Prevalence of Risk Factors of Acute Coronary Syndrome in Erbil Cardiac Center: comparing ST-elevation with non ST-elevation Acute Coronary Syndrome

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Abstract

Background and objectives: Acute coronary syndrome is the leading cause of death all over the world, there are many different risk factors as important etiology for this acute condition, this syndrome has been studied in different countries with a variety of results**.** The aim was to define different risk factors for the patients admitted to Erbil cardiac center and to find out the most common of these factors and the relationship between different clinical types of this syndrome (namely ST-elevation myocardial infarction, non-ST elevation myocardial infarction/unstable angina) with varying types of risk factors.

Methods: This was a cross-sectional descriptive nonrandomized study that included 100 patients with acute coronary syndrome, mean age of 57.5, the age range of 27—90 years, the majority of patients were male (78%), all patients were interviewed and investigated properly, and according to coronary angiographic findings treated by percutaneous coronary intervention or surgery.

Results: The prevalence of acute coronary syndrome was significantly higher in male gender, the commonest risk factor was overweight and obesity 77% , followed in reduced frequency by other risk factors, More than half of patients(58.6%)with ST-elevation myocardial infarction were≤55years age, while 66.7% of patients with non ST-elevation myocardial infarction were >55years age. The most common artery involved was the left anterior descending artery, significant number 26.2% of non ST- elevation myocardial infarction/UA patients had three vessel stenosis and higher number34.5% of ST- elevation myocardial infarction patients had right coronary artery stenosis.

Conclusions: The most common risk factor was overweight and obesity, no significant relation between clinical types and risk factors, low number of unstable angina cases seen in the emergency unit.

 Keywords: Acute coronary syndrome,ST- elevation myocardial infarction,Non ST- elevation myocardial infarction.

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Introduction

Background: Cardiovascular disease accounts for a great impact on the population all around the world[1],ischemic heart disease(IHD) is the predominant type of cardiovascular disease(CVD) which attributes to a single major cause of premature death worldwide despite great advances in management, during 2013,eight million people died from IHD all over the world and from 1990 up till 2013 there was an increase of 42% in the death rate due to IHD (according to WHO)[2,3], patients with IHD are divided into two major categories: patients with chronic coronary artery disease who commonly present with (stable angina),and patients who present acutely with acute coronary syndrome (ACS)[4]. A great number of patients admitted to cardiac hospitals is due to ACS, total admissions due to ACS to emergency department exceeds 20 million patients in Europe and North America every year[5,6],acute coronary syndrome (ACS) refers to a range of clinical presentations well paralleled with acute myocardial ischemia with great clinical and monetary impact[7], recently the American college of cardiology /American Heart Association(ACC/AHA) divided ACS into two clinical categories: ST elevation myocardial infarction(STEMI) and non—ST elevation acute coronary syndrome(NSTE-ACS), the ACC/AHA guideline will no more deal with (NSTEMI) as a separate entity but will treat it with (unstable angina) under new group (NSTE—ACS)[8].According to ESC/ ACC consensus in 2018 diagnostic criteria for acute myocardial infarction is typical rise and gradual fall(Troponin) or more rapid rise and fall(CKMB) of biochemical markers of myocardial necrosis with at least one of following ;1-- prolonged chest pain more than 30 min or 2-- pathological Q wave on ECG ,or 3—ECG indicative of ischemia (ST elevation of 0.1mv in two contiguous chest lead or two limb leads) , 4-- imaging evidence of new loss of viable myocardium is another point(regional wall motion abnormality)[9],on the other hand in UA there is no rise in cardiac biomarkers (troponin), with at least one of these three characters:1- chest pain at rest or with minimal exertion last more than 10 min,2- sever and of new onset (within prior 4—6 weeks), 3- occurs with crescendo pattern[4,10], moreover the diagnosis of NSTEMI was established by the presence of clinical features of UA plus elevation of cardiac biomarkers troponin, creatinine kinase(CK-MB), Myoglobin[4].Multiple risk factors are responsible for atherosclerotic coronary disease, they are categorized into two groups: non-modifiable like age above 55 years old, male sex, and Family history of CAD and Ethnicity[1], and modifiable risk factors the most prominent of them are dyslipidemia which is the most firmly established risk factor for atherosclerosis(abnormalities in plasma lipoproteins and in the metabolism of lipid), for example LDL(low density lipoprotein) is a well-known athero-thrombotic risk factor for cardiovascular death, small dense LDL particles with high triglyceride and low HDL(high density lipoprotein),increased inflammation causes increase risk of CV disease as in diabetes while larger less dense LDL particle less linked with cardiac events[11].Other important risk factors are hypertension, hyperglycemia, overweight and obesity ,smoking, alcohol consumption, unhealthy diet ,lack of physical activity , psychosocial factors , blood Apo lipoprotein level[12]. The aim of the study is to find out the risk factors of acute coronary syndrome for patients presenting to Erbil cardiac center, the most common of these factors, and the main factors in each of the two clinical types.

Patients and methods

This is a cross-sectional descriptive study was performed on adult patients of both genders, age groups (≥ 18 years),who were referred and admitted to Erbil Cardiac Center(ECC) from other hospitals after confirming the diagnosis the patients were admitted to emergency department or coronary care unit(CCU) for early intervention and revascularization by primary percutaneous intervention (PPCI), the study was started at the beginning of October 2021 to the end of May 2022, the patients were non-randomly assigned and the sample size is 100 patients. Inclusion criteria: Any patient of both gender, age group (≥18 years), with the first attack of Acute Coronary Syndrome, admitted to Erbil Cardiac Center. Exclusion criteria:1-patient in bad general condition, unconscious or shocked.2-patients with known previous ischemic heart diseases.3-patients with previous PCI or previous CABG.4-Patients diagnosed to have heart failure previously.5-patient with known previous valvular or rheumatic heart disease.6-patients with congenital heart disease.7-patient with chronic kidney disease.

Data collection done for all patients admitted to the emergency department, vital signs checked, IV lines established, attached to monitors, blood samples collected, and 12 leads ECG done by EDAN electrocardiograph machine, china. all patients/relatives were interviewed according to patients' condition immediately or later for detailed sociodemographic data, lifestyles, dietary habits, risk factors for CAD, chronic diseases, and drug history as specified in the questionnaire. all patients received dual antiplatelets, Aspirin 300 mg loading, and a second antiplatelet (ticagrelor 180 mg loading for STEMI and prasugrel/ticagrelor/clopidogrel for NSTEMI patients)provided not contraindicated, a bolus dose of anticoagulant (UH or LMWH) according to body weight given to all patients, analgesics, and oxygen according to pulse oximetry were prescribed as recommended. After discussing the risk /benefits with the patient/family all patients are sent to catheter lab for coronary angiography and possibly PCI, after the procedure, patients are transferred to recovery and then to the coronary care unit for further management, Echocardiography (using Echo machine vivid 3 GE, USA,) done for all patients on admission or before discharge to check for LV function.

A venous blood sample was sent to the lab immediately after admission of the patient, the sample was separated into two tubes one containing ethylenediaminetetraacetic acid (EDTA) for complete blood count done by Sysmex XP300 analyzer (Japan) and HbA1c done by COBAS 311 analyzer (Germany),the other tube (gel tube) was centrifuged immediately at 4000rpm for 10 minutes and the serum separated for random blood sugar(RBS), Blood urea, serum creatinine, serum lipid profile including total serum cholesterol, triglyceride, HDL, LDL done by COBAS 311 analyzer, and cardiac biomarkers (Troponin T,I, and CKMB done by COBAS 411 Roche, Germany), and virology tests like HbsAg, HCV, HIV done by laison XL analyzer (Italy) all the tests in the lab was performed by expert lab technicians and normal values obtained from the lab and depended on for the management of the patient. Normal ranges as follow:- HbA1c values are; (4%—5.6% normal, 5.7%--6.4% impaired glucose tolerance, more than 6.5% diabetic) with normal values for lipid profile are:(serum total Cholesterol up to 200mg/dl serum triglyceride up to 200mg/dl ,HDL 35 – 55mg/dl , LDL up to 130mg/dl), normal range for cardiac enzymes as follow; Troponin T up to 0.014ng/ml , Troponin I up to 0.160ng/ml ,CKMB up to 4.88ng/ml for Female , up to 6.22ng/ml for Male, RBS up to 144mg/dl normal, 144—199mg/dl

impaired glucose tolerance ,200 and above diabetic.

This study was approved by the ethics committee of Howler medical university, Patients are informed that this is a study about their disease condition, and they were interviewed with a standard questionnaire about their personal history, major risk factors, and how could be prevented, we reassured them that their confidentiality will be preserved, and written consent obtained from all patients. Data were analyzed using the Statistical Package for Social Sciences (SPSS, version 25). Chi square test of association was used to compare proportions. Fisher's exact test was used when the expected frequency (value) was less than 5 of more than 20% of the cells of the table. A p value of ≤ 0.05 was considered as statistically significant.

Results

Hundred patients were included in the study, their mean age (SD) was 57.5 (12.9) years, the median was 57 years, and the age range was 27 – 90 years. In the basic characteristics It is evident that 10% of the patients were aged less than 40 years, and the largest proportion (31%) of the sample were aged 50-59 years. The majority (78%) of the patients were males, and almost all (98%) were married. It is shown that 41% of the patients were manual workers, and 35% were illiterate. More than two-thirds (70%) of the patients owned a house, 39% were of low socioeconomic status, and almost all of them (98%) were Muslims. Regarding the ethnic group, 83% were Kurds and 15% were Arabs.

The prevalence of smoking was 38% but there was no significant difference between patients with STEMI and those with NSTEMI/UA regarding the prevalence of smoking (p = 0.664). More than half (54%) of the patients were hypertensive, but the difference was not significant (p = 0.896), and 38% were diabetics but the difference was also not significant (p = 0.473). No significant differences were detected between the two groups regarding the prevalence of lipid profile as follows: cholesterol (p = 0.329), LDL (p = 0.333), triglycerides (p = 0.808), and HDL (p = 0.277). Only 9% of the patients were alcoholics, and no significant association was detected with the type between the groups (p = 0.617). More than half of the patients (57%) had high waist circumference, but the differences were not significant between the groups (p=0.399), as presented in Table 1.

Table (1). Prevalence of modifiable risk factors among the study groups.

		STEMI	NSTEMI/UA	
	N	No. (%)	No. (%)	p value
Smoking				
Yes	38	21 (36.2)	17 (40.5)	
No	62	37 (63.8)	25 (59.5)	0.664*
Hypertension				
Yes	54	31 (53.4)	23 (54.8)	
No	46	27 (46.6)	19 (45.2)	0.896*
Diabetes				

Diabetic	38	20 (34.5)	18 (42.9)	
Impaired glucose tolerance	25	17 (29.3)	8 (19.0)	
Normal	37	21 (36.2)	16 (38.1)	0.473*
Cholesterol				
Normal	65	40 (69.0)	25 (59.5)	
High	35	18 (31.0)	17 (40.5)	0.329*
LDL				
Normal	58	36 (62.1)	22 (52.4)	
High	42	22 (37.9)	20 (47.6)	0.333*
Triglycerides				
Normal	68	40 (69.0)	28 (66.7)	
High	32	18 (31.0)	14 (33.3)	0.808*
HDL (mg/dl)				
< 35	41	20 (34.5)	21 (50.0)	
35-55	54	34 (58.6)	20 (47.6)	
> 55	5	4 (6.9)	1 (2.4)	0.277**
Alcohol consumption				
Yes	9	5 (8.6)	4 (9.5)	
No	91	53 (91.4)	38 (90.5)	1.000**
BMI (Kg/m^2)				
< 25	23	14 (24.1)	9 (21.4)	
25-29	39	23 (39.7)	16 (38.1)	
30-34	25	12 (20.7)	13 (31.0)	
≥ 35	13	9 (15.5)	4 (9.5)	0.617*
Waist circumference				
Normal	43	27 (46.6)	16 (38.1)	
High	57	31 (53.4)	26 (61.9)	0.399*
Total	100	58 (100.0)	42 (100.0)	

*By Chi square test. **By Fisher's exact test.

It is evident from Table 2 that 52% of the patients were aged > 55 years (as a risk factor for ACS). The prevalence of older ages (> 55 years) was 66.7% among patients with NSTEMI/UA, compared with 41.4% among patients with STEMI (p = 0.012). The majority (78%) of the patients were males, but there was no significant association between gender and type of ACS (p = 0.389). No significant association was detected between the type of ACS and family history of PMCAD (p = 0.304), and ethnic groups (p = 0.704) as presented in Table 2.

Table (2). Prevalence of non-modifiable risk factors among the study groups.

		STEMI	NSTEMI/UA	
	N	No. (%)	No. (%)	p value
Age				
≤ 55	48	34 (58.6)	14 (33.3)	
> 55	52	24 (41.4)	28 (66.7)	0.012*
Gender				
Male	78	47 (81.0)	31 (73.8)	
Female	22	11 (19.0)	11 (26.2)	0.389*
Family history of PMCAD				
Yes	44	23 (39.7)	21 (50.0)	
No	56	35 (60.3)	21 (50.0)	0.304*
Ethnic groups				
Kurds	83	47 (81.0)	36 (85.7)	
Arabs	15	9 (15.5)	6 (14.3)	
Turkman	2	2 (3.4)	0 (0.0)	0.704**
Total	100	58 (100.0)	42 (100.0)	

*By Chi square test. **By Fisher's exact test.

Discussion

This study included a sample of patients with ACS, concentrating on their different presentation and the risk factors responsible for the development of this condition, to identify the local risk factors for primary prevention and decrease the burden of the diseases. The socio-demographic profile of the studied population shows that the highest number of patients are of the age group 50—59 years it is about 31% of the cases, and predominantly male 78%, and almost all married 98%, they are mostly manual workers 41%, and their education is mostly either illiterate or finished primary school, they are of low or middle socioeconomic status, this finding is similar to a study done in brazil in 2014 which demonstrates that among patients with ACS mean age 55—60y, mostly male gender, white, married with incomplete primary education and monthly income of minimum salaries, this age range of the onset of the disease is the reflection of the usual normal progression of atherosclerosis which begins in early adolescence and continues through decades of life until advanced

atheroma develops above the age of 50 years where a thin fibrous cap forms which might rupture at any time[1]. This study included three clinical presentations of ACS namely STEMI (58%) of cases NSTEMI (36%) of patients, UA (6%)of cases, the last two grouped under NSTEMI-ACS, they all presented for the first time as chest pain typical in 79% of cases and atypical in 21% of the patients, the timing of onset of chest pain differed but the bulk of cases their chest pain was started between 12 midnight and 6 am 41%, next number was between 6 am and 12mid day 23%, so it has two peaks one after midnight and the second before mid-day. The most significant finding related to non-modifiable risk factors in this study was a gender difference, male predominated (78%) while Female was only (22%), giving a ratio of (Male/Female) about 3.5, but there is no significant association between gender and types of ACS (STEMI and NSTEMI/UA), this predominance of Male was also seen in a study done in Northern Saudi Arabia which shows (83.3%) Male and (16.7%) Female[7]. In patients aged ≤55y there is significantly higher cases with STEMI(58.6%) than patients with NSTEMI (33.3%) on the other hand Significantly higher number of cases aged >55y with NSTEMI (66.7%) than sample peoples with STEMI (41.4%), there is also no significant association between the types of ACS and family history of premature coronary artery disease, and also with ethnic groups. The most common modifiable risk factor is overweight and obesity (77%), then hyperglycemia (63%)(diabetics plus impaired glucose tolerance), hypertension (54%), high LDL (42%), followed by other risk factors with reduced frequency like low HDL (41%), Smoking(38%), high total cholesterol(35%), high triglyceride(32%), heavy alcohol intake(9%),if we compare with other studies: a cross sectional study was done in Brazil with a sample of 150 patients showed the most frequent risk factor was hypertension next

dyslipidemia and diabetes mellitus[1] .Another study done in Prague, Czech Republic on the traditional risk factors of ACS in four different male populations indicates a lot of diversity in risk factors between 4 different ethnical and geographical male groups[13]. In this population sample, no significant differences were detected between the two groups of clinical presentations namely STEMI and NSTEMI/UA regarding all the above modifiable clinical risk factors, while in other studies done in other geographical area there was difference in risk factors between the two clinical groups, Ralapanawa U et al conducted a research in Sri Lanka investigating the epidemiology and risk factors of patients with types of ACS and concluded that patients with HTN and past history of ACS are more likely to develop (NSTEMI/UA) than (STEMI),whereas patients with dyslipidemia are more likely to develop (NSTEMI) than (STEMI/UA)[2]. In Nepal 100 patients with ACS was investigated for the presence of conventional risk factors there was statistically significant correlation between types of ACS with Gender and type of ACS with hypertension, at the same time 64% of patients had hypertension[14].Regarding coronary angiographic findings(CA) we found the most common artery occluded is left anterior descending artery LAD 48% next right coronary artery RCA(24%) , then left circumflex artery LCX 17% while three vessels are involved in 11% of cases, CA finding was also investigated in a study done in Iraq and published in (American Journal of Cardiovascular Disease Research), gives the sequence of arteries involved LAD 41.6% LCX 29.3% then RCA 25.9% LMS 3.2% but this study was on IHD as a whole not only ACS[15].The significant finding in CA is that 26.2%of the NSTEMI/UA patients had three vessel stenosis while none of the STEMI patients had three vessel disease. There is also significantly higher number of RCA stenosis (34.5%) in STEMI group than in NSTEMI

group (9.5%).The significant finding of this study is a low number of UA cases(only 6 patients) presented to emergency department OPD within the period of the study, although they should be dealt with and managed as emergency like the other clinical types, but their referral rate is very low, possible explanation for this condition is delay in the referral of the patients presented with typical ischemic chest pain but initially negative biomarkers , another reason is physician inertia in the referral and delayed intervention in cases of NSTEMI/UA in general and UA specifically, this reduction in the number of UA patients was explained in 2013 by Braun Wald and Morrow in a review article , they mentioned that by the beginning of 21st century three sub groups of patients defined UA ,STEMI ,NSTEMI, By 25 years ago half of patients with NSTEMI—ACS was considered UA, with the use of more sensitive biomarkers many patients who were diagnosed as UA now considered MI,UA is likely to be farther marginalized and its definition largely depend on the particular assay of cTn used[16].

Conclusions

We concluded from this study that most of the patients were men, although the male gender is a known risk factor yet women's were less likely to be referred for intervention and the most common modifiable risk factor was overweight/obesity furthermore STEMI Patients present at younger age compared to NSTEMI/UA and unstable angina patients were undertreated and the risks were underestimated. In this study the most frequent culprit coronary artery occluded was left anterior descending artery, there was no statistically significant difference between clinical types of ACS regarding different risk factors.

Larger studies in this field are required to further identify the relation between the clinical type of ACS and different risk factors. A healthy diet and increased physical activity are two therapeutic lifestyle changes with the potential to reduce premature morbidity and mortality related to CAD.

Conflict of Interest
The authors had nothing to declare.

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