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RISK FACTORS OF MYOCARDIAL INFARCTION AMONG PATIENTS ATTENDING IBN SENA TEACHING HOSPITAL IN MOSUL

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INTRODUCTION

Myocardial infarction (MI) is a complex disease caused by interaction of a number of genetic and environmental factors. MI as the first manifestation of ischemia; is a common cause for hospital admission. Several factors related to the severity of the disease have been identified, such as smoking, diabetes mellitus, systemic arterial hypertension and dyslipidemia. Most of these risk factors are modifiable and can be prevented to decrease MI, so there must be primary or secondary prevention to these risk factors.

The aim of this study was to identify the risk factors of myocardial infarction in patients attending outpatient clinics for internal medicine in Iben Sena teaching hospital in Mosul. To achieve this aim, a case control study design was adopted, upon 100 patients (cases) who have been diagnosed by the responsible cardiac specialist according to the WHO criteria for diagnosis of MI with another 100 persons (controls) who diagnosed not to have MI. The period of data collection was from 1st of October 2013 to the 1st of April 2014. A especially designed questionnaire form has been prepared; these questionnaires were filled by interview with both cases and controls.

The present study showed that the highest frequency of MI occurred in the age group 51-60 years [40 patients (40%)], more frequent MI attacks occurred in males.

The significant risk factors for MI were female with hormonal contraceptive use (70% of female), family history (65%), hypertension (62%), dyslipidemia (53%), physical inactivity (48%), smoking (45%), DM (32%). Weak association was found between obesity and occurrence of MI in the present study.

1.1 DEFINITION
Myocardial Infarction (MI)[1]
Myocardial Infarction is defined by the demonstration of myocardial cell necrosis due to significant and sustained ischemia. It is usually, but not always, an acute manifestation of atherosclerosis-related coronary heart disease. MI results from either coronary heart disease, which implies obstruction to blood flow due to plaques in the coronary arteries or, much less frequently, to other obstructing mechanisms (e.g. spasm of plaque free arteries). Plaques are always a consequence of atherosclerosis. Coronary heart disease may relate to stable or unstable underlying plaques.

1.2 Symptoms and Signs
Pain is the cardinal symptom of an acute coronary syndrome but breathlessness, vomiting and collapse are common features. The pain occurs in the same sites as angina but is usually more severe and lasts longer.[10] Most patients are breathless and chronic dyspnea usually is caused by increases in pulmonary venous pressure as a result of left ventricular failure or valvular heart disease. Orthopnea, which is an exacerbation of dyspnea when the patient is recumbent, is due to increased venous return to the pulmonary vasculature or loss of gravitational assistance in diaphragmatic effort. In some patients, paroxysmal nocturnal dyspnea is the only symptom.[10]

Indeed, MI may pass unrecognised. Painless or „silent‟ MI is particularly common in older patients or those with diabetes mellitus. If syncope occurs, it is usually due to an arrhythmia or profound hypotension. Vomiting and sinus bradycardia are often due to vagal stimulation and are particularly common in patients with inferior MI.

Sudden death, from ventricular fibrillation or asystole,

may occur immediately and often within the first hour. If the patient survives this most critical stage, the liability to dangerous arrhythmias remains, but diminishes as each hour goes by. The development of

cardiac failure reflects the extent of myocardial ischaemia and is the major cause of death in those who survive the first few hours. In the elderly, fatigue is a common presenting complaint of MI.[10]
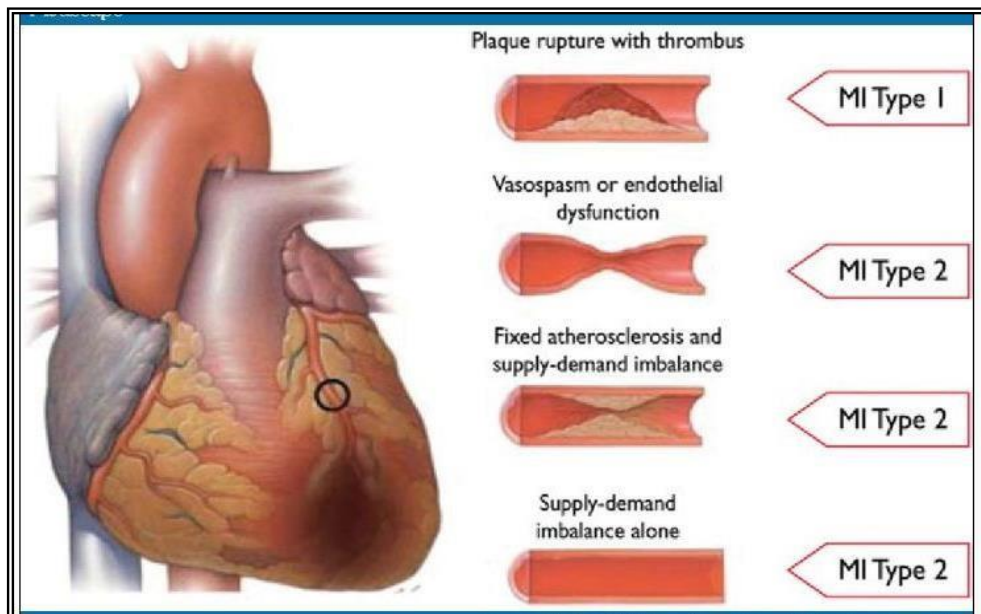
Figure 1: Differentiation between myocardial infarction (MI) types 1 and 2 according to the condition of the coronary arteries.[13]

1.3 Risk factors of MI
1.3.1 Non-modifiable risk factors
1.3.1.1 Age
According to the American Heart Association, about 80 percent of people who died from MI are 65 years and older. Age itself increases your risk of developing heart disease.[13]

MI is usually a disease of old age. However, it is infrequently encountered in young adults.

1.3.1.2 Gender
MI has long been considered to be primarily men"s disease. Although women tend to develop cardiovascular disease about 10 years later in life than men, the outcome for women is often worse.[17] Additionally, women appear to be at higher risk than men when diabetes, hypertriglyceridemia, and metabolic syndrome are present.[18]

1.3.1.3 Family history of heart disease (Including Race)
Children of parents with heart disease are more likely to develop it themselves. African Americans have more severe high blood pressure than Caucasians and a higher risk of MI. MI risk is also higher among Mexican Americans, American Indians, native Hawaiians and some Asian Americans.[21]

1.3.2 The modifiable risk factors include
1.3.2.1 Dyslipidemia
Atherosclerosis increases the risk of MI, stroke, and other vascular diseases. Fortunately, we may be able to

reduce high lipid levels and, therefore, prevent or slow the progression of atherosclerosis. Lifestyle changes like exercising and eating a healthy diet can also lower the lipid levels and are often the first step in treatment.[24] The excess risk is closely related to the plasma concentration of Low density lipoprotein (LDL) cholesterol and inversely related to the plasma High density lipoprotein (HDL) concentration.[25]

Here's the lowdown on where those numbers need to be:
- Total Cholesterol: Less than 200 mg/dL
- LDL (bad) Cholesterol:
- If you're at low risk for heart disease: Less than 160mg/dL.
- If you're at intermediate risk for heart disease: Less than 130mg/dL.
- If you're at high risk for heart disease (including those with existing heart disease or diabetes): Less than 100mg/dL.
- HDL (good) Cholesterol: 40mg/dL or higher for men and 50mg/dL or higher for women.
- Triglycerides: Less than 150mg/dL.[27]

1.3.2.2 Hypertension
High blood pressure increases the heart's workload, causing the heart muscle to thicken and become stiffer. This stiffening of the heart muscle is not normal, and causes the heart not to work properly. When high blood pressure exists with obesity, smoking, high blood cholesterol levels or diabetes, the risk of MI increases several times.[29]

1.3.2.3 Obesity

Obesity is a condition in which excess body fat may put a person at health risk especially cardiac disease including MI.[34,35] Excess body fat results from an imbalance of energy intake and energy expenditure.[36]

Body Mass Index (BMI), a surrogate indicator of body fat, is often used as a measure of overweight and obesity.

1.3.2.4 Diabetes Mellitus

Diabetes mellitus (DM) or simply diabetes, is a group of metabolic diseases in which a person has high blood sugar.[41] Untreated, diabetes can cause many complications. Serious long-term complications include heart disease, kidney failure.[42]

1.3.2.5 Smoking

Cigarette smoking increases the risk of MI by itself. When it acts with other factors, it greatly increases the risk. Smoking increases blood pressure, decreases exercise tolerance and increases the tendency for blood to clot. Smoking also increases the risk of recurrent coronary heart disease after bypass surgery. Cigarette smoking is the most important risk factor for young men and women.[44]

1.3.2.6 Alcohol Consumption

Alcohol influences a wide range of vascular and biochemical functions that have potential cardioprotective benefit.[48]

The recommended levels of ,,,,safe drinking"" are up to two drinks (approximately 20g) per day for a man and up to one drink (10g) per day for a non-pregnant woman. These different recommended daily doses of alcohol between genders are explained by the fact that women are more sensitive to the effects of alcohol on the body.[49]

1.3.2.7 Diet

Several aspects of peoples' dietary patterns have been linked to heart disease and related conditions. These include diets high in saturated fats and cholesterol, which raise blood cholesterol levels and promote atherosclerosis. High salt or sodium in the diet causes raised blood pressure levels.[57]

1.3.2.8 Physical inactivity

Today, physical inactivity is responsible for a large worldwide burden of the heart disease. For this reason, the WHO has raised focus on national monitoring and surveillance of physical activity. WHO see an urgent need for accurate methods for large-scale surveillances.[57]

1.3.2.9 Psychosocial and stress factors

Popular opinion holds that stress is an important risk factor for coronary heart disease. However, compared with other major risk factors, psychosocial variables such as stress are difficult to define objectively, and stress consists of several different (and inter-related) elements. Therefore, measurement of stress is complex and difficult. Despite this drawback, several constructs within the broad conceptual framework of stress are increasingly regarded as being causally related to coronary heart disease mainly MI.[64]

1.3.2.10 Socioeconomic status

Socioeconomic inequalities in health can be defined as systematic differences in the prevalence or incidence of health problems between people of higher and lower socioeconomic status distinguished by level of education, occupational class, or income.[67]

1.3.2.11 Contraceptive Drugs

Hormonal contraceptive pills double the risk of MI in women. The risk increases for women with hypertension (5folds), who smoked (12folds), with diabetes (16folds), and with high cholesterol.[70]

1.8 Diagnosis of myocardial infarction

Rapid identification of acute myocardial infarction is critical for the initiation of effective evidence-based medical treatment and management. Electrocardiography (ECG) and measurement of cardiac troponins are the current diagnostic cornerstones and complement the clinical assessment.[75] Follow WHO criteria meets the diagnosis for MI.[76]

1.9 Treatment of MI

The recent developments in the treatment of MI, such as coronary recanalization therapy, and the increased availability of cardiac care units have significantly improved the acute prognosis and reduced the hospital mortality rate of these events.[1]

1.9.1 Medical management[77]

The medical management used in MI are as follows:
a. Supplementary oxygen.
b. Morphine sulfate for pain relief.
c. Coronary reperfusion.

There are currently two means of reopening a blocked coronary artery in acute MI

1. **Thrombolysis**: the most common form of treatment, is contraindicated in 20% of patients primarily because of bleeding risk. The recanalization rate is up to 55% with streptokinase and up to 60% with alteplase.
2. **Primary angioplasty**: with stenting is becoming the intervention of choice for acute ST segment elevation MI in many hospitals. Primary angioplasty with stenting is safe and confers advantages over balloon angioplasty alone.

1.9.2 Surgical Management[78]

➢ Only a few patients need a coronary artery bypass graft (CABG) in the acute phase but CABG may be indicated:

o After failed percutaneous coronary intervention(PCI), coronary occlusion not amenable for PCI, or the presence of refractory symptoms after PCI.
o Cardiogenic shock, or mechanical complications - eg, ventricular rupture, acute mitral regurgitation, or ventricular septal defect.
o Multivessel disease.
➢ In patients with a non-emergency indication for CABG (eg, multisystem disease), it is recommended to treat the infarct-related lesion by PCI and to perform CABG later in more stable conditions if possible.

1.9.3 Post MI treatment[77]
a. Submaximal stress ECG test and echocardiogram
b. Discharge medications: aspirin; beta blocker, and possibly angiotensin- converting enzyme inhibitor
c. Exercise program within 3 or 4 weeks
d. Return to work within 8 weeks
e. Sexual intercourse within 4 weeks
f. Involvement of the spouse or family members is critical.

1.10 Complications of MI[79]
Table 3: Complications of MI.

Early Complications:	Late Complications
➢ Failure of reperfusion. ➢ Arrhythmias ➢ Left ventricular dysfunction and heart failure ➢ Cardiogenic shock ➢ Pericarditis ➢ Ventricular rupture and Ventricular septal defect ➢ Acute mitral regurgitation Right ventricular failure	➢ Deep vein thrombosis ➢ Pulmonary embolism ➢ Mural thrombosis and systemic embolism ➢ Left ventricular aneurysm ➢ Dressler˝s syndrome ➢ Depression

DISCUSSION
This is a case control study of 100 cases of MI compared to 100 controls for the most common risk factors of MI in Mosul city.

4.1 Age and Sex distribution
In this case _control study, the maximum frequency of MI was observed in the age group 51-60 years [40 patients (40%)], the lowest frequency was at the age group71 years[4 patients (4%)].

4.2 Risk factors of MI among the study population
4.2.1 Dyslipidemia and the occurrence of MI
In the present study there is a strong relationship between the occurrence of MI and elevated LDL(OR =1.94, 95%CI= 1.10-3.42, P=0.022),and low HDL(OR =2.07, 95% CI= 1.18-3.63, P=0.01), which is similar to Sidney C. Smith et al., 2011, who found that the development of MI was higher inpatient with elevated level of LDL and low HDL when compared with normal level.[91]

4.2.2 History of Hypertension and the occurrence of MI
The present study showed that there is a strong association between the occurrence of MI and HT (OR=2.163, 95% CI=1.23-3.80, P=0.007)
Jiamsripong P. et al., found in a study a significant relationship between hypertension and MI.[94] Charlotte Larsson, found in a study of (401) MI patient,(277) of them were hypertensive.[95]

4.2.3 Obesity and the occurrence of MI
The present study showed that there is possible association between the occurrence of MI and obesity but the p-value is not significant (OR=1.46, 95% CI=0.76-2.78, p= 0.25). This result was opposite to that found by other studies.

4.3.3 DM and the occurrence of MI
The present study, also demonstrates a significant association between occurrence of MI and DM. (OR=3.149,95% CI=1.54- 6.39,P=0.001).
A.R Abduel karem et al. in his study in Libya, demonstrated that those with DM, Almost half of the pooled sample (48.2%), had a greater risk of MI than those without DM.[100]

4.3.4 Smoking and the occurrence of MI
In the present study There was a significant association between smoking and the occurrence of MI (table (3.10)) (OR=2.45,95% CI=1.35-4.45, p=0,003), this result found to be similar to many other studies which are conducted in Iraq and other countries.
Ahmed S. EL-Aloosy, found in a total of 3000 patients from major hospitals in UAE with myocardial infarction, 1629 patient were smoker.[97]

4.3.5 Physical activity and the occurrence of MI
The present study, observed that there is significant association between physical inactivity and the occurrence of MI (OR=2.37, 95% CI=1.32- 4.25, p=0,004), this result found to be similar to the result of Omran A. et al., who found that physical inactivity roughly doubles the risk of CHD. Regular exercise (20

min.2-3 times a week) appears to have a protective effect.[106]

4.3.6 Hormonal contraceptive and occurrence of MI

The present study found that 21% of female from the cases used hormonal contraceptive (OR=3.37,95% CI=1.27-8.90,P=0.04). This result found to be similar to the result of a study which was conducted by Bea C. Tanis et al., (2011) showed that The risk of myocardial infarction was increased among women who used oral contraceptives.[109]

4.3.7 Family history of cardiac disease and the occurrence of MI

The present study found that there is a highly significant association between the occurrence of MI and this variable (OR=2.36,95% CI=1.33- 4.17, P=0.003), more over N. Ranjith. et al., reported a strong familial link with a history of CHD/MI.[90]

CONCLUSIONS

From the results of the present study the following conclusions can be obtained:

➤ The highest frequency of myocardial infarction occurred in the age group 51-60 years, more common MI attack occurred in males.
➤ The significant risk factors for MI were dyslipidemia (53%), hypertension (62%), DM (32%), smoking (45%), physical inactivity (48%), family history (65%), female with hormonal contraceptive use (70% of female). Weak association was found between obesity and occurrence of MI in the present study.

RECOMMENDATIONS

1. It is essential to adopt international recognized protocols for primary, secondary and tertiary prevention, diagnosis, treatment and follow up for myocardial infarction patients, and it is the function of both bio-physician (general physician and specialist) and primary health care provider at all sectors (public, private).
2. Conducting educational programs targeting patients and their families, this can be achieved through PHCC. Therefore a planned programs of rehabilitation can encourage patients to stop smoking, lose weight, improve exercise, avoid sedentary life and to avoid fatty diet. In addition a better control of blood pressure, blood sugar and hyperlipidemia are important to reduce attacks and complications of MI.
3. Community support is one of the most important criteria"s for smoking cessation programs.
4. Providing a follow up centers for chronic diseases prevention and health promotion to decrease the incidence of many chronic diseases especially ischemic heart diseases.

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