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PHYSICAL ACTIVITY, BODY MASS INDEX AND HEALTH SERVICES UTILIZATION

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Abstract
The aim of this study was to explore the relationship of leisure time physical activity and body mass index with health care utilization in patients treated by family physicians in Sarajevo Canton. The study included 300 respondents (150 of normal weight and 150 overweight/obese). Data concerning socio-demographic characteristics, leisure-time physical activities and utilization of health care were collected using a designed questionnaire. Normal weight and physically inactive respondents compared to normal weight and physically active were 3,5 times more likely to have family practice office visits (95% CI: 1,53-8,01). Overweight/ obese and physically inactive respondents compared to normal weight and physically active were 3,3 times more likely to have family practice office visits (95% CI: 1,80-6,31). Overweight/ obese and physically active respondents compared to normal weight and physically active were 1,8 times more likely to have family practice office visits (95% CI: 1,03-3,29). Our findings suggest that physical activity may compensate, to some extent, for the adverse effects of overweight and obesity and prevent some of the health service utilization associated with overweight and obesity.

Key words: overweight, physical inactivity, family practice, office visits

Introduction

Physical inactivity and obesity have become a major health issue in the modern world. Lack of physical activity is a risk factor for obesity (Kirsi et al., 2008). Obesity is a common metabolic condition and a key risk factor for a range of chronic conditions (ie, hypertension, diabetes, dyslipidaemia, heart disease, stroke, narcolepsy, osteoarthritis, asthma, apnoea, gout and certain cancers), which tend to reduce quality of life and ultimately cause death (Pi-Sunyer, 2009).

Being obese could reduce the likelihood of participating in physical activity (Kim et al., 2017). Physical inactivity is itself a risk factor for cardiovascular diseases, diabetes, and higher premature mortality rate (Katzmarzyk and Janssen, 2004).

Health consequences of physical inactivity are independent of those associated with obesity as indicated in several major studies, which have simultaneously evaluated physical activity, and obesity in relation to colon cancer, diabetes, and total mortality. For example, evaluating relationships between physical activity and colon cancer, Giovannucci at al. (1995) and Martinez at al. (1997) found that the inverse associations with level of activity were independent of body mass index.

Because of high prevalence of physical inactivity and obesity and their association with multiple chronic illnesses, physical inactivity and obesity tend to substantially increase health care utilisation. Several studies reported that health service usage is substantially higher among physically inactive people and/or overweight-obese people due to those diseases (Quesenberry, Caan and Jacobson, 1998; Tsai. Williamson and Glick, 2011).

Using the National Health Interview Survey (NHIS) and the RAND Health Insurance Experiment samples, US studies conclude that physically active individuals use less inpatient and outpatient services. Depending on the samples used, estimated difference in use of health care services between active and inactive individuals varies from 20–35% for inpatient services and 6–28% for outpatient services (Manning et al., 1987).

Quesenberry, Caan and Jacobson (1998) found a significant association between self-reported body weight and outpatient health services use for a 12-month survey period. Obese patients, however, reported a greater number of comorbid conditions.

Several previous studies reported an association between decreased health care utilization and increased leisure-time physical activity (Wang at al., 2005; Galán at al., 2010). Combined with diet, physical activity has synergistic and likely cumulative effects on an individual's ability to maintain or obtain a healthy body weight over the life course (Elliot and Hamlin, 2018).
This study aims to explore the relationship of leisure time physical activity and body mass index with health care utilization in patients treated by family physicians in Sarajevo Canton.

Methods

Sample subjects

This cross-sectional study was carried out in family medicine outpatient departments of the Public Institution Primary Health Care Center of Canton Sarajevo, Bosnia and Herzegovina (B&H) in period 1 March – 30 June 2018. A total of 300 respondents (150 of normal weight and 150 overweight/obese) were selected from patients who used health care services at the Primary Health Care Centre during the study period.
The inclusion criteria were adults aged 18–64 years who have a medical record in the Primary Health Care Center of the Sarajevo Canton. The exclusion criteria were persons younger than 18 or older than 64 years, persons who do not have medical records at the Primary Health Care Center of the Sarajevo Canton, pregnant, postpartum women, adults with chronic noncommunicable conditions related to mobility.

Sample variables

Respondents were asked to complete an anonymous questionnaire containing questions related to physical activity in different domains of life, socio-demographic characteristics and utilization of health care.
Domains of physical activity were included: leisure-time, transportation and occupational physical activity.
Leisure-time physical activities were defined as exercise, sports, recreation, or hobbies that are not associated with regular job-, household-, or transportation-related activities (U.S. Department of Health and Human Services, 1996). Respondents reported the number of days and minutes spent in moderate recreational activities in a week by answering the questions "In a typical week, on how many days do you do moderate-intensity sports, fitness, or recreational activities?" and "Minutes moderate recreational activities." We summarized the total number of minutes. Respondents were classified into three categories: physically active >60 minutes per week, physically active 60-149 minutes per week and physically active ≤150 minutes per week. According to World Health Organization physical activity guidelines, a person who is physically active ≤150 minutes per week was considered as a complier to the WHO physical activity recommendations (World Health Organization, 2010).
Transportation physical activity was defined as physical activity that is performed in order to get from one place to another. Walking or bicycling to and from work, school, transportation hubs, or a shopping center is examples. Participants self-reported their active transport behavior. Participants were asked about activity frequency ("In a typical week, on who many days do you walk or bicycle to get to and from places?") and duration ("How much time do you spend walking or bicycling for travel on a typical day?"). Levels of active transport were calculated as the weekly minutes that participants reported participating in walking or cycling by multiplying the number of days participants walked or bicycled by their daily duration. Travel mode was defined as low level of active transport (<150 min/wk), and high level of active transport (≥150 min/wk).
Occupational physical activity was defined as physical activity that is performed while one is working. Stocking shelves in a store, delivering packages in an office, preparing or serving food in restaurant, or carrying tools in a garage are examples of occupational physical activity. Employed respondents categorized occupational physical activity into the categories „physically demanding job "and „sedentary job ".
The main domain that further is used in the study is leisure-time physical activity. Sociodemographic characteristics were included: age, gender, the highest level of accomplished formal education. Formal education level was categorized as incomplete elementary school, completed elementary school, completed secondary school, completed high school and completed university.
As an indicator of health care utilization, visits to family physicians were observed. All respondents were asked the following question: 'In the last 12 months, how often did you visit family physicians yourself?'
The respondents were asked to indicate their own height and weight. BMI was calculated as weight in kilograms/height in meters squared. We categorized study participants into standard BMI categories: underweight (<18.5 kg/m^2), normal weight (18.5–24.9 kg/m^2), overweight (25.0–29.9 kg/m^2), and

obese (≥30.0 kg/m^2). We combined overweight and obese participants (≥25 kg/m^2).

Statistical analysis

The collected data were analyzed using IBM Statistics SPSS v 23.0 i MedCalc v12.3. Independent sample t test, Chi-square (x^2) and logistic regression analysis were used. The results of logistic regression analyses were reported as odds ratios (OR) and 95% confidence intervals. Results of the analysis were considered statistically significant with p-value less than 0.05.

Results

The study evaluated 300 respondents in two groups of 150 each (i.e., normal weight and overweight/ obese).

Levels of physical activity during leisure-time in the normal weight group and overweight/ obese group was significantly different (p=0.00). More respondents who reported ≥150 minutes of physical activity per week, was in the normal weight group 50 (33.3%), than in the overweight/ obese group 23 (15.3%).

Levels of active transport in the normal weight group and overweight/ obese group was significantly different (p=0.00). More respondents who reported high level of active transport (≥150 min/wk), was in the normal weight group 76 (50.7%), than in the overweight/ obese group 27 (18.0%).

Levels of occupational physical activity in the normal weight group and overweight/ obese group was significantly different (p=0.01). There were almost two times as many employed respondents who categorized occupational physical activity into the categories „physically demanding job "in the normal weight group, 60 (40.0%), then in overweight/ obese group, 42 (28.0%) (Table1).

Table 1 Physical activity in different domains of life

Domains of physical activity	Body mass index				p
	Normal weight		Overweight / obese		
	n	%	n	%	
Leisure-time physical activity (min/week)					
≤150	50	33.3	23	15.3	0.00
60-149	70	46.7	61	40.7	
>60	30	20.0	66	44.0	
Transportation physical activity (min/week)					
≥150	76	50.7	27	18.0	0.00
<150	74	49.3	123	82.0	
Occupational physical activity					
Physically demanding job	60	40.0	42	28.0	0.02
Sedentary job	65	43.3	67	44.7	
Unemployed	25	16.7	41	27.3	

Mean age of physically active respondents in the normal weight and overweight/ obese group was 40.4±11.8 years and 44.9±13.3 years, respectively. In the normal weight group, most of the physically active respondents were in the age group of 18 to 34 years, while in the overweight / obesity group they were in the age group of 55 to 64 years.

In the normal weight group physically, active females were more represented than physically active males, 56.7%:43.3%. In the overweight/ obese group physically active males were more represented than physically active females, 51.2%:48.8%.

In the normal weight group 41.7% of the physically active respondents had completed college/university, while in the overweight/ obese group 34.5% of the physically active respondents had a college/ university degree (Table 2).

Table 2 Socio-demographic characteristics of physically active and physically inactive respondents among normal weight and overweight/obese group

Characteristics	*Normal weight (n=150)*		*Overweight obese (n=150)*	
	PA n=120 n (%)	PI n= 30 n (%)	PA n=84 n (%)	PI n=66 n (%)
Age group (years)				
18-34	49 (40.8)	4 (13.3)	27 (32.1)	6 (9.1)
35-54	45 (37.5)	14 (46.7)	28 (33.3)	24 (36.4)
55-64	26 (21.7)	12 (40.0)	29 (34.5)	36 (54.5)
Gender				
Male	52 (43.3)	14 (46.7)	43 (51.2)	27 (40.9)
Female	68 (56.7)	16 (53.3)	41 (48.8)	39 (59.1)
Education level				
Incomplete elementary school /completed elementary school	1 (0.8)	2 (6.7)	6 (7.1)	12 (18.2)
Completed secondary school	69 (57.5)	18 (60.0)	49 (58.3)	38 (57.6)
Completed high school /university	50 (41.7)	10 (33.3)	29 (34.5)	16 (24.2)

SD, standard deviation;
PA – Physicaly active;
PI - Physically inactive

Physically inactive respondents visited family physicians significantly more often than physically active (p=0.00). Overweight/ obese respondents visited family physicians significantly more often than normal weight (p=0.01) (Table 3).

Normal weight and physically inactive respondents compared to normal weight and physically active were 3.5 times more likely to have family practice office visits (95% CI: 1.53-8.01). Overweight/ obese and physically inactive respondents compared to normal weight and physically active were 3.3 times more likely to have family practice office visits (95% CI: 1.80-6.31). Overweight/ obese and physically active respondents compared to normal weight and

physically active were 1.8 times more likely to have family practice office visits (95% CI: 1.03-3.29) (Table 4).

Table 3. Annual health care utilization by physical activity and body mass index

Number of visits to Family physicians in the last twelve months	PA n=204	PI n=96	p	Normal weight n=150	Overweight /obese n=150	p
	n (%)	n (%)		n (%)	n (%)	
0-2	131 (64.2)	39 (40.6)	0.00	96 (64.0)	74 (49.3)	0.01
3-10	73 (35.8)	57 (59.4)		54 (36.0)	76 (50.7)	

PA – Physicaly active;
PI - Physically inactive

Table 4 The relationship between physical activity, body mass index and annual health care utilization

	OR (95% CI)	p
Normal weight and physically active	1	
Normal weight and physically inactive	3.50 (1.53-8.01)	0.0030
Overweight/ obese and physically active	1.84 (1.03-3.29)	0.0404
Overweight/ obese and physically inactive	3.37 (1.80-6.31)	0.0001

OR. Odds Ratio; CI. confidence interval

Discussion

This study evaluated relationship between leisure-time physical activity, body mass index and health services utilization. Studies examining the relationship between physical activity and health services utilization among adults have shown mixed results. Some studies, as well as this one, found that physically inactive respondents visited family physicians significantly more often than physically active. Mitchell et al. (2004) found physician visits to be inversely associated with physical fitness among 6 679 men aged 20–79 years. Fisher at al. (2015) found that leisure time physical activity was significantly associated with lower use of GP physician services in the 50 to 64 years age group, with active individuals 27% less likely to have contact with a GP and reporting 8% fewer GP consultations than their inactive counterparts in the 12-month study period. Woolcott et al. (2010) in a nationally representative sample of 24 281 adults found that physically active respondents reported significantly fewer "general health visits" than their inactive counterparts (8,15 versus 11,76 visits/yr). In contrast, Souza, Fillenbaum and Blay (2015) found that physically inactive participants were 19% less likely than those who were physically active to report any outpatient visit. Physical inactivity involves multiple, complex behavior processes (Hallal et al., 2003), such that over time individuals may adopt a lethargic attitude to health care, reinforced by obstacles to health service use (Liu-Ambrose et al., 2010). Several studies reporting no significant association between LTPA and physician visits (Martin et al., 2006; Dunlop, Coyte and McIsaac, 2000; Perkins and Clark, 2001).

In this study, overweight/ obese respondents visited family physicians significantly more often than normal weight. This result agrees with previous studies. In the study conducted by Quesenberry, Caan and Jacobson (1998,) compared with respondents with BMI of 20 to 24.9 those with BMI of 30 to 34.9 (hereafter referred to as moderately overweight) experienced a 17% higher outpatient visit rate, and those with BMI of 35 or greater (hereafter referred to as severely overweight) experienced a 24% higher rate. Raebel et al. (2004) found that obese patients had more annual outpatient visits than nonobese. The median number of outpatient visits was three for the obese group and two for the nonobese group (P=0,005). There was greater variability in the number of outpatient visits in the nonobese group (5th-95th percentile: obese 0-7; nonobese 0-9). Another study observed increased healthcare resource utilization in individuals with higher BMIs compared with individuals of healthy BMI in a large representative sample of UK and US individuals (1 878 017 UK and 4 414 883 US individuals). The utilization of healthcare resources is significantly higher in individuals with obesity. A similar trend was observed in both the UK and US cohorts. The study found that each single-point increment in BMI over the reference range (18,5–<25 kg m^2) was associated with a mean increase in the rate ratio for general practitioner contacts over a 5-year period of 2.1% in the UK and the US cohort (Nortoft, Chubb and Borglykke, 2018).

In this study, physically inactive respondents visited family physicians more often than overweight/ obese, normal weight and physically active.

In this study, normal weight and physically inactive respondents compared to normal weight and physically active were 3.5 times more likely to have family practice office visits. Overweight/ obese and physically active respondents compared to normal weight and physically active were 1.8 times more likely to have family practice office visits.

Our findings suggest that physical activity may compensate, to some extent, for the adverse effects of overweight and obesity and prevent some of the health service utilization associated with overweight and obesity. Physical activity confers several positive health benefits. It reduces risks for obesity and for several chronic diseases (Booth, Roberts and Laye, 2012). A study by Weinstein et al. (2008). indicate that the risk of CVD associated with a high BMI might be partly negated by physical activity. This study found that the risk of coronary heart disease associated with increased BMI was considerably reduced by higher levels of physical activity.

Our study had some limitations. The main limitation of our study was its cross-sectional design that does not allow definitive conclusions about causal relationships. One limitation in studies of physical activity, and also in the present study, is that self-reported physical activity is difficult to measure, implying a risk for under—and overestimation of the level of LTPA. Assessing leisure-time physical activity with self-reporting tools is cheap and easy, and has been validated in different countries, but it has the inconvenience of relying on the subject's memory and honesty. There are objective methods of assessing leisure-time physical activity, e.g., using pedometers and accelerometers that may provide data that are more accurate.

Conclusion

Physical inactivity increases the number of visits to the doctor more than the patient's obesity. Promoting physical activity may have added benefits of reducing health services utilization. Physical activity leads to better health status, which could reduce the needs for health services. Physical activity is also a positive self-care behaviour, which could decrease the demand for professional help.

Promoting active life style in overweight and obese groups could potentially improve their well-being and reduce the usage of health care system. Understanding the role of physical activity in the development of obesity-associated health hazards appears crucial for effective treatment of obesity and prevention of its complications.

It is possible that interventions aimed at increasing leisure-time physical activities in adults will result in tangible reductions in health services utilization

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