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Original Research Article

Characteristic and predictors of readmission among patients with heart failure Gaza-Palestine

[*1]Amal Jamee, [2]Samar AL Nahhal, [3]Awni Alshurafa and [4]Yehia Abed

[1]Al Shifa Hospital, Cardiology department, ministry of health, Palestine

[2]Al Shifa Hospital ministry of health, Palestine

[3]Al Shifa Hospital ministry of health, Palestine

[4]AL Quds University, Faculty of Public Health, Gaza, Palestine

***Corresponding Author's Email: dr_amal08@yahoo.fr**

Abstract

Heart failure defined as complex of clinical syndrome that can result from cardiac disorder and represent a major health problem, leading cause of mortality and hospitalization of adult older than 65 years in developed countries. Our study aimed to identified socio demographic factors, medical characteristic, etiology, NYHA class, Ejection fraction, length of stay, co morbidities and predict risk of readmission after discharge. To find an answer for this question, we developed a database of 83 patients with 18-83 years, mean age (63.8years) hospitalized with a principal diagnosis of Congestive heart failure. Within 6months, a number 62: 83 patients (74.7%) were readmitted, five variable including longer hospital stay (6.4±5.6 days), accelerated heart rate (79.0±10.6), low income (less than 1500 shekels), potassium level (4.87±0.6) and low education level (33.9% illiterate) were identified as significant independent predictors of readmission by multivariate logistic regression analysis. We concluded that knowing these factors, intervention, and better surveillance to decrease the readmission of these patients is needed.

Keywords: Congestive heart failure, Gaza, Hospital Readmission, Palestine

INTRODUCTION

Congestive heart failure (CHF) is a part of cardiovascular disease and almost all heart disease can lead to this syndrome (Braun, 2005). It is one of the most common chronic diseases and the cause of the most hospitalization in the elderly (McMurray et al., 2012). The prevalence increases to reach 10% among the population aged 70 years or older (Ulfvarson, 2007). Epidemiological studies show that CHF is a major public health problem in developing countries (Mosterd, 2007; Bui, 2010), and estimated that 15 million people in worldwide are suffering from this condition. Heart failure is third common cardiovascular disease in USA affecting 2% of the population (Hou, 2004; Jessup, 2003; Kenchaiah, 2003) and 20%-27% of those will be readmitted within 30 days to discharge (Jencks, 2009). In high income countries heart failure consumes 1-2% of health care resources (Bui, 2010). In middle income countries heart failure become a significant burden for patients and health care system due to demographic changes and epidemiological transition to non communicable disease, where it represent an average of 2.2% of hospital admission affecting more male than female (Lozano, 2010; Murray, 2010). In Iran 25% of patients hospitalized in heart wards suffer from CHF, and the prevalence of readmission rate has been reported to 40% (Habibollahzadeh, 2001; Hatamipour, 2005). Heart failure is defined as a syndrome in which patient have typical symptom and signs resulting from an abnormality of left ventricular function. The typical symptoms are breathlessness at rest or on exercise, fatigue, ankle and body swelling, orthopnea, paroxysmal nocturnal dyspnea and palpitations, these symptoms are used to classify the severity of effort intolerance in heart failure. The New York Heart Association Classification is recommended. All patients presenting with heart failure requires an Echocardiography as part of the diagnostic assessment.

According to annual report of Palestinian ministry of health 2013 the data related to CHF was 11.9% in west

bank and 15.5% in age group 60 years and above (Health Annual Report, 2013), no data were available for Gaza. Heart failure can severely reduce patient`s quality of life. This disease is a single cardiovascular which is increasing in term of incidence and prevalence worldwide (Iranian Ministry of Health, 2007). Readmission in patients with HF is about 10-50% with 3-6 months after discharge (Gonseth, 2004). Heart failure poses a great problem to people around the world with its high prevalence, poor clinical outcome and large health care cost (Krum, 2009; Sharp, 1998).

METHODOLOGY

After approval of the studyby the research and ethics committee in Palestine (Helsinki), this observational study recruited 83 patients with the diagnosis of CHF who were hospitalized in cardiology department AL Shifa central hospital in Gaza from October 2013-May 2014. The diagnostic of heart failure was done by cardiologist based on clinical history, physical examination and trans-thoracic Echocardiography. Data were collected by face to face interview and from patient`s hospital files. We identified demographic and clinical variables, including gender, age, Body mass index (BMI), blood pressure measurement, heart rate, NYHA classification (New York heart association) etiology of heart failure, Ejection Fraction (EF), presence of Coronary Artery Disease (CAD), Atrial Fibrillation (AF), stroke, Hypertension (HTN) is defined as BP higher than 140/90 or taking anti hypertensive medication, Diabetes Mellitus (DM) was determined by fasting blood sugar >126 mg/dl or taking anti diabetic medication. The study variables also included cigarette smoking, history of surgical cardiac intervention, Renal failure and laboratory test (Sodium, potassium and creatinine level), Socio economic variable, as (occupation, income, education), also we asked about physical activity, competence with physicians instruction, (non compliance is a voluntary and conscious decision by which patients does follow up or obey instructions of the physicians), medication use and length of hospital stay. The exacerbation of heart failure which needs a hospital admission was considered as readmission. Categorical variable were presented as counts and percents and were compared using by chi square test for statistical significance testing, Continuous variables are presented as means, and logistic regression model was applied for multivariable analysis. Data was analyzed by SPSS version 20.0, and the criterion for significance was 0.05.

RESULTS

During a follow upof83patients 37 males (44.6%) and 46 females (55.4%) developed heart failure, the main age of study population is 63.8 ±13.2years and 65.2±11.6 in readmitted group and there were minor difference between two group Pvalue 0,06. General characteristics of the study population are presented in table 1, we noted that 74.7% of participants had readmission during the 6 months which 44.6% of patients were hospitalized less than 5 times and 30.1% 5 times and more, and 25.3% had no readmission. The prevalence of men and women in not readmitted group were 52.4%, 47.6% respectively, while in readmitted group 42.9%, 58.1% without significant difference regarding the sex between two group P= 0.41. Similarly no significant difference has been observed between two groups regarding their job we noted that 94% of study population were unemployed (in fact the mean age of population was 64 years). However a significant difference was observed between two groups in three variables: (1.) in education status with a significant difference in the level of literacy and primary education was observed in readmission group (33.9%, 24.2%) compared to (14.3%, 4.8%) in non readmission group respectively P value <0.001. (2.) Point 67.7% of participants in the readmitted group had a monthly income less than 1500 Shekels and 47.6% of non readmitted group had a monthly income more than 2000 Shekels, chi square test showed a significant difference P value 0.001. (3.) The length of hospital admission was longer in readmitting patients' 6.4±5.6 vs 4±2.2 days in non-readmission group with Pvalue 0.02.

The main clinical characteristics are listed in table 2, among 61.3%, 30.6% of patients with CHF on NYHA class III, and IV were readmitted during follow up, the value for significance was 0.02.The most common morbidities were Hypertension and diabetes which were present in 62.7%, 59% of all patients respectively. All patients had mean BMI 35.8kg/ m^2 considered as obesity according to WHO classification. The most common underlying cause was ischemic cardiomyopathy which was diagnosed in 53% of all patients. Only 12% of patients had smoking history and cardiac surgery was found in 28.9% in all patients with 33.9% in readmitted group, 12.9% had a history of stroke, 27.7% were in end stage renal failure. For all these variables the difference between two groups doesn`t reach a statistical significance level, in addition we noted in our study that only 45.8% of patients had regular medical follow up and obey to recommended diet and 61.3% of readmitted group did not.

To continue our summary of our estimation we conclude in table 3 that there was minor difference with regard to Blood pressure systolic or diastolic, the mean level of hemoglobin, Sodium, and Creatinine; however the independent t-test difference was significant for heart rate and potassium level. The mean left ventricular Ejection fractions LVEF (±SD) was 33.2±10, and 37.1 % of readmission patients had EF less than 25%, and 29% of them were on atrial fibrillation, for these two

Table 1. Socio demographic characteristics of study population

Characteristics	All		Not readmitted		Readmitted		P. value
Age (Mean)	63.8±13.2		59.6±16.8		65.2±11.6		0.06
Gender							
Male	37	44.6	11	52.4	26	42.9	0.41
Female	46	55.4	10	47.6	36	58.1	
Education status							
Illiterate	24	28.9	3	14.3	21	33.9	0.02
Primary school	16	19.3	14	4.8	15	24.2	
Secondary school	34	34	13	61.9	21	33.9	
High school	9	10.8	4	19	5	8.1	
Occupation							
employee	5	6	2	9.5	3	4.8	0.43
unemployed	78	94	19	90.5	59	95.2	
Income							
Less than1500 Shekels	50	60.2	8	38.1	42	67.7	0.001
1500-2000 Shekels	17	20.5	3	14.1	14	22.6	
>2000 Shekels	16	19.3	10	47.6	6	9.7	
Length of stay							
mean±SD	5.88±5.03		4.4±2.2		6.4±5.6		0.02
≤5days	56	67.5	16	76.2	40	64.5	0.32
>5days	27	32.5	5	23.8	22	35.5	

Table 2. Medical history and clinical characteristic

	All		Not readmitted		Readmission		P. value
NYHA functional class							
Class I	1	1.2	1	4.8	0	0	0.02
Class II	11	13.3	6	28.6	5	8.1	
Class III	45	54.2	7	33.3	38	61.3	
Class IV	26	31.3	7	33.3	19	30.6	
Co morbidities conditions							
Hypertension	52	62.7	13	61.9	39	62.9	0.94
Diabetes mellitus	49	59	12	57.1	37	59.7	0.83
End stage renal failure	23	27.7	6	28.6	17	27.4	0.91
Stroke	10	12	2	9.5	8	12.9	0.90
BMI	35.8±7.3		34.8±5.71		36.3±7.8		0.21
Cigarette smoking	10	12	4	19	6	9.7	0.25
History of cardiac surgery	24	28.9	3	14.3	21	33.9	0.08
Heart failure etiology							
Ischemic	44	53	8	38.1	36	58.1	0.27
Valvular	10	12	3	14.3	7	11.3	
cardiomyopathy	29	34.9	10	47.6	19	30.6	
Follow up							
Regular	38	45.8	14	66.7	24	38.7	0.03
neglected	45	54.2	7	33.3	38	61.3	

Table 3. Vital signs and laboratory characteristic of study population, comparison of two groups

	All	Not Readmitted	Readmission	P. value
Heart rate (mean)	81.5±15.9	88.8±24.9	79.0±10.6	0.014
Blood pressure mean				
Systolic blood pressure(mmhg)	120.64±18.4	124.4±19.0	119.3±18.1	0.277
Diastolic blood pressure(mmhg)	75±10.7	75.60±12.3	74.8±10.8	0.761
Lab test(mean)				

Table 3. Continue

Hemoglobin level(g/dl)	**10.9±1.2**		**11.5±2.0**		**10.8±1.6**		**0.172**
Sodium level(Na) meq/L	139.9±5.4		141.8±6.3		139.3±4.9		0.115
Potassium (K^+) meq/L	4.76±0.63		4.48±0.5		4.87±0.6		0.007
Creatinine(mg/dl)	1.6±1.14		1.56±0.93		1.72±1.2		0.56
Left ventricular EF							
Mean EF	33.2±10.7		37.4±9.2		31.8±10.8		0.04
<25%	25	30.1	2	9.5	23	37.1	
25+	58	69.9	19	90.5	39	62.9	0.02
Electrocardiogram							
Sinus	63	75.9	19	90.5	44	71.0	
Atrial fibrillation	20	24.1	2	9.5	18	29	0.07

Table 4. Independent factors associated with readmission in patients with congestive heart failure in logistic regression model

Variables	**B**	**P. value**	**OR(95%CI)**
Education	-0.98-	0.01	0.86(0.17-0.81)
Length of stay	0.25	0.06	1.26(0.99-1.66)
Heart rate	0.48	0.02	0.95(0.91-0.99)
Potassium level	2.12	0.004	7.74(1.91-35.6)
income	0.69	0.111	0.49(0.21-1.17)
constant	3.92	0.303	

variables Chi-square test was statically significant p< 0.05.

All the variable proved to have statistical significance association with occurrence of readmission are included as independent variable in the logistic regression model demonstrate in table 4 which showed that low education, Heart rate, potassium level, length of stay and income are the major independents risk factors for readmission.

DISCUSSION

Patients with heart failure are frequently readmitted to the hospital because of exacerbation of their symptoms. Vinson et al., demonstrated that readmission rate in 3-6 months has been reported as 30%-50% (Vinson, 1990). Others studied have estimated that readmission due to CHF during one year was 35% to 40% (Cowie, 2002; Krumholz, 1997). In our study it was reported as 74.7% during the 6 months where 44.6% of patients were hospitalized less than 5 times and 30.1% 5 times and more. Heart failure affects 1-2% of the adult's population in developed countries, with prevalence of 10% among the population aged 70 years or older (McMurray, 2012). In a study done in 2009 in US showed that average age was 80.1years in male and 57.3years in female, and 74.1% of these patients had been previously diagnosed with heart failure with different co morbidities such as 60.1% arrhythmias, 72.8% chronic atherosclerosis, 49.2% with diabetes and 28.9% with renal failure (Joseph, 2012). In addition a review study about CHF in low and middle income countries in 2014 showed that CHF makes up an average of 2.2% of hospital admission affecting more male than female and the mean age of patients was 63years and Ischemic heart disease was responsible of large majority of case (Thomas, 2014). Our finding come in according with these studies and shows that the mean age of patients was approximately 64 years and the most common co morbidities were Hypertension, diabetes, and history of previous cardiac surgery.

While in developed countries Welsh and Mc Cafferty believe that patients with CHF are frequently hospitalized due to the disease symptoms exacerbation (Welsh, 1996), and Mejhert et al consider the demographic characteristics of patients such as older age, lower quality of life and diabetes as the main cause of repeated hospitalizations (Mejhert, 2006), our results for this study showed that low education, accelerated heart rate, elevated potassium level, longer hospital of stay, low income and EF less than 25% were the most cause as demonstrate in logistic regression model. However the severity of CHF (NYHA class), low EF <25%, diabetes mellitus, renal failure, stroke, HTN were not different between readmitted and non readmitted patients in our study population.

Welsh and Mc Cafferty, consider that patients with CHF are frequently hospitalized due to the disease symptoms` exacerbation and patients non adherence in taking drugs and following diet instruction recommended by physician (Happ,1997; Atefeh, 2014; Welsh,

1996). Mejhert et al., believe that demographic characteristics of patients such as older age, lower quality of life and diabetes are the main cause of repeated hospitalization (Mejhert, 2006), the same results were found in the present study, such as a poor follow up, severe symptoms (NYHA class Ш, IV) represents a significant predictor of readmission, and large hospital stay as an indicator of severity of the disease.

CONCLUSION

Our data re confirm the importance of heart failure as a major public health in our country, so congestive heart failure remains the most cause of hospitalization, for this reason, good programs such as instructing, teaching, educating, follow up, surveillance plan and social management in this group of patient is necessary to decrease co morbidities, reduce hospital readmission rate, and health care cost.

LIMITATION OF THE STUDY

There are several limitations in this study first relative small sample of patients, and the short follow time which it can confirm the large number of heart failure endpoint, second some important factors are poorly documented in the medical records specially those related to socio environmental variables, third we identified five predictors independent variables for hospital readmission, so the necessity to control these variables during hospitalization and after discharge.

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