Burden of Right Ventricular Infarction in Patients with Inferior Myocardial Infarction in Babylon

Mohammed Hassan Ali
College of Medicine, Babylon University
Mhd163811@gmail.com
Ameer Kadhim Al-Humairi
Community Medicine, College of Medicine, Babylon University.
ameer.alhumairi@yahoo.com
Ameer Ahmad Al-Jubawii
College of Medicine, Babylon University.
ameeraljubawii@yahoo.com

Abstract

Aim of study: the study aim to comparing the rate of cardiogenic shock and mortality rate between patient with RV infarction and inferior MI and the patient with inferior MI alone.

Patient and method: Across sectional study conducted in coronary care unit in merjan medical city at time from the first of March 2014 to the 30th of September 2014 for patient with inferior MI. patients were divided to two group, the first group for patients with inferior MI and RV infarction and the second group for patients with inferior MI alone. The both groups were monitor in the hospital for any complications that can take place in the hospital stay.

Result: A total of 80 patient were enrolled in the study and divided to two groups, the first group (26 patients) for patients with inferior MI and RV infarction and the second group (54 patients) for patients with inferior MI alone, both group had the same baseline characteristic. The mean age was 59.30 ± 7.56 for first group and it was 55.03 ± 5.18 for second group, male patients were 17 (65.4%) and 33 (61.1%) in the first and second group respectively. The in hospital mortality was 4 (15.4%) and 1(1.9%) in the first and second group respectively and the P value was 0.036 (significant).The risk of cardiogenic shock was 7 (26.9%) and 5 (5.6%) for first and second group respectively with P value 0.011 (significant).

Conclusion:

1- The patients with RV infarction and inferior MI expose to higher rate of cardiogenic shock than the patients with inferior MI alone during the time of his hospital stay.

2- The patient with RV infarction and inferior MI had higher in hospital mortality rate when compared with patient with inferior MI alone.

Key word: Inferior myocardial infarction, right ventricular infarction, in hospital mortality, cardiogenic shock.

الخلاصة

هدف الدراسة: هده الدراسة تهدف الى المقارنة في نسبة حصول الصدمة القلبية والوفاة للمرضى الدين يحصل لديهم احتشاء للعضلة القلبية السفلى والمرضى الدين بحصل لديهم احتشاء للعضلة القلبية السفلى مع احتشاء البطين الايمن .

طريقة الدراسة : هده دراسة مقارنة اجريت في مدينة مرجان الطبية في وحدة الانعاش للفترة من 1-2-2014 الى 30-9-2014 للمرضى الدين الدين أصيبوا باحتشاء العضلة القلبية السفلى .تم تقسيم المرضى الى مجموعتين ,المجموعة الاولى هم المرضى المصابين باحتشاء العضلة القلبية السفلى والمجموعة الثانية هم المرضى المصابين باحتشاء العضلة القلبية السفلى مع احتشاء البطين الايمن للقلب .تم متابعة المرضى طول فترة بقائهم بالمستشفى لأي تعقيدات ممكن ان تحدث.

النتائج: مجموع 80 مريض ادخلوا في الدراسة وقسموا الى مجموعتين : المجموعة الاولى26 مريض أصيبوا باحتشاء العضلة القلبية السفلى مع احتشاء البطين الايمن ,والمجموعة الثانية 54 اصيبوا باحتشاء العضلة القلبية السفلى ,المجموعتين لديهم نفس الخصائص .معدل العمر للمرضى هو 59.30 للمجموعة الاولى , 55.03 للمجموعة الثانية .نسبة الذكور للمجموعة الاولى هو 17 (65.4%)

و33(61.1%) للمجموعة الثانية .نسبة الوفيات للمجموعة الاولى هو 4(15.4) و1 (1.9) للمجموعة الثانية . قيمو البي 0.036 وتعتبر نسبة مهمة .عدد المرضى الدين اصيبوا بالصدمة القلبية للمجموعة الاولى هو 7(26.9) وللمجموعة الثانية هو 5(5.6) ,قيمة البي هي 0.011 وتعتبر مهمة .

الاستنتاجات:

1-المرضى المصابين باحتشاء العضلة القلبية السفلى والبطين الايمن لديهم نسبة عالية لحدوث الصدمة القلبية اكثر من المرضى المصابين باحتشاء العضلة القلبية السفلى في فترة بقائهم بالمستشفى .

2- المرضى المصابين باحتشاء العضلة القلبية السفلى والبطين الايمن لديهم نسبة عالية للوفاة اكثر من المرضى المصابين باحتشاء العضلة القلبية السفلى في فترة بقائهم بالمستشفى

الكلمات المفتاحية: احتشاء عضلة القلب السفلى, احتشاء البطين الايمن للقلب, نسبة الوفيات داخل المستشفى, الصدمة القلبية.

Abbreviation

1- RV= right ventricle.
2- MI= myocardial infarction.
3- RVI= right ventricular infarction.
4- RVMI= right ventricular myocardial infarction.

Introduction

Cardiovascular diseases are the leading cause of death in the world (Khan *et al.*, 2004), In the year 2000, ten million people had an acute myocardial infarction in the world (Samad, 2003), Although the death rate from acute myocardial infarction has decrease by 30% over the last two decades (Tipoo *et al.*, 2004), It still has a fatal result in about one third of patients (Khan S, Kundi A, Sharieff S., 2004).

Right Ventricular infarctions complicate 30-50% of inferior wall myocardial infarction. Most of the RV myocardial infarction results from occlusion of the right coronary artery. RV infarction may lead to decreased RV compliance, reduce filling and decrease right sided stroke volume with concomitant RV dilatation (Antman *et al,* 2004), hemodynamic consequences of RVI are asymptomatic right ventricular (RV) dysfunction, RV insufficiency with distended jugular veins together with maintained blood pressure, and in most severe cases RVI is followed by a systemic hypotension and cardiogenic shock. RVI is commonly used term to refer to acute RV dysfunction caused by free wall motion abnormalities and/or dilation of right ventricle in the presence of ischemic but viable myocardium (Goldberg *et al.*, 1991; Berger & Ryan, 1990; CORE Investigators,1997; Yusuf *et al.,* 1985). The occurrence of the RVI during acute infarction in the left ventricle is associated with high in-hospital mortality and morbidity. (Zehender *et al.,* 1993, Hamon *et al.*, 2008) Patients with inferior myocardial infarction (MI) who have right ventricular myocardial involvement seem to have a worse prognosis than those who do not have RV involvement (Goldberg *et al.,* 1991; Berger & Ryan, 1990; Kinch & Ryan, 1994).

Patients with RV infarction have higher chance of cardiogenic shock, complete heart block, right ventricular free wall rupture, cardiac tamponade, pulmonary embolism, atrial and supraventricular tachycardia and atrial fibrillation (Braat *et al.,* 1984; Candell-Rierra, 1981; Bueno *et al.*, 1995; Rechavia, 1992). The treatment of these patients is primarily by early reperfusion. Reperfusion, either by thrombolysis or percutaneous coronary intervention (PCI) enhances the better RV function and improves clinical outcome and survival (Zehender *et al.,* 1994; Kinn *et al.,* 1995; Bowers *et al.,* 1998).

Successful thrombolysis improves survival in patients with RVI, while the absence of reperfusion is associated with persistent dysfunction of the right ventricle

and increased mortality (Zehender *et al.,* 1994; Kinn *et al.,* 1995; Bowers *et al.,* 1998; Giannitsis *et al.,* 1997).

The major cause of death in patients with acute right ventricle infarction is cardiogenic shock (Ali *et al.,* 2004).

Diagnosing RVMI in patients with acute inferior wall MI is very important because its management is somewhat different complications from other types of myocardial infarction. Patients with RV infarction are usually hypotensive and require intravenous fluids in addition to standard management of establishing reperfusion. Treatment with nitrates and morphine is better to be avoided as this may cause complications such as hypotension (Jacobs *et al.,* 2003).

Infarction of the right ventricle alone, on the other hand, is reported in less than 3% of myocardium infarction cases (Moreyra *et al.,* 1986; Roberts *et al.,* 1985).

The involved right coronary artery that is obstructed in its proximal third, thus resulting in dysfunction of the free walls of the right ventricle and the walls of the inferior left ventricle (Bowers TR et al, 1998). Although the performance of the right ventricle spontaneously improves even in the absence of coronary reperfusion, its recovery may be slow and may be associated with high rates of atrioventricular conduction, hemodynamic instability and hospital mortality (Isner, 1988; Andersen *et al.,* 1989; Andersen *et al.,* 1989). Reperfusion optimizes the recuperation of the right ventricle and improves patients' clinical evolution (Bowers *et al.,* 1998).

The gold standard for the diagnosing of RV infarction is hemodynamic evaluation or by an autopsy. It is known that this diagnosis may be made by clinical evaluation Cintron *et al.,* 1981; Dell'Italia *et al.,* 1984), electrocardiogram, hemodynamic evaluation, studies using radioisotopes like technetium 99m (99mTc) pyrophosphate, and right nuclear ventriculography. ECG using the right V3 and V4 (V3R and V4R) is a simple method presenting good sensitivity and specificity (Zehender *et al.,* 1993; Klein *et al.,* 1983; de Mesquita *et al.,* 1982; Lopez-Sendon, 1985). Identification of right ventricular abnormality, shown by elevation of the ST segment in the right leads, especially V4R, is an important predictor of hospital complications and mortality (Zehender *et al.,* 1993).

Patients with right ventricular infarction associated with inferior infarction have much higher rates of significant hypotension, bradycardia requiring pacing support, and in-hospital mortality than isolated inferior infarctions (Chockalingam *et al,* 2005).

Right ventricular infarction should always be considered in any patient who has inferior wall myocardial infarction and associated hypotension, especially in the absence of rales. RV failure may limit filling via a decrease in cardiac output, ventricular interdependence, or both (Reynolds & Hochman, 2008).

Isolated infarction of the right ventricle is extremely rare; right ventricular infarction usually is noted in association with inferior wall myocardial infarction. The incidence of right ventricular infarction in such cases ranges from 10- 50%, depending on the series (Kanjwal *et al.,* 2008).

The detection of elevated concentrations in plasma of macromolecules released from irreversibly injured myocardium has become the definitive diagnostic criterion for MI (Kaikkonen *et al.,* 2008; Ottervanger, 2011; Jesse, 2010).

Studies have demonstrated that more proximal right coronary artery occlusions result in larger right ventricular infarctions (Robinson & Curzen, 2009). On occasion, the right ventricle can be subjected to infarction from occlusion of the left circumflex coronary artery (Turkoglu *et al.,* 2008).

Aim of the Study

1- To determine the importance of diagnosis of right ventricular infarction in patient with inferior MI.
2- To compering the rate of cardiogenic shock and mortality rate between patient with RV infarction and inferior MI and the patient with inferior MI alone.

Patient and Method

A cross sectional study was conducted on eighty patients with inferior myocardial infarction who admitted to merjan medical city in coronary care unit at time from the first of March 2014 to the 30th of September 2014, all patients admitted to the unit without any exclusion criteria enter the study.

Patients with ST elevation MI in the inferior leads (II, III, and AVF), were included in the study and divided into two group; first group for patients with inferior myocardial infarction with right ventricular infarction ,and the second group for patients with inferior myocardial infarction without right ventricular infarction. Informed consent was taken from all the patients.

All patients admitted to hospital at coronary care unit where history and physical examination was taken from patients regarding age, sex, history of smoking, hypertension(patients were considered hypertensive if they had history of hypertension or blood pressure above 140/90 (Chobanian *et al.*, 2003), diabetes (patient considered diabetic if had history of diabetes or fasting blood sugar above 126 mg/dl (7 mmol/l) or in a patient with classic symptoms of hyperglycemia and random blood sugar above 200mg/dl (11.1 mmol/l) (Alberti & Zimmet, 1998), and hyperlipidemia (patient considered have hyperlipidemia if have total cholesterol more than 200 mg/dL or LDL- cholesterol more than 130 mg/dL or HDL- cholesterol less than 40 mg/dL for men and less than 50 mg/ dL for women or total triglyceride level more than 150 mg/dL) (Paul *et al.,* 2015). Investigations were done in form of random blood sugar, fasting lipid profile, troponin level, stander electrocardiogram, right side electrocardiogram, echocardiography and rhythm monitoring with cardiac monitors. All patients kept on anti-ischemic measure and treated with reperfusion therapy via thrombolytic treatment and kept under monitoring in the hospital for at least five days with at least 48 hour continues monitoring of cardiac rhythm and blood pressure monitoring for any possibility of cardiogenic shocked (was define as a state of severe failure of tissue perfusion characterized by systolic blood pressure less than 90 mm Hg, a low cardiac output and signs of poor tissue perfusion such as oliguria, cold extremities and poor cerebral function) (Malla & Sayami, 2007).

Echocardiography was obtained for the diagnosis as well as detection of complications such as acquired ventricular septal rupture, tricuspid regurgitation, papillary muscle rupture and right ventricular dilatation or hypokinesia.

Inferior myocardial infarction diagnosis

The diagnosis depend on clinical features and baseline electrocardiogram with at least 1-mm ST segment elevation in at least two contiguous leads on the leads II, III and aVF (Afonso *et al.*, 2006), and/ or elevated cardiac enzymes (Troponin I) above the upper level (Normal value Troponin- I :upto0.4 ng /ml) (Muhammad *et al.*, 2012).

Right ventricular infarction diagnosis:

Patients with acute inferior myocardial infarction who also had ST segment elevation of more than 1 mm in lead of v4 on right sided precordial chest leads and / or evidence of right ventricle akinesia/ hypokinesia/dilatation or new tricuspid

regurgitation on echocardiography were considered to have had an acute right ventricular infarction (Muhammad *et al.*, 2012).

The exclusion criteria for the study was:

1- Patients with associated anterior or lateral myocardial infarction.
2- Left or right bundle branch.
3- Recurrent myocardial infarction on presentation.
4- Patients with valvular heart disease and cardiomyopathy as these conditions independently affect the morbidity and mortality in acute myocardial infarction patients.
5- Late presentation and patients not eligible for thrombolytic therapy.
6- Patients having other causes of shock like sepsis, or hypovolemia.
7- Pulmonary hypertension and pulmonary embolism.

Data analysis

Statistical analysis was carried out using SPSS version 17. Categorical variables were presented as frequencies and percentages. Continuous variables were presented as (Mean ± SD). Independent samples t-test was used to compare means between two groups. Pearson's chi square (X^2) and Fisher-exact test were used to find the association between categorical variables. A p-value of ≤ 0.05 was considered as significant.

Results

3.1 The Distribution of Patients with Inferior MI by Socio-Demographic Characteristics

Table 3.1: Mean ± SD and range of age of study patients. The mean age of patients with inferior MI was 56.34±6.34.

Figure 3.1 shows the distribution of patients with inferior MI according to gender. Majority (62.5%) of them were male.

3.2 The Distribution of Patients with Inferior MI According to Smoking Habit

Figure 3.2 show the distribution of patients with inferior MI according to smoking habit. Only (35%) of them were current smokers.

3.3 The Distribution of Patients with Inferior MI According to History of Chronic Diseases

Table 3.2 shows the distribution of patients with inferior MI according to history of chronic diseases which includes (hypertension, diabetes mellitus and hyperlipidemia). (40%) of patients were hypertensive, (42.5%) were diabetic and (22.5%) of them presented with hyperlipidemia.

3.4 The Incidence of Right Ventricular Infarction among Patients with Inferior MI

Table 3.3 shows the incidence of right ventricular infarction among patients with Inferior MI. The incidence was (32.5%).

3.5 Case Fatality Rate for Patients with Inferior MI

Table 3.4 shows the case fatality rate for patients with inferior MI. The case fatality rate was (6.25%).

3.6 Mean Differences of Age according to presence of right ventricular infarction

Table 3.5 shows mean differences of age (years) according to presence of right ventricular infarction among patients with inferior MI. There were significant differences between means of age for study groups.

3.7 Association between Presence of Right Ventricular Infarction and Study Variables

Table 3.6 shows association between presence of right ventricular infarction and study variables including (gender and smoking habit) among patients with inferior MI. There was no significant association between presence of right ventricular infarction and study variables.

3.8 Association between Presence of Right Ventricular Infarction and Cardiogenic Shock

Table 3.7 shows association between presence of right ventricular infarction and the cardiogenic shock among patients with inferior MI. There was significant association between presence of right ventricular infarction and cardiogenic shock.

3.9 Association between Presence of Right Ventricular Infarction and History of Chronic diseases

Table 3.8 shows association between presence of right ventricular infarction and history of chronic diseases including (hypertension, diabetes mellitus and hyperlipidemia). There was no significant association between presence of right ventricular infarction and history of chronic diseases.

3.10 Association between Presence of Right Ventricular Infarction and death sequel

Table 3.9 shows association between presence of right ventricular infarction and death sequel among patients with inferior MI. There was significant association between presence of right ventricular infarction and death sequel.

Table 3.1: Mean ± SD and range of age of study patients

Variable	Mean ±SD	Range
Age (years)	56.42 ± 6.34	39-80

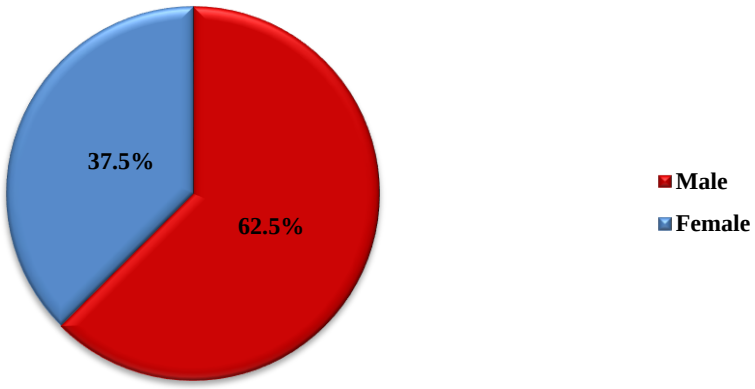

Figure 3.1: Distribution of patients according to gender

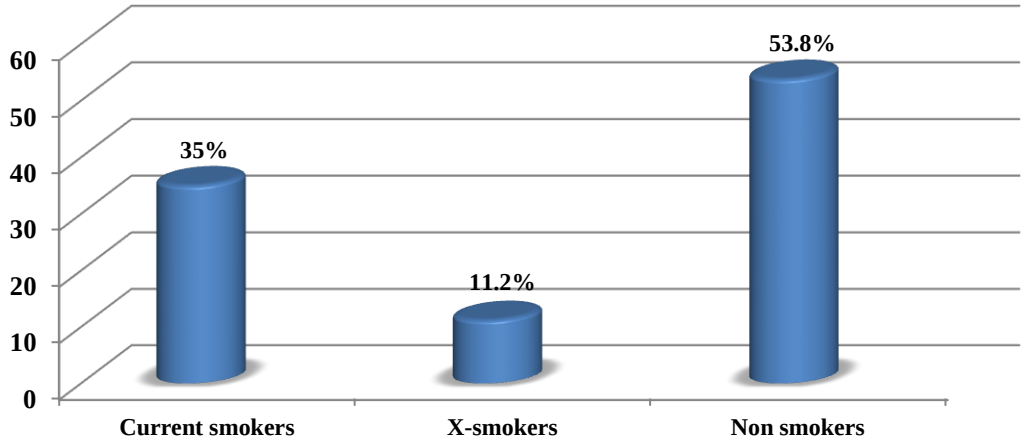

Figure 3.2: Distribution of patients according to smoking habit

Table 3.2: Distribution of patients according to history of chronic diseases

Chronic diseases	Frequency (%)
Hypertension	
Present	32 (40.0%)
Absent	48 (60.0%)
Total	80 (100.0%)
Diabetes mellitus	
Present	34 (42.5%)
Absent	46 (57.5%)
Total	80 (100.0%)
Hyperlipidaemia	
Present	18 (22.5%)
Absent	62 (77.5%)
Total	80 (100.0%)

Table 3.3: The incidence of right ventricular infarction among patients with inferior MI

Right ventricular infarction	Frequency	(%)
Present	26	32.5%
Absent	54	67.5%
Total	80	100%

Table 3.4: The case fatality rate for Patients with Inferior MI

Number of death	Total patients	Case fatality rate
5	80	6.25%

Table 3.5: The mean differences of age by presence of right ventricular infarction

Variable	RV infarction	N	Mean ± SD	t-test	P-value
Age (years)	**Present**	26	59.30 ± 7.56	2.599	**0.013***
	Absent	54	55.03 ± 5.18		

*p value ≤ 0.05 was significant
**p value ≤ 0.01 was significant

Table 3.6: Association between presence of right ventricular infarction and study variables

Variables	RV infarction		χ^2	P-value
	Present (%)	Absent (%)		
Gender				
Male	17 (65.4)	33 (61.1)	0.137	0.712
Female	9 (34.6)	21 (38.9)		
Smoking habit				
Smoker	9 (34.6)	19 (35.2)		
X-smoker	3 (11.5)	6 (11.1)	0.005	0.998
Non smoker	14 (53.9)	29 (53.7)		

*p value ≤ 0.05 was significant,**p value ≤ 0.01 was significant

Table 3.7: Association between presence of right ventricular infarction and cardiogenic shock

Variable	RV infarction		P-value
	Present (%)	Absent (%)	
Cardiogenic shock			
Present	7 (26.9)	5 (5.6)	**0.011***
Absent	19 (73.1)	51 (94.4)	

*p value ≤ 0.05 was significant, Fisher-exact test.

Table 3.8: Association between presence of right ventricular infarction and history of chronic diseases

Chronic diseases	RV infarction		χ^2	P-value
	Present (%)	Absent (%)		
Hypertension				
Present	12 (46.2)	20 (37.0)	0.608	0.436
Absent	14 (53.8)	34 (63.0)		
Diabetes mellitus				
Present	14 (53.8)	20 (37.0)	2.029	0.154
Absent	12 (46.2)	34 (63.0)		
Hyperlipidaemia				
Present	7 (26.9)	11 (20.4)	0.432	0.511
Absent	19 (73.1)	43 (79.6)		

*p value ≤ 0.05 was significant
**p value ≤ 0.01 was significant

Table 3.9: Association between presence of right ventricular infarction and death sequel

Variable	RV infarction		P-value
	Present (%)	Absent (%)	
Death sequel			
Present	4 (15.4)	1 (1.9)	**0.036***
Absent	22 (84.6)	53 (98.1)	

*p value ≤ 0.05 was significant, Fisher-exact test.

Discussion

Complications during acute phase of myocardial infarction were responsible for the high mortality in patients with acute myocardial infarction. Recognition of complications and managing promptly has been important to reduce this high mortality (Di Bella *et al*, 2007).

Patients with inferior MI who have RVMI were at increased risk of major complications, including death, and cardiogenic shock. Studies showed that the adverse prognosis in patients with RVMI were to be due directly to involvement of the right ventricle (Chockalingam *et al*, 2005).

In this study, the right ventricular infarction was complicate 32.5% of inferior myocardial infarction, and it was 27% in Muhammad A. Iqbal *et al*., stydy (Muhammad *et al.*, 2012), and it was 27.5% in Martial et al study, and it was 32% in Asif *et al*., study (Iqbal *et al*, 2013).

The percentage of the male in this study was 65% and 61% in patient with RV infarction and without RV infarction respectively and the p value between these group was non-significant (P value 0.712) and it was 72.4% and 80.4% in patient with RV infarction and without RV infarction respectively and the p value between these group was significant (p value 0.001) in Shamir et al study (Shamir *et al.*,, 2001), and this imply difference in gender between these two groups, and it was 74% and 77% in patient with RV infarction and without RV infarction respectively and the p value between these groups was non-significant (P value 0.4) in Muhammad *et al.,* study (Muhammad *et al.,* 2012).

For smoking habit, the percentage of current smoking was 34.6% and 35.2% in patient with RV infarction and without RV infarction respectively, and it was 53.9%and 52.7% in patient with RV infarction and without RV infarction respectively in Shamir et al study (Shamir *et al.,* 2001), and it was 20% and 26% in patient with RV infarction and without RV infarction respectively in Muhammad Asif et al study (Muhammad *et al.,* 2012) , these difference in the percentages of smoking may be result due to difference in the cultural habit between populations undergo study.

For hypertension , there was 46.2% and 37% in patient with RV infarction and without RV infarction respectively ,and the P value was 0.43 (non-significant) and it was 47.1% and 44.1% in patient with RV infarction and without RV infarction respectively ,and the P value was non-significant in Shamir *et al.,* stud (Shamir *et al.,* 2001), and it was 49%and 39% in patient with RV infarction and without RV infarction respectively ,and the P value was non-significant (0.08) in Muhammad Asif et al study (Muhammad *et al.,* 2012).

For diabetes mellitus , there was 53.8% and 37% in patient with RV infarction and without RV infarction respectively ,and the P value was 0.154 (non-significant) and it was 16.1%and 13.7% in patient with RV infarction and without RV infarction respectively ,and the P value was non-significant in Shamir et al study (Shamir *et al.,* 2001), and it was 22% and 24% in patient with RV infarction and without RV infarction respectively ,and the P value was non-significant (0.7) in Muhammad Asif et al study (Muhammad *et al.,* 2012), the difference in the percentage of diabetes mellitus among these populations may be explained by the difference in the dietary habit, physical activity and genetic factors.

For hyperlipidemia , there was 26.9% and 20.4% in patient with RV infarction and without RV infarction respectively ,and the P value was 0.511 (non-significant) and it was 28.3and 27.9% in patient with RV infarction and without RV infarction respectively ,and the P value was non-significant in Shamir et al study (Shamir *et al.,* 2001), and it was 4% and 6% in patient with RV infarction and without RV infarction respectively ,and the P value was non-significant (0.5) in Muhammad Asif et al study (Muhammad *et al.,* 2012), and these differences may be explained due to the only cholesterol level was taken in account in this study without the other parameter of hyperlipidemia.

The in hospital mortality rate among patient with and without RV infarction was 15.4% and 1.9% respectively in this study and it was 10% and 3.03% respectively in Malla *et al.,* study (Malla & Sayami A, 2007) and it was 22 % vs. 7% in Muhammad Asif et al study (Muhammad *et al.,,* 2012), while it was 7.1% and 5.5% respectively in Shamir *et al.,* study (Shamir *et al.,* 2001).

The P value for mortality between the two groups was 0.036 (significant), and it was significant (<0.0005) in Muhammad *et al.,* study (Muhammad *et al.,,* 2012), and it was significant (0.0001) in Afonso et al study (Afonso *et al.,* 2006), while it was not

significant in Malla *et al.*, study (Malla & Sayami, 2007), and this may be explained due to small numbers in this study (53) and small numbers of mortality (3 patients totally).

For cardiogenic shock it was occured in 26.9% of patients with RV infarction while it was 5.6% in patient without RV infarction, with significant P value (0.011) and it was 40% in patient with RV infarction and 12% in patients without RV infarction with significant P value (0.05) in Malla *et al.*, study (Malla & Sayami, 2007), and it was 26% in patients with RV infarction and 6% in patient without RV infarction with significant P value (<0.0005) in Muhammad *et al.*, study (Muhammad *et al.*, 2012).

Conclusion

1- The patients with RV infarction and inferior MI expose to higher rate of cadiogenic shock than the patients with inferior MI alone during the time of their hospital stay.
2- The patient with RV infarction and inferior MI had higher in hospital mortality rate when compare with patient with inferior MI alone.

Recommendation

1- It is important to do right side ECG in patients with inferior MI as it's important for diagnosis of RV infarction which may be associated with inferior MI in about one third of cases.
2- It is important to well monitoring the patient with inferior MI and RV infarction because there is high risk of cadiogenic shock among those patients.

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