# Coronary angiographic findings in young and older patients with myocardial infarction: a comparative analysis.

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## Abstract

**Background and objectives: Coronary artery disease is one of the most common causes of morbidity and mortality worldwide, which was not studied in Erbil city previously by angiography.**

**The aim of this study: to investigate the risk factors and angiographic features of coronary artery disease in patients ≤ 40 years and compare with those of older patients within six months after first ST elevation myocardial infarction.**

**Patients and methods: A total of 100 patients who underwent coronary angiography at Hawler Cardiac Center within six months of first ST-elevation myocardial infarction for the period from December 2009 to January 2011 were included in this study. The patients were divided into two groups on the basis of age. Group (A) included patients 40 years of age or younger. Group (B) included patients older than 40 years. Both groups were compared with respect to risk factors and severity of coronary artery disease as assessed on coronary angiography.**

**RESULT: Of total 100 patients, 29(29%) were ≤40 years old (group A) and 71(71%) were older than 40 years (group B)There was no significant difference between the two groups with respect to the risk factors apart of higher rate of smoking among group (B) compared with group (A) (P=0.0167). Coronary angiography identified higher incidence of one-vessel disease in the young patients15 patients (51.72%) versus 18(25.35%),P=0.01,while there was no significant statistical differences between the two groups in relation to multiple vessels disease. High frequency rate of coronary artery bypass graft among group B (18 patients, 25.35%) versus group A (2 patients (6.89%),P 0.037.No significant difference between group A and B in relation to percutaneous coronary intervention and medical therapy.**

**Conclusion: Young patients (≤ 40 years) have single vessel coronary disease more often than older patients. Coronary artery bypass graft were performed significantly less often among young patients when compared to older patients with myocardial infarction.**

**Keyword: Myocardial infarction, coronary artery disease**

## Introduction

The atheromatous process starts in early childhood. In a necropsy study of 760 young adult patients who died of various causes, advanced coronary heart disease was found in 20% of men and 8% of women between the ages of 30 and 34 years of age1. The pathological determinants of atherosclerosis in youth (PADY) study2 and Bogalusa heart study also reflect similar trends3. The clinical

presentation of acute myocardial infarction (AMI) in young adults differs from their older counterparts. The classic presentation of worsening angina culminating in myocardial infarction is rare in younger patients. The first onset of angina that rapidly progresses to fully evolved myocardial infarction is often the case in patients less than 45 years of age4.

Angiographic findings significantly differed in patients less than 45 years. Increased prevalence of normal coronary arteries (up to 18%) and minor coronary artery abnormalities were found in the coronary artery surgery study register (CASS study). Single vessel disease was found in 38% of subjects5. These findings highlight the role of vulnerable plaques and plaque rupture in younger people, similar to the older age groups, and the need to investigate the mechanisms that convert stable plaques into unstable plaques. In the West, a significant number of young patients presenting with acute myocardial infarction are cocaine and amphetamine abusers, these patients usually have normal coronaries6,7,8. In Iraq, these risk factors for coronary artery disease (CAD) in young are almost rare. In spite of this difference, CAD has been found to be more prevalent and occurs at a younger age in South Asians9. With an obvious difference in the presence and prevalence of risk factors, we expect a difference in angiographic features of coronary artery disease in young patients (≤40 years) as compared with older patients in our society.

Improvement in percutaneous coronary interventions have revolutionized the management of high risk people with acute myocardial infarction using primary percutaneous coronary intervention (PCI), rescue PCI and the use of stents, together with antiplatelet and antithrombotic treatment, has reduced procedure complications10 . More recent observational studies have shown a lower rate of mortality in patients undergoing routine PCI after thrombolysis versus those managed conservatively11. Patients who don't underwent primary PCI need early angiographic risk stratification for interventional treatment because one of the most important factor is how to assess the severity and extent of the obstructive lesions in the coronary vascular bed12 .These patients are at increased risk of recurrent infarction and subsequent increased mortality, and may benefit from revascularization if severe coronary artery disease is

identified at catheterization13. Coronary artery disease is one of the most common causes of morbidity and mortality worldwide, which was not studied in Erbil city previously by angiography.The aim of this study investigate the risk factors and angiographic features of CAD in patients ≤ 40 years and compare with those of older patients undergoing coronary angiography within six months of first ST elevation myocardial infarction.

## Patients and Methods

In this retrospective study, 100 consecutive patients survived from first acute ST-elevation myocardial infarction (STEMI) and treated medically with or without thrombolytic who were admitted to Hawler Cardiac Center (Erbil-Iraq) from December 2009 through January 2011within six months of their first acute STEMI were evaluated for angiographic severity of coronary artery disease and needs for revascularization. Myocardial infarction was diagnosed by the presence of pathological Q- waves in contagious leads, Q-waves or QS complexes in the absence of QRS confounders with typical rise and/or fall of troponin14.The site of myocardial infarction (MI) was classified by presence of pathological Q-wave in leads as: I, aVL, V1-V6 for anterior leads, II, III, aVF for inferior leads and in V1-V4 for anteroseptal leads10. Exclusion criteria of our study were second attack of MI, valvular heart disease, previous percutaneous coronary intervention (PCI) or coronary artery bypass graft (CABG) and attack of MI more than 6 month. The following risk factors for ischemic heart disease were recorded: past history of diabetes mellitus, hypertension, smoking or ex-smoker defined as more than one year after stopping smoking, hyperlipidemia as risk factors not included because of in accuracy of this test within 3 month after acute coronary syndrome15. All cases came either by referral from internist or the patient visited our outpatient department for evaluation by cardiologist on call that day, prepared for diagnostic coronary angiography. The strategy of Hawler Cardiac Center for angiography the patient admitted in the same day of angiography with lab test of renal function test, viral screen with premedication of antihistamine and intravenous antibiotics, All patients underwent selective coronary angiography using the Judkins technique, Multiple views of each

coronary artery were obtained. For the purpose of analysis, visual inspection of the coronary artery in all views obtained and analysis done only by visual inspection16 and results classified as total when there is TIMI zero flow in the infracted artery, critical when there is more than 50% lesion in left main stem or more than70% stenosis in other artery and non critical if less than 70% stenosis17.When there is lesion in more than one artery even not critical regard as more than single vessel disease and the treatment decision also done by the same operator as for surgery, PCI or medical treatment.The patients were divided into 2 groups according to age. Group A included patients ≤45 years and group B comprised patients >45 years.

Statistical analysis

Data were analyzed using the Statistical Package for Social Sciences (SPSS, version 15). Chi square test was used to test the association between different variables. A "p" value of ≤0.05 was considered as statistically significant.

## RESULT

A total of 100 patients with first ST-elevation myocardial infarction admitted to the CCU at Hawler Cardiac Center from December 2009 to January 2011,twenty nine percent (29 patients) were equal or less than 45 years of age (group A) and the remaining 71% (71 patients) were older than 45 years of age (group B). The mean age of group A was 40.68 years (SD 3.53) with 86.2% (25 patients) being men. Mean patient age in group B was 59.72 years ( SD 8.42 years),and 71.8%of patients were men. No significant difference were obtained between group A and B in relation to gender, X-smoker, diabetes mellitus and hypertension.(table-1).

Smoking was higher among group B (19 patients,26.76%) than group A (15 patients,15.72%) ,P=0.0167. (table-1).

Five patients (17.24%) among group I received thrombolytic therapy compared with 9 patients (12.67%),group=II ,P=0.37.(table-2).

Inferior myocardial infarction was higher among group A (12 patients,41.38%) than group B (13 patients,18.3%),P=0.015.While no significant difference between the 2 groups in relation to other site of infarction.(table-3).

Coronary angiography identified higher incidence of one-vessel disease in the young patients,15 patients (51.72%) vs. 18(25.35%),P=0.01

,Table: ,while there was no significant statistical differences between the two groups in relation to three vessel

Percutaneous coronary intervention was the most frequent method of treatment used among group A and B (82.75%,73.24% consequently disease (VD) ,2VD and 3VD+ left main stem (LMS.)Table-4..

High incidence of CABG in group B (18 patients,25.35%) versus (2 patients(6.89%),P 0.037.no significant difference between group A and B in relation to PCI and medical therapy table:5

## Discussions

Our results shows that the incidence of myocardial infarction is lower in young women (group-A) as compared with older woman (group-B) but without significant difference, these results suggests that young woman are protected from development of AMI until menopause18, One of the possible reasons for this could be due to the loss of estrogen and its cardio-protective effects in the elderly females19. Smoking in our study was higher among group-B as compared with group A to the contrary to the results of other studies that the risks associated with smoking were considerably higher at younger ages. It has been suggested that smoking is not a relevant risk factor at older age20,21,22 but other study found that the relative risk of heavy smokers was over 2 even after 65 years of age, indicating that smoking is an important risk factor even in older subjects, particularly when absolute (and not only relative) risk is considered23. The frequencies of hypertension and diabetes mellitus in both the groups in our study were similar. Chen et al24 found a similar pattern of distribution of hypertension and diabetes mellitus. Zimmerman et al5 however, found that both hypertension and diabetes mellitus were more prevalent in older patients. Whether this difference is due to the geographic location of the two study populations or selection pattern of the population is not clear. Patients >45 years (group-B) has lower chance to receive thrombolytic therapy compared with group I but without significant P value which is similar to other studies25,26,27.Thrombolytic therapy was given if the Q-wave MI patients present within 12 hours from onset of symptoms. It is generally regarded that elderly AMI patients tend to delay seeking medical assistance after onset of symptoms28,29,30 but in

this study, most of our patients in both groups attend the CCU>12 hours after the onset of symptoms of acute myocardial infarction, this reflect that most of our patients have poor information about the importance of attending early to the hospital in case of chest pain. Inferior myocardial infarction among group A was higher than group B which is similar to other studies31,32.The frequency of 3VD and 2VD among group B was higher than group A but without significant P value.The population of elderly people is characterized by more advanced atheromatosis, and thus more frequently suffers from coronary artery disease. Moreover, this population is more severely burdened with risk factors33,34 These patients often have major benefit from primary angioplasty35.Young patients in our study have less extensive disease than their older counterparts, both with respect to the number of vessels involved and the number of lesions per patient. The present finding of predominantly normal coronaries and single vessel disease in young patients versus multivessel disease in the older patients is in accordance with the previous studies5,36.High incidence of CABG in group B (18 patients,25.35%) versus (2 patients(6.89%),P 0.037.no significant difference between group A and B in relation to PCI and medical therapy. Coronary artery bypass graft should be offered to patients with triple vessel disease, complex coronary artery abnormalities, and impaired left ventricular function. CABG carries a better success rate in younger patients. Survival rates were found to be 92% at five years and 86% in 10 years respectively in patients less than 40 years37.

## Conclusion

Young patients has similar cardiac risk factor profile apart of lower frequency rate of smoking compared with older patients with myocardial infarction. Younger patients have less extensive disease than their older counterparts. Unlike the patients in the West, younger patients do not have a higher frequency of normal coronaries.CABG are performed significantly less often among young patients when compared to older MI patients.

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**Table (1): characteristics of patient sample underwent coronary angiography**

| | Group-A (n=29) | Group-B (n=71) | P |
|---|---|---|---|
| | N (%) | N (%) | |
| **Age (years)** | 40.68(3.53) | 59.72(8.42) | |
| **Men** | 25(86.2) | 51(71.8) | 0.126 |
| **Women** | 4(13.79) | 20(28.16) | 0.13 |
| **Smoker** | 15(15.72) | 19(26.76) | 0.0167* |
| **X-smoker** | 6(20.68) | 8(11.26) | 0.18 |
| **Diabetes** | 5(17.24) | 18(25.35) | 0.38 |
| **Hypertension** | 7(24.13) | 32(45.1) | 0.052 |

Group A≤45years, Group B>45 years *=P value <0.05

**Table-2:Thrombolysis in group A versus group B**

| Group-A(n=29) | Group-B(n=71) | P |
|---|---|---|
| N (%) | N (%) | |
| 5(17.24) | 9(12.67) | 0.37 |

**Table-3 Comparison between group A and B in relation to the site of myocardial infarction**

| Site of MI | Group-A(n=29) | Group-B(n=71) | P |
|---|---|---|---|
| | N (%) | N (%) | |
| Inferior MI | 12(41.38) | 13(18.3) | 0.015* |
| Extensive MI | 12(41.37) | 31(43.66) | 0.834 |
| Anteroseptal MI | 5(17.24) | 21(29.57) | 0.2 |
| Lateral MI | 0(0) | 6(8.45) | 0.12 |

MI=myocardial infarction Group A≤45years, Group B>45 years

| **Table-4-Coronary angiographic findings in group A versus group B** | | | |
|---|---|---|---|
| **Number of vessel disease** | **Group-A 29** | **Group-B 71** | **P** |
| | **N (%)** | **N (%)** | |
| **3VD** | 6(20.68) | 20(28.16) | 0.43 |
| **2VD** | 8(27.58) | 32(45.07) | 0.105 |
| **SVD** | 15(51.72) | 18(25.35) | 0.01* |

| | | | |
|---|---|---|---|
| **3VD+LMS** | 0(0) | 1(1.4) | 0.71 |

VD=vessel disease LMS=left main stem *=P value significant

**Table-5 Planned treatment for patients.**

| | **Group-A 29** | **Group-B 71** | **P** |
|---|---|---|---|
| | **N (%)** | **N (%)** | |
| **PCI** | 24(82.75) | 52(73.24) | 0.31 |
| **CABG** | 2(6.89) | 18(25.35) | 0.037* |
| **Medical treatment** | 3(10.34) | 1(1.4) | 0.077 |

PCI=Percutaneous coronary intervention. CABG=Coronary artery bypass graft

*=P significant.