BODY MASS INDEX AND CORONARY HEART DISEASE RISK FACTORS IN ACTIVE AND NON-ACTIVE SENIOR PATIENTS

H. Marefati*, K. Ebrahim** and M. Gharooni***

* Unité de Biologie de l'Effort et Médecin du Sport, CHU, Hôpital Nord, Amiens, France
** Department of Cardiology Taleghani, University of Shahid Beheshti, Tehran, Iran
*** Amir-Aalam Hospital, University of Tehran, Tehran, Iran

hamid.marefati@u-picardie.fr

Abstract: The aim of this research was to deal with the correlation between the BMI and risk factors of the CHD and compare them in senior patients of the cardiology department of Taleghani and Amir-Aalam hospital. The subjects were divided into two groups according to their daily activity by a valid questionnaire which distinguish active (n = 30, age 62.8 ± 6.9 ys) and non-active persons (n = 44, age 53.8 ± 9.1 ys). We observed no significant difference between the two on the BMI, Systolic, the diastolic Blood Pressure and the Total Cholesterol. Whereas there was a significant difference in the average of the LDL-C (105.65 ± 30.5mg.L for active vs 131.65 ± 26.35mlg for non-active), of the Triglycirid (TG) (160.65 ± 108mg.L^1 active vs 226.3 ± 168.2mg.L^1 non-active) and HDL_C(45.28 ± 9.5mg.L^1, active vs 39.72 ± 7.1mg.L^1 non-active) p<0.05. The average age of a heart attack is delayed of 9 years in the active group. There was a significant correlation between BMI and the diastolic Blood pressure in non-active group; there was no significant correlation between BMI and other variables.

Introduction

Physical inactivity and obesity are strong risk factors for poor health [1]. Mortality caused by a coronary heart disease (CHD) was reported to be inversely related to the level of physical activity and to be reduced in subjects who exercise regularly. There is a strong interaction between physical activity and body mass index (BMI)[1]. Obesity is a well-known risk factor for cardiovascular disease, based on the findings of large-scale epidemiological studies. But for a few studies the subjects were Asians who had a relatively lean body mass. There are different diagnostic criteria for a diagnosis of obesity in Asia-Pacific populations [3].

Therefore, the centers for disease control and prevention, and the American college of sports medicine recommend 30 minutes or more of moderate-intensity physical activity [2]. However, some reports suggest that even a single session of moderate- to long-duration exercise can reduce blood pressure, glucose, and triglyceride levels and can increase HDL cholesterol levels [5,10]. Furthermore, physical activity has been proposed as an important adjunct in the prevention and treatment of obesity and stress-induced disorders [6]. To further explore the health benefits related to the frequency of physical activity, we compared CHD risk factors, including blood pressure, lipids and obesity, among non-active and active groups.

The aim of the study was to cross physical activity lifestyle with (CHD) risk factor, like the BMI, and average age of a heart attack.

Methods

Population

The individuals were all senior patients of the Taleghani and Amir-aalam hospital; There, due to a heart attack (infarctus only not another heart disease), the subjects stayed in cardiology department for medical treatment.

Subjects were divided into two groups according to daily activity or sport activity reported through a valid questionnaire (Table 1). These groups include active people (n = 30, age 62.8 ± 6.9 years) and the non-active ones(n = 44, age 53.8 ± 9.1 years).

Measurements

The criteria to determine the sum of risk factor scores for hypertension, hypertriglyceridemia, hypercholesterolemia, and low HDL cholesterol level (one point for each) are shown in Table 2 [2].

The baseline medical examination included a medical history, a physical examination, anthropometric measurements, a collection of blood samples for laboratory analysis, and a health risk appraisal questionnaire. The questionnaire consisted of 49 questions.

Anthropometrics parameters, including height and weight, were measured with the subjects wearing light clothes and no shoes. The body mass index (BMI) was calculated as the weight in kilograms divided by the height in meter square (kg/m2), that classified in four categories: underweight (BMI<20 for males), normal weight (20<BMI > 25), overweight (25 to 29.9), and obese (BMI> 30 kg/m^2) [7].

ISSN: 1727-1983

Table 1: Questionnaire Content

Subject	Number
Socioeconomic status	5
Family history of chronic diseases	8
Past medical history	6
Smoking information	6
Drinking	2
Drug history	4
Seat belt use	1
Dietary salt intake	1
The frequency of moderate intensity of physical activity	11
Transfusion	1
Sleeping amount	1
Social stress and job stress	3

Table 2: Criteria for Determining the Sum of CHD Risk Factor Scores

Risk Factor	Criteria
Hypertension	SBP >140 mm Hg and/or DBP >90 mm Hg
Hypertriglyceridemia	Triglycerides >150 mg/dL
Hypercholesterolemia	Cholesterol >220 mg/dL
Low HDL_C level	HDL_C <40 mg/dL

CHD indicates coronary heart disease; Sum of risk factor.

Sitting blood pressure was measured twice by trained nurses using the left arm with a standard mercury sphygmomanometer and the average of all the measures in hospital was used in the analysis.

Independent variable

Physical activity: These analyses consider different kinds of physical activities which are regular, occasional, their job or during the sport.

Body mass index (BMI): was considered as one effective variable for CHD risk factor.

Age: apparently it is frequent while entering old age, it is observed that CHD risk factor increase, all of the patients were senior (>40 years).

Statistical Analysis

Our primary analysis was to evaluate the comparison between baseline BMI and all of the risks factors (BMI, blood lipids, blood pressure and age).

Secondary approach, we verified the correlation between BMI and all variables in the two groups separately. Correlation coefficients were calculated for the correlation of BMI with variables and individual risk factors, and statistical comparisons were made with "Student *t* tests". Tests of normality used the Kolmogorov-Smirnov statistic. Values of $p<0.05$ were considered statistically significant.

Results

Regarding the comparison of the average of the variables, BMI in the non-active group was higher than the one in the active group but we observed no significant difference in BMI, and in blood pressures (systolic and diastolic). In blood lipids like the LDL_C and the TG of the active subjects were lower than the ones of the non actives. The difference was significant ($p<0.05$), and HDL_C in active was higher than among non active persons with a difference of $p<0.05$. About the Total Cholesterol there was no significant difference.

The most important result is that it does exist a suffering age for a heart attack. The average age of a heart attack among the actives was 62.80 years old and among non-active was 53.81 year old, with a difference $p<0.01$. A daily physical activity can delay heart attack (Table 3).

Table 3: Variable means in active and non-active groups.

Characteristics	Active	Non-Active
BMI,(kg/m²)	27.84±3.3	29.47±4.54
SBP,(mmhg)	132.75±18.5	130.68±19.92
DBP, (mm hg)	83.28±8.25	82.27±10.96
LDL,(mg/dl)	105.65±30.51	131.65±26.35
HDL, (mg/dl)	45.28±9.49	39.72±7.99
TG,(mg/dl)	160.65±108.19	226.30±168
TC,(mg/dl)	188.66±47.62	204.53±41.41
Age,(yr)	62.80±6.97	53.81±9.11

In secondary approach, we verified the relationships between the BMI and the variables one by one in the two groups. Each time the BMI was considered like an independent variable. However, the results showed that the increase of the BMI and age are linked :(r=0.17 active vs r=0.11 non-active), SBP (r=0.16 active vs r=0.13 non-active), LDL (r=0.07 active vs r=0.22 non-active), triglycerid (r=0.25 active vs r=0.04 non-active) and Total-C (r=0.07 active vs r=0.13 non-active) variables in active and non-active groups differently which some of that was considerable, but theirs wasn't significant.

The correlation between BMI and DBP in non-active groups was significant (r=0.06 active vs r=0.3 non-active). (Table 4).

Table 4: Correlations of body mass index (BMI) and Variables in active and non-Active groups.

Variables	BMI(kg/m²)	
	Active	**Non-Active**
SBP,(mmhg)	0.16	0.13
DBP, (mm hg)	0.06	0.30
LDL,(mg/dl)	0.07	0.22
HDL, (mg/dl)	-0.08	0.01
TG,(mg/dl)	0.25	0.04
TC,(mg/dl)	0.07	0.13
Age,(yr)	0.17	0.11

ISSN: 1727-1983

Discussion

This study demonstrates some of the complexities of the risk factors of CHD and other kind of factors that can be crucial in this research.

Relationship between BMI and CHD risk factor

The correlation between the BMI and the age , and the risk factors of the CHD such as: SBP, Total-C, LDL-C and TG was not significant. The findings observed that BMI could not predict the risk factors of the CHD for the senior. It may be on account of the diversity, the amount of the physical activity or the way of eating of the subjects.

Nevertheless we can assert that when the BMI increase in a Non-Active group, the DBP also increase.

However it would be wrong to deduce the risk factors of the CHD from the BMI exclusively. Opposite to an amount of study findings which suggest that BMI predicts increased CHD risk independent of atherogenic remnant–rich lipoproteins [7]. Interestingly, the relationship between the degree of obesity and the extent of metabolic abnormalities is heterogeneous, with largely unknown environmental, genetic, and gene environment interactions that may potentially modify the effects of obesity on CHD risk[8].

It is well-known that overweight is associated with an increase in all-cause of mortality, hypertension, diabetes, hypercholesterolemia, CHD and other chronic disease. In addition, others have found that children or adolescents at the extremes (ie, 75th percentile) of body weight or BMI have an increased risk (OR 1.5-2.3) for all cause and cardiovascular disease (CVD) mortality [9].

Physical activity in senior and CHD risk factor

Although physical activity favorably modifies CHD risk factors, the frequency of physical activity needed to accomplish these goals remains poorly defined and controversial. Our results confirm the public health message that “doing some physical activity is better than doing none at all.”[10]. So that the our subjects who was doing physical activity daily or irregularly sport had less LDL cholesterol, triglycerides and higher serum HDL cholesterol levels than the sedentary individuals. The subjects with a physical activity showed a further lowering of CHD risk factors, although BMI did not differ [5].

Most of researches make a direct correlation between CHD risk factor and BMI or obesity.

After verification it has to be underlined that the results dealing with the BMI in Active and non-Active groups in others’ researches are not the same. The results of diverse researches were different respectively (5, 10). This can be due to variable parameters like, intensity, duration of exercise and nourishment kind, of age, the quantity, regularity vs irregularity of exercises and research types. Therefore the BMI and CHD risk factors also vary.

Tracking of Physical activity and BMI

According to the research done and my result confirm that intensive exercises, do not change the body weight or the BMI whereas that affect CHD risk factor and make them decrease, That is physical activity can decrease CHD risk factor independently of the body weight or BMI.

The accuracy of BMI in defining obesity has been questioned because of the disparity between BMI and body fat, in that BMI reflects muscle and bone as well as fat. The physically active groups might increase their muscle amount accompanied by loss of fat so that their BMI would not be different from that of the sedentary group [2].

We demonstrated that lifestyle physical activity seems to be a strong protective factor against poor health status among seniors.

In follow-up period after exercise, there was observed a greater decline in fitness and a greater increase in weight [12].

Possible pathways between lifestyle physical activity and age of heart attack

The researches studied clearly put in relief that CHD risk factors were lowest in individuals with a regular physical activity (>3 days per week). Our data supports the recommendation of the American College of Sports Medicine and suggest that the frequency of training is an important determinant of maximal health benefits on the basis of not only cardiorespiratory fitness but also CHD risk factors [2].

This results have to be moderated as this study divide the group between active and non active, but the active subjects who practice a physical activity (jobs, recreation, sport …), they were not so sportive. In fact they are active relatively to the other group defined as non active.

But in observation of the average age difference of heart attack between the two groups, we can consider that physical activity even if it is only a daily activity can delay heart attack. Moreover, nowadays the lifestyle tends to be more and more sedentary so that for people of a poor health status the age of their mortality is all the more lower. Recent studies have suggested that adults with this degree of obesity may have a substantially reduced life expectancy, by as much as 15 to 20 years [11].

Limitations

The limit of this study is about the small size of the sample within a short period of 4 month at two hospitals in Tehran. Lots of factors are not taken into account: the inheritance CHD risk factor, kind of subjects’ nourishment, psychology types, level and income of life, smoking status, stress job and others factor which can be effect over change of BMI or CHD risk factor.

ISSN: 1727-1983

Conclusions

To conclude, this study confirms the current findings and is not contradictory to other large local epidemiological studies. The complexity of cardiac risk factors and their interrelationships are demonstrated.

Risk factor profiles are already apparent in adolescents, and this finding emphasizes on the need of intervention in programs for adult diseases which have their origins in childhood. As a consequence we have to focus too on suitable young age groups and to be cognizant of ethnic differences.

The finding was attractively notice of although daily activities do not affect the BMI, they reduced CHD risk factor. Therefore, these findings recommend they every one should do a physical activity which suits to its lifestyle.

References

[1] JOHANSSON S.E. and SUNDQUIST J. (1999): 'Change in Lifestyle Factors and Their Influence on Health Status and All-Cause Mortality', *Inter J Epidemiology*, **28**, pp. 1073-1080.

[2] HSIEH S.D., YOSHINAGA H., MUTO T. and SAKURAI Y. (1998): 'Regular Physical Activity and Coronary Risk Factor', *Japanese Men. Pob. Med.*, **97**, pp. 661-665.

[3] LEE S.H., KIM Y.S., SUNWOO S., HUH B.Y. (2005): 'A Retrospective Cohort Study on Obesity and Hypertension Risk among Korean Adults', *J. Korean Med. Sci.*, **20**, pp. 188-195.

[4] KLAIN M., COULEHAN J.L., ARENA V.C. and JANETT R. (1988): 'More Frequent Diagnosis of Acute Myocardial Infarcion among Navajo Indians', *Am. J.Publ. Health*, **78,** pp. 1351-1352.

[5] HUGHES R.A., THORLAND W.G., HOUSH T.J. and JOHNSON G.O. (1990): 'The Effect of Exercise Intensity on Serum Lipoprotein Responses', *J Sports Med Phy Fitness*, **30**, pp. 254-260.

[6] BLUMENTHAL J.A., WILLIAM R.S., WILLIAM R.B. and WALLACE A.G. (1980): 'Effects of Exercise on the Type A (Coronary Prone) Behavior Pattern', *Psychosom Med*., **42,** pp. 289–296.

[7] MORA S., YANEK L.R., MOY T.F., FALLIN M.D., BECKER L.C. and BECKER D.M. (2005): **'**Interaction of Body Mass Index and Framingham Risk Score in Predicting Incident Coronary Disease in Families', *pob med*, **111**, pp. 1871-1876.

[8] REILLY M.P. and RADER D.J. (2003): 'The Metabolic Syndrome: more than the Sum of Its Parts?', *Circulation*, **108,** pp. 1546-1551.

[9] KURTH T., GAZIANO J.M., REXRODE K.M., KASE C.S., COOK N.R., MANSON J.E. and BURING J.E. (2005): 'Prospective Study of Body Mass Index and Risk of Stroke in Apparently Healthy Women', *Circulation*, **111,** pp. 1992-1998.

[10] BLAIR S.N., KOHL H.W., GORDON N.F. and PAFFENBARGER R.S. (1992): 'How Much Physical Activity is Good for Health?', *Annu Rev Public Health*, **13,** pp. 99-126.

[11] MUST A. and ANDERSON S.E. (2003): 'Effects of Obesity on Morbidity in Children and Adolescents', *Nur Clin Care*, **6**, pp. 4-12.

[12] DUNN A.L., MARCUS B.H., KAMPERT J.B., GARCIa M.E., KOHL H.W. and BLAIR S.N. (1999): 'Comparison of Lifestyle and Structured Interventions to Increase Physical Activity and Cardiorespiratory Fitness', *JAMA*, **281**, **4**, pp. 327-334

ISSN: 1727-1983