The Effect of Body Mass Index of Patients with   Post Myocardial Infarction Angina on the Heart Function

Hakemia Sh. Hassan *   PhD

Summary:

Background: Extreme obesity is recognized to be a risk factor for coronary heart disease. It is unclear whether overweight and normal weight also poses a risk.

Objective: The study aims to determine the effect of the body mass index on coronary arteries and left ventricular functions in patients with post myocardial infarction (MI) angina

Method: The study included 50 patients with the diagnosis of post MI angina consecutively admitted to the medical ward of Iraqi Center for Heart Disease. All patients underwent coronary artery catheterization and Echocardiography for assessment of coronary artery and left ventricular functions

Results: The results of the study showed that there is a significant difference in impaired left ventricular systolic pressure between normal weight and overweight patients with post MI angina .The study also revealed that (16.16%) of the patients with normal weight and (30.76%) of the patients who are over weight had three vessels disease.

Conclusion: left ventricular functions reflected by ejection fraction and left ventricular wall motion and state of coronary artery were better in normal weight patients than in over weight patients.

Key words; Body mass index; post myocardial infarction angina; heart function
.

Introduction:

Obesity is a common and growing problem; almost one third of American adults are obese (1) and obese adults are at an increased risk of cardiovascular mortality (2). Obesity is associated with hemodynamic overload (1, 2).The increased metabolic demand imposed by the expanded adipose tissue and augmented fat- free mass in obese results in a hyperdynamic circulation with increased blood volume .In addition to the increased preload, left ventricular (LV) afterload is also elevated in obese individuals due to both increased peripheral resistance and greater conduit artery stiffness(3,4).

Heart failure occurs frequently in obese patient and appears to be the predominant cause of death in grossly obese subjects (4, 5). Obesity has been linked to a spectrum of cardiovascular changes ranging from a hyper dynamic circulation ,through sub clinical cardiac structural changes to overt heart failure(5) Cardiac output is often higher in obesity due to an augmented stroke volume and an increase in heart rate (7, 8). The objective of the study is to determine the effect of the body mass index on coronary arteries and left ventricular functions in patients with post myocardial infarction (MI) angina Several epidemiological studies linking chromium deficiency with risk factor of cardiovascular diseases, in individual taking B-blocker, chromium may raise the level of high-density lipoprotein HDL (4).

Dept of Medical-Surgical Nursing \Nursing College\ Baghdad University

Selenium was discovered in 1969(5).It has been found that low selenium levels along with other risk factors play an important role in developing dilated cardiomyopathy.

The aim of this study is to check the levels of trace element selenium, chromium in patients with cardiovascular diseases as compared with control subjects.

Patients and Methods:

For the purpose of achieving the aims cohort study has been used throughout the present study during the period from 2nd January 2007 to 3rd June 2007

The study population included 50 patients with post MI angina consecutively admitted to the medical ward of Iraqi Central for Heart Disease. Reasons for referral were post MI angina These patients were chosen according to the following criteria Patients who were diagnosed (definitely) as post MI angina (An episode of transient ST segment depression was defined as horizontal or downsloping ST shift of 1mm or more ,80 msec after the J point and lasting 1 minute or more) (9). Patients whose age ranged from 31-70 years. Patients were able to speak, read and write Arabic Patients agree to participate in the study. Excluded from the study patients with other risk factors for post MI angina such as smoking habit, alcohol intake, diabetic mellitus, hypertension and hyperlipidemia. All patients underwent coronary artery catheterization and transesophageal echocardiography The study method consisted of 3 parts

Part I Sociodemographic characteristics were obtained from each patient and patients' chart before

hospital discharge, which included age, weight, height, marital status and occupational status.

Part II Assessment for coronary artery was performed by Judkins' technique (Percutaneous Tran femoral) (5) and were visually analyzed by two – experienced cardiologist

Coronary artery lesions were considered significant if stenosis was at least 70 %(or 50%for main coronary artery), stenos is of larger diagonal or marginal branches were considered lesions for the anterior descending and circumflex coronary arteries.

The left ventricular angiogram was divided into five segments and each segment was scored comparing systolic and diastolic volumes as follows: Normal contraction, mild hypokinesias, severe hypokinesias, akinesia, dyskinesia

Hypokinesia is defined as reduced motion, dyskensia as paradoxical wall motion and akinesis as abscent wall motion.

Coronary collateral score according to (Cohn and Rentropl 1986) (7). indicating flow from other vessels whether dominant or non dominant was graded as follows:

-grade 0 no collateral flow present

-grade I collateral flow present

Part III Assessment of left ventriculer pressure which included left ventricle end systolic pressure (LVESP) ,and left ventricle end diastolic pressure (LVEDP), and left ventricle function by ejection fraction.

Validity instrument was determined through the use of panel of (10) experts . The reliability of the tool was determined at (r=0.96) which was adequately reliable

To determine body mass index was .The following formula was used :-

BMI =Weight (kg)/Height (m^2)

Patients were classified as obese if BMI was > 30 kg /m2 according to the criteria of National Heart Lung and blood Institute (NHLBI) (6) Normal weight 18.5- 24.9;Over weight 25.0-29.9 kg /m2

Mean, standard deviation and T- test value were computed to estimate the differences between normal weight and over weight patients

Kolmogorve –Smirnove test used two samples to determine the significant difference between the findings of Echocardiography and coronary artery catheterization for normal weight and over weight patients.

Kolmogorve –Smirnove test was considered the most appropriate non –parametric test for the purpose of the project study and it was interchange ability used with Chi-square, in case , where the frequencies in each cell in the rows or the columns had less than five frequencies

Results:

Table (1) Sociodiamographic characteristics of the normal weight and over weight patients with post myocardial infarction angina

Characteristics	Normal weight patient		Over weight patient	
	NO.	%	NO.	%
Age(years)				
31-40			4	15.38
41-50	8	33.33	2	7.69
51-60	14	58.33	16	61.53
61-70	4	16.66	4	15.38
Total	24	100	26	100
Mean SD	53.25 8.35		53.91 8.59	
Sex				
Female	2	8.33	6	23.03
Male	22	91.66	20	76.92
Total	24	100	26	100
marital status				
Married	20	83.33	24	92.30
Single	4	16.66	2	7.69
Total	24	100	26	100
Occupation				
House wife	2	8.33	6	23.07
Governmental employee	6	25	4	15.38
Retired	6	25	7	26.92
Non Governmental employee	10	41.66	9	34.61
Total	24	100	18	100

MI=myocardial infarction;,No.=Number ;%=Percentage;SD=standard deviation

Table-1- shows that 22 (91%) of the normal weight patients were male and the mean age (53.25) years while 20(76.92%) of over weight patients were male and the mean age (53.91) years .

Table –2- Comparison between normal weight and overweight patients with post MI angina regarding weight ,height and body mass index

Characteristics	Normal weight patient		Over weight patient		t-test	P-value
	mean	SD	mean	SD		
Weight	69.166	5.44	79.58	8.74	S	<0.05
Height	172.25	6.25	166.25	6.96	S	<0.05
BMI	23.012	1.84	27.98	2.92	S	<0.05

BMI=body mass index' ; SD= Standered deviation; S =Significant; N.S=No significant

Table-2- shows that there are significant differences in weight,height and body mass index between normal weight and overweight for patients with post MI angina

Table –3- Comparison between normal weight and overweight patients with post MI angina regarding assessment of left ventricle function

left ventricle function	Normal weight patient	Over weight patient	K.S
	No.	No.	
left ventricle systolic dysfunction	4	10	S
left ventricle hypertrophy	4	8	S
Ejection fraction Mean	61.23	52.37	S
SD	13.30	10.13	
Motion of left ventricular	No.	No.	
Normal contraction	8	4	S
Mild hypokinesias	12	16	S
Sever hypokinesias	0	2	O.C
Akinesia	0	2	O.C
Dysckensia	4	2	N.S

S=Significant; N.S= Non significant; O.C=Out of comparative; K.S=Kolmogorve Smirnove test;
Table-3- shows that there is significant difference in Left ventricular systolic function between normal weight and overweight for patients with post MI angina Kolmogorve Smirnove test

Table-4- Comparison between normal weight and over weight patients with post myocardial infarction angina regarding the number of obstructed vessels

Vessels disease	Normal weight patients		Over weight patients		C.S K.S
	No.	%	No.	%	
Single obstructed vessels	9	7.5	-	-	O.C
Two obstructed vessels	5	20.83	4	15.38	N.S
Three obstructed vessels	4	16.66	8	30.76	S
Left main stem and single vessels disease	2	8.33	2	7.69	N.S
Left main stem and double vessels disease	2	8.33	6	23.07	N.S
Left main stem and three vessels disease	2	8.33	6	23.07	N.S
Total	24	100	26	100	N.S

No.= number; % = percentage ; K.S=Kolmogorve Smirnove test;

O.C= Out of comparision

Table-4 shows that there is significant difference between normal weight patients and over weight patients regarding three obstructed vessels

Table-5- Comparison between normal weight and over weight patients with post myocardial infarction angina regarding specific vessels disease

Vessels disease	Normal weight patients	Over weight patients	K.S
	No.	No.	
Left anterior descending artery	22	22	N.S
Circumflex artery	16	18	N.S
Right coronary artery	10	16	S
Left main stem artery	6	14	S

K.S=Kolmogorve-Smirnove test; S=significant; N.S=non significant; No.=NumberTable-5 shows that there was significant differences between normal weight and over weight patient with post myocardial infarction angina regarding right coronary artery disease and left main stem Kolmogorve-Smirnove test.

Table-6- Comparison between normal weight and over weight patients with post myocardial infarction angina regarding the characteristics of obstructed vessels

Vessels disease		Normal weight	Over weight	K.S
		No.	No.	
Left anterior descending artery		22	22	N.S
Circumflex artery		16	18	N.S
Right coronary artery		10	16	S
Stenosis	<70	4	2	N.S
	70-90	10	12	N.S
	>90	10	12	N.S
Site of lesion	Proximal	8	6	N.S
	Middle	12	12	N.S
	Distal	4	8	S
Collateral	Present	10	8	N.S
	Absent	14	18	S

K.S=Kolmogorve-Smirnove test; S=significant; N.S=non significant; Freq.=frequency

Table-6 shows that there is significant difference between normal weight and over weight patient with post myocardial infarction angina regarding distal site of lesion Kolmogorve-Smirnove test.

Table -6- reveals that there is significant difference between normal weight and over weight patient with post myocardial infarction regarding absence of collateral circulation.

Discussions:

It is obvious that serum selenium level in AMI , AP and HT were significantly lower than those in the controls as in table 2 , 3 , 4 .

This result is in agreement with the results obtained by Salonen (7), his results observed low serum selenium level in patients with AMI compared with controls, he suggested a correlation between low Se level and AMI. Finally he considered low Se level is one of the important factors for AMI because Se compounds may protect cell membrane against different oxygen radicals.

In a stress situation with great demand for oxygen to the heart muscle, it could be that insufficient amount of the necessary selenium compound lead to accumulation of dangerous amount of hydroxyl radicals with serious damage to the cell membrane and triggering of platelets aggregation and this is the cause for formation of thrombus. This is one of the important risk factors for AMI. If sufficient Se had been available, the thrombus formation might have

been avoided (7). Besides it had been illustrated that the crucial role that Se, the co-factors of one of the major antioxidant enzymes of the myocardium, plays in determining the vulnerability of the heart to ischemia and reperfusion (8).

Conclusions:

Since there is a significant decrease in selenium and chromium in patients with myocardial infarction , angina pectoris and hypertension , a supplementation of these trace elements were necessary to prevent a deficiency disease or to get beneficial of trace element rebalance in blood serum.

References:
1. Sandstead H.H and Klevay C.M. " Trace element nutrition and human health'' (2000) J.Nutr. 130:4835—4845.
2. Alaejos MS et al. Selenium and cancer : some nutritional aspects. Nutrition 16(5):376—83 ,2000.
3. Anderson RA, Cheng N, et al. Elevated intakes of supplemental chromium improve glucose and insulin variables in individuals with type 2 diabetes. Diabetics. 1997;46:1786—1791.
4. Roeback JR, HIa KM, Chambless LE, et al. Effect of chromium supplementation on serum high-density lipoprotein cholesterol levels in men taking beta-blockers. A randomized, controlled trial. Ann Intern. Med. 1991 ;115:917—924 .

Previous research has further shown an association between Cr intake and heart disease. So chromium supplementation has been observed to raise high density lipoprotein (HDL) and lower total cholesterol and triglyceride levels (9).

5. Rotruck, J . T. , Pope, A .L., Ganther, H.E., Swason, A.B., Hafeman, D.G. & Hoekstra, W.G. (1973). Selenium: biochemical role as a component of glutathione peroxide. Science. 179:588—590.
6. Uster , O. And Prellwitz W., The trace elements in heart disease, International workshop. Trace Element Analytical Chemistry in Medicine and Biology . April 1986.
*7. Salonen J.T. et al. " Association between cardiovascular death and myocardial infarction and serum selenium in a matched pair longitudinal study`` the lancet Vol. 11. 24*th* July 1982.*
8. Toufektsian MC, Boucher F , Pucheu S, Tanguy S, Ribuot C, Sanou D, Tresallet N, de Leiris J. ,Effects of selenium deficiency on the response of cardiac tissue to ischemia and reperfusion. Ann Med 1991 Aug;23(3):299—300.
9. Lee N.A. Resamer CA. "Beneficial effect of chromium supplementation on serum triglyceride level in NIDDM diabetes care`` 1994; 17: 1449—1452.