blood pressure of the patients who were engaged immoderate or vigorous physical activity were within the physiological range and significantly better than in Group 1 and Group 2. However, devastating result of our investigation refers to the fact that almost half of the study participants were engaged in sedentary lifestyle. Our findings further extend the understanding of the impact of socioeconomic indicators on a significant incidence of sedentary behavior in this suburb working class area.

Knowing the current prevalence of a sedentary lifestyle in adult population and the main characteristics of sedentary patients in certain areas is necessary for strategic promotion of physical activity (19). Considering that the high incidence of sedentary lifestyle and severity of the consequences that such behavior may have, our particular concern was the association of educational level and sedentarism. Our results showed that higher educational level (College or faculty degree) was significantly associated with a lower incidence of sedentary lifestyle. Even 78.5% of the patients who have elementary school were engaged in sedentary lifestyle, while in patients with secondary education, the percentage was 53.4%. Conversely, well educated patients tended to be less sedentary when compared to patients with elementary or high school. Therefore, our study confirms the well-known relationship between a sedentary lifestyle and lack of education, as Crespo et al. demonstrated (20).

Transitioning to retirement leads to significant changes on older person's life (21, 22). As older people no longer need to spend time at work, they tend to reduce their involvement in physical activities compared to younger individuals. In contrast, students have proven to be extremely physically active. In other groups, 52.3% of workers, 43.1% of entrepreneurs and 37.5% of unemployed subjects were engaged in a sedentary lifestyle. Based on the obtained results it could be concluded that the occupational sedentarism may be one of the most important factors that influence the physical activity of people.

Finally, the objective of our research was related to the impact of income level on sedentary behavior. Kozo et al. concluded that people with higher income spend more time using the computer (Internet) and reading (23). However, the percentage of people with low income who engaged in leisure-time physical activity were significantly lower when compared to total adult population and our results were in accordance with this study (24). The percentage of patients with high or average incomes who were less engaged in sedentary lifestyle, were lower when compared to patients who had low income. The differences in study results indicate that there is a need for a specific strategy in reducing sedentary lifestyle and that it should be adapted to the characteristics of the local population.

While we think that the findings obtained in this study can be useful for better understanding of the causes of sedentary lifestyle, some limitations of this study need to be considered. First is concerning the fact that analysis assumed that all the experimental groups used the public services equally. A limited number of patients use private health sector so we were not able to analyze engagement in sedentary lifestyle among these people. Besides, we can only assume that people who use private health sector have higher incomes and educational level, but we have no evidence for such a claim. Second, the income status, educational level, occupation and level of physical activity were self-reported and might be measured with errors.

Community based prediction of risk of sedentary behavior could be benefited twofold: first, increase of the total time spent in some kind of physical activity and health improvement, and second, decrease of health care resources consumption. In order to identify a segment of the population, which is more likely to be engaged in sedentary lifestyle, we have tried to determine whether the socioeconomic indicators had potential to predict risk of sedentary behavior. Our research has shown that special attention should be paid to individuals who are retired, with low income and less educated because they have higher odds of spending less time in leisure-time physical activity. In old age, retired individuals with different educational and financial status may exert advice provided by health professionals differently. Therefore, it is very important that groups with higher odds for sedentary behavior get detailed advice and information about sedentarism as a significant health risk factor.

Conclusion

Each community has its own specificities in terms of social and economic backgrounds. In conclusion, our results are important for public health, especially if they are elderly. Although our results identify older, retired people who are less educated and have lower incomes, as a risk group for sedentary lifestyle, further research on the local, community level should provide an answer which model of counseling and control provided by health professionals could be best in reducing sedentary lifestyle.

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.

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The authors declare that there is no conflict of interests.

References

1. Van der Ploeg HP, Chey T, Korda RJ, Banks E, Bauman A. (2012). Sitting time and all-cause mortality risk in 222 497 Australian adults. *Arch Intern Med,* 172 (6): 494-500.
2. Katzmarzyk PT. (2010). Physical activity, sedentary behavior, and health: paradigm paralysis or paradigm shift? *Diabetes*, 59 (11): 2717-2725.
3. Biernat E, Piątkowska M. (2014). Individual and Environmental Factors Determining Sedentary Lifestyle of the Polish Population. *Iran J Public Health,* 43 (8): 1033-1044.
4. Paganini-Hill A. (2011). Lifestyle practices and cardiovascular disease mortality in the elderly:

the leisure world cohort study. *Cardiol Res Pract,* 2011. doi: 10.4061/2011/983764.
5. Gardiner PA, Eakin EG, Healy GN, Owen N. (2011). Feasibility of reducing older adults' sedentary time. *Am J Prev Med*, 41 (2): 174-177.
6. DiPietro L. (2001). Physical activity in aging changes in patterns and their relationship to health and function. The Journals of Gerontology Series A: Biological Sciences and Medical Sciences, 56 (suppl 2), 13-22.
7. Dunstan DW, Kingwell B A, Larsen R, Healy GN, Cerin E, Hamilton MT, et al. (2012). Breaking up prolonged sitting reduces postprandial glucose and insulin responses. *Diabetes Care*, 35 (5): 976-983.
8. Martinez-Gonzalez MA, Alfredo Martinez J, Hu FB, Gibney MJ, Kearney J. (1999). Physical inactivity, sedentary lifestyle and obesity in the European Union. *Int J Obes*, 23 (11): 1192-1201.
9. Owen N, Bauman A. (1992). The descriptive epidemiology of a sedentary lifestyle in adult Australians. *Int J Epidemiol*, 21 (2): 305-310.
10. Tudor-Locke C, Leonardi C, Johnson WD, Katzmarzyk PT. (2011). Time spent in physical activity and sedentary behaviors on the working day: the American time use survey. *Int J Occup Environ Med*, 53 (12): 1382-1387.
11. Stojanović MD, Ostojić SM, Milošević ZS. (2013). Fizička (ne) aktivnost-definicija, učestalost i ekonomski aspekti. *Teme-Časopis za Društvene Nauke*, (02): 857-866.
12. World Health Organization. Health statistics and health information systems. World Health Survey. www.who.int/healthinfo/survey/en/.
13. SF-36.org. A community for measuring health outcomes using SF tools. SF Surveys. Available from: www.sf-36.org/
14. Haskell WL, Lee IM, Pate RR, Powell KE, Blair SN, Franklin BA, Macera CA, Heath GW, Thompson PD, Bauman A. (2007). Physical activity and public health: updated recommendation for adults from the American College of Sports Medicine and the American Heart Association. *Circulation*, 116 (9), 1081.
15. King AC, Guralnik JM. (2010). Maximizing the potential of an aging population. *JAMA*, 304 (17): 1944-1945.
16. Hamilton MT, Healy GN, Dunstan DW, Zderic TW, Owen N. (2008). Too little exercise and too much sitting: inactivity physiology and the need for new recommendations on sedentary behavior. *Curr Cardiovasc Risk Rep*, 2 (4): 292-298.
17. Owen N, Healy GN, Matthews CE, Dunstan DW. (2010). Too much sitting: the population-health science of sedentary behavior. *Exerc Sport Sci Rev*, 38 (3): 105.
18. Kyle UG, Morabia A, Schutz Y, Pichard C. (2004). Sedentarism affects body fat mass index and fat-free mass index in adults aged 18 to 98 years. *Nutrition*, 20 (3): 255-260.
19. Varo JJ, Martínez-González MA, de Irala-Estévez J, Kearney J, Gibney M, Martínez JA. (2003). Distribution and determinants of sedentary lifestyles in the European Union. *Int J Epidemiol*, 32 (1): 138-146.
20. Crespo CJ, Ainsworth BE, Keteyian SJ, Heath GW, Smit ELLEN (1999). Prevalence of physical inactivity and its relation to social class in US adults: results from the Third National Health and Nutrition Examination Survey, 1988-1994. *Med Sci Sports Exerc*, 31 (12): 1821-1827.
21. Robinson J, Godbey G. (2010). Time for life: The surprising ways Americans use their time. *Penn State Press.*
22. Haworth JT, Iso-Ahola SE. (1997). Work, leisure and well-being. *Psychology Press*
23. Kozo J, Sallis JF, Conway TL, Kerr J, Cain K, Saelens BE, et al. (2012). Sedentary behaviors of adults in relation to neighborhood walkability and income. *Health Psychol*, 31 (6): 704.
24. Siegel PZ, Brackbill RM, Heath GW. (1995). The epidemiology of walking for exercise: implications for promoting activity among sedentary groups. *Am J Public Health*, 85 (5): 706-710.