ORIGINAL ARTICLE

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Physical Activity and Body Weight Status in Relation to Ischemic Heart Diseases (IHD)

Abstarct

Background: Cardiovascular diseases (CVD) especially Ischemic Heart Diseases (IHD) are responsible for more than 40 % of mortalities in the Islamic Republic of Iran; As is the case in the Western hemisphere, physical inactivity is the most prevalent CVDs risk factor. The aim of this research was to determine the association of the physical activity indices (work, sport and leisure-time indices), and body weight measures with the risk of developing IHD in Tehran, Islamic Republic of Iran.

Materials and methods: This case – control study was conducted during 2003 and 2004 in Tehran Heart Center and Tehran Shahid Rajaii hospital. A sample of 100 IHD patients (cases) and 100 healthy individuals served as control. The controls were matched to the IHD patients by age (± 5 years), sex. Information about Physical activity was recorded by means of the ***Beacke*** questionnaire. Some important risk factors including hypertension, hyperlipidemia, diabetes and Body Mass Index (BMI) were also recorded. All the data were statistically analyzed with the SPSS for Windows. All reported P values are based on two-sided and compared to a significance level of 5 %.

Results: The patients had significantly lower indices for work, sports and Leisure time Physical Activity ($P < 0.001$). Analysis of BMI showed that there was a significant association between obesity and the risk of developing IHD ($P = 0.01$). There was a significant negative correlation between BMI and Leisure Time Physical Activity index: the higher the BMI, the lower the likelihood of participation in Leisure Time Physical Activity activities. After multivariate analysis, the Leisure Time Physical Activity (LTPA) independently had a protective effect against developing IHD risk, also in the cases group. Obesity increased the risk of IHD nearly 4 times more in comparison with normal subjects.

Conclusion: Physical activity has a beneficial effect on IHD risk developing and IHD related predisposing risk factors.

Key words: IHD, lifestyle, LTPA, CVD, Obesity

Introduction

Ischemic Heart Diseases (IHD) have the highest mortality ranking in the Islamic Republic of Iran [1]. Although studies over the past 10 years have provided strong evidence to support the health benefits of undertaking regular physical activity, increasing numbers of people throughout the world continue to pursue a sedentary lifestyle [2]. Moreover, during the past years, there has been a significant change of attitude with regard to unhealthy lifestyles [3]. Physical inactivity was considered the most prevalent CVDs risk factor with an attributable risk of IHD of 34.6%, making it a serious public health problem [4]. World Health Organization (WHO) estimates that 21% of IHDs are attributable to obesity and overweight [5]. Studies in Islamic Republic of Iran have shown that the prevalence of overweight and obesity in Tehran among individuals aged over 20 years is 40% and 23% respectively [6]. Some studies estimate that up to 80% of cases of coronary heart disease could be avoided through changing lifestyle factors [7]. This study aimed to see the relationship between different type of activities (work, sport and leisure-time) and BMI with the risk of developing IHD among patients in Tehran Heart Center and Tehran Shahid Rajaii Hospital.

Materials and methods

This case – control study conducted between August 2003 and April 2004 in Tehran Heart Center and Tehran Shahid Rajaii hospital. A sample of 100 IHD patients (cases) and 100 individuals free of cardiovascular symptoms (controls) were entered into the study. The sample size was determined by power analysis (statical power (ϒ) >0.80, P.V < 0.05). To put study participants at ease, questionnaires were completed during a private interview held after the second day of hospitalization. The cases were randomly selected from the admission listing of the cardiology clinics. The cases were who had experienced a first event of acute myocardial infarction (diagnosed by typical electrocardiograph changes or cardiac catheterization ("cath"). Controls were matched with the IHD patients by age (± 5 years), sex. They were also randomly selected by the same procedure from friends or colleagues of the patients. Patients' relatives were excluded to eliminate potentially adverse effects of positive family history of IHD as a confounder. All individuals were examined by a cardiologist who recorded detailed medical histories and carried out physical examinations and necessary laboratory measurements (Fast Blood Sugar, High-density lipoprotein (HDL), Low-density lipoprotein (LDL), and Total cholesterol). Information regarding physical activity level was recorded by using the Beacke questionnaire. For purposes of this study, we categorized the physical activities as work, leisure time, or sports related, and scored the intensity of each category according to the Beacke's questionnaire [8]. Body mass index was calculated by dividing the participants' weight (kg) by their height (m) squared (kg/m^2).We used the established WHO criteria

for classification of both groups (normal weight is defined as $18.5 \leq BMI \leq 24.9$, $25 \leq BMI \leq 29.9$ kg/m^2 is defined as overweight and BMI ≥ 30 kg/m^2 is obese) [9]. All data were statistically analyzed using SPSS for Windows, version 11. Continuous variables were presented as mean values ± one standard deviation, while qualitative variables were presented as absolute and relative frequencies. Estimates of the relative risks of developing IHD were calculated by using the Odds Ratio (OR) and corresponding confidence intervals through Multiple Conditional Logistic Regression Analysis. The qualitative data were analyzed with Chi Square (χ^2) or Fisher's exact test. Comparisons between two continuous variables were done using independent sample t test. To estimate the independent effect of each risk factor on IHD, adjusted odds ratios were calculated by logistic regression analysis.

Results

57 (57 %) of cases were males and 43 (43 %) were females with the mean age of 53 ±8.38. 54 (54 %) of controls were males and 46 (46 %) were females with the mean age of 51±9.92. The differences between control and case groups about sex variable and age mean were not significant. Analysis of BMI (Table 1) shows that 47 (47%) of the patients were classified as overweight and being in overweight range increased significantly risk of IHD by 2.13 compared to normal weight group (p= 0.01).

Table1: Distribution of IHD patients and control subject's BMI

BMI((kg/m^2)	IHD patients (%) (Total Number=100)	Controls (%) (Total Number=100)	O.R	95% CI	P-value
Normal	33 (33%)	58(58%)			
Over weight	47(47%)	32(32%)	2.7	1.13, 4.01	0.01
Obesity	20 (20%)	10(17%)	3.5	2, 7.18	0.001

There was a significant negative correlation between BMI and LTPA index among the cases (P =0.01). That is, the higher the BMI, the lower the likelihood of participation in LTPA. According to table 2, the cases had significantly lower indices for work physical activity, sport physical activity and LTPA (P<0.001).

Table2: Comparison of cases and controls by physical activity indices (Data is expressed as mean ± SD)

Physical activity indices	Case (Total Number=100) *Mean ± S.D*	Control (Total Number=100) *Mean ± S.D*	95% CI	P-value
Work Physical Activity index	2.87 ± 0.42	3.22 ± 0.41	0.22, 0.46	<0.001
Sport Physical Activity index	2.04 ± 0.62	2.95 ± 0.95	0.68, 1.14	<0.001
Leisure Time Physical Activity index	2.66 ± 0.38	3.14 ± 0.53	0.31, 0.63	<0.001

Table 3: Adjusted odds ratios for the effect of LTPA and BMI on IHD risk in the cases

Cases (Total Number =100)	Coefficient (β)	S.E	P-value	Exp (β)	95% CI
Leisure Time Physical Activity Score	-1.72	0.38	<0.0001	0.17	0.08, 0.38
BMI ≥ 25	1.38	0.63	0.02	3.58	1.14, 13.76
α constancy:	5.91	4.18	0.15		
Goodness- of- fit test: Chi-square:6.30, df:8, significance: 0.61					

The results adjusted for smoking, income, occupation, hypertension, hypercholesterolemia, family history of IHD, diabetes mellitus, diet showed (Table 3) that LTPA index was inversely and independently associated with the risk of developing IHD (P<0.0001). Where as in cases group BMI ≥ 25 increased significantly the risk of IHD (P =0.02).

Discussion

The results of this study suggest that a low LTPA score is associated with an increased risk of developing IHD. This is consistent with other prospective studies that have found a progressive decrease in the risk of death from cardiovascular disease with increasing physical activity [10, 11]. Based on Isfahan Healthy Heart Program (IHHP], LTPA leads to improve lipid profile and reduction of obesity as major IHD risk factors [12]. A recent meta-analysis has also emphasized the role of physical activity in the prevention of mortality from cardiovascular disease in general [13]. In a series of studies of Harvard University students, a strong inverse association was found between reported exercise levels and death from coronary heart disease. The participants with lower LTPA scores were significantly more likely to have IHD risk factors [14, 15, 16, 17]. Another study showed that women and men who were physically active at least twice a week had a 41% lower risk of development of coronary artery diseases (CAD) than those who performed no physical activity [18]. Also it has been reported that men and women with no weekly vigorous activity had a higher relative risk for CADs mortality [19]. Data from the Canadian National Population Health Survey has shown that physical activity is a significant predictor for CADs [20]. Regular physical activity tends to be a lifelong habit which inhibits cardiovascular mortality and morbidity. Moreover it has been reported that vigorous physical activity has been associated with an increased risk of heart attacks but the optimal intensity of LPTA is still unclear [21,22]. Some studies have examined the association between walking and the risk of coronary heart disease and provided additional evidence for mechanisms by which walking may reduce the risk of chronic diseases, including BMI and physical function, and cholesterol levels [23]. In this study overweight and obese subjects were found to be at an increased risk of developing IHD than normal, non-obese subjects. This observation is also in agreement with another study carried out at University of Florida College of Medicine [16]. Obesity and increased weight could lead to adverse metabolic changes, including increases in blood pressure, unfavorably high cholesterol levels and increased insulin resistance leading to

increase the risk of developing coronary artery disease [24]. In IHHP study the most frequent IHD risk factor was obesity and the total prevalence of increased body weight and obesity in the Tehran population was 63.3% [25, 26]. Therefore the other reason might be attributed to lifestyle changes in population of Tehran such as increasing consumption of high fat foods, fast foods and low levels of physical activity.

Conclousion Physical activity has beneficial effects and reduces the risk of developing IHD. The data presented here demonstrate the importance of LTPA in maintaining cardiovascular health. Because of the widespread and increasing prevalence of physical inactivity, improving physical activity behavior can have a substantial impact on IHDs morbidity and mortality. Therefore community based education and regional epidemiological studies are strongly recommended on the basis of their effectiveness in educating the public at large, increasing physical activity and improving physical fitness among adults and children. Furthermore, clinicians, public health professionals, and legislators must focus their efforts on getting sedentary people to become more physically active.

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