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RESEARCH ARTICLE

THE EFFECTS OF BETA BLOCKERS IN ENJECTION FRACTION OF MYOCARDIAL INFRACTION PATIENT

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Abstract

Myocardial infarction (MI) is a major health problem, with relatively high rates of morbidity and mortality. Beta blockers have been demonstrated to improve the long-term prognosis post-MI in terms of mortality and sudden cardiac death.

This study was designed with the aim to provide information about the benefits of beta-blockers at improvement of ejection fraction in patients with myocardial infarction. The present study is one of the first echocardiographic studies of patients treated with beta blockers for myocardial infarction focusing on ejection fraction. Study was carried out in Sudan Heart Center, in between July 2012 to June 2014. Study population comprises A total of 67 adults patient who underwent cardiac ultrasound scanning were enrolled in this prospective study.

(52; 77.6% males and 15; 22.4% females) and aged 33 to 86 years; mean age of 64 ± 14.67 years. Echocardiography studies were performed using Esaote echocardiography System (My Lab 50 Vision, Italy) with Phased array probe, convex face with small footprint for "peeking" in between rib interspaces (2.5 MHz). The mean and standard deviation (SD) of LVEF before prescribed beta blockers was (43.10±4.2).After receive beta blockers the mean and standard deviation (SD) of LVEF was (57.12±8.6) , T-Test for Paired Samples shows there is significant different effect between Two Variables . 48 patients had normal LVEF (>55%), 15 mildly reduced (45%–54%), and 4 moderately reduced (<44%).

The result of this study shows significant increase in ejection fraction ($p<0.001$) after received beta blockers.

Introduction

Myocardial infarction (MI) is a major health problem, with relatively high rates of morbidity and mortality (Fallon, 1996). Beta blockers have been demonstrated to improve the long-term prognosis post-MI in terms of mortality and sudden cardiac death (Hjalmarson, 1997 and Viskin *et al*., 1995).

Additionally, beta blockers administered post-MI have been shown to decrease reinfarction rates (Viskin *et al*.,1995 and Yusuf *et al*.,1988) and infarct size, prevent ischemic complications (Hjalmarson ,1997), and reduce the incidence of intracerebral hemorrhage (Hoffmann *et al*.,2000).

Left ventricular ejection fraction (LV-EF) after acute myocardial infarction (AMI) is an important marker for mortality. (Pfeffer et al., 1992 and Volpi *et al*., 1993) LV-EF may be assessed by nuclear imaging, (Senior *et al*., 1994) magnetic resonance imaging (Ioannidis *et al*., 2002) and echocardiography (McGowan *et al*., 2003). Nuclear imaging and magnetic resonance imaging provide relatively reliable information and with acceptable intra- and

interobserver variability (Benjelloun *et a*l., 1991 and Hyun *et al*., 2001). However, the use of these imaging modalities is limited by radiation exposure during nuclear imaging, high costs and non-availability in the coronary care unit and catheterization laboratory. Echocardiography is currently the most frequently used imaging modality for the assessment of LV-EF. However, echocardiographic images are sometimes of poor quality and in a recent review article high intra- and inter-observer variability were reported for echocardiographic LVEF assessment (McGowan *et al*., 2003).

Beta blocker therapy given immediately following the diagnosis of acute myocardial infarction (MI) has been shown to have a favorable effect on mortality (Borzak *et al*., 1993).

BBs are recommended to be used indefinitely in patients with decreased LVEF after AMI (Dargie *et al*., 2001).

MATERIALS AND METHODS

A prospective, cross sectional study was carried out in Sudan Heart Center, in between July 2012 to June 2014. Study population comprises A total of 250 adults patient who underwent cardiac ultrasound scanning were enrolled in this prospective study.

For each participant, an extensive medical history was obtained that included Residence, Drug type and etiology. Each participant also underwent a detailed physical examination, including measurement of body mass index (BMI).

Echocardiography studies were performed using Esaote echocardiography System (My Lab 50 Vision, Italy) with Phased array probe, convex face with small footprint for "peeking" in between rib interspaces (2.5 MHz). A water-soluble gel was used to produce airless contact between the transducer and the patient's chest. With the patient in the recumbent position, the transducer was placed in the fourth intercostal space at the left sternal border and directed posteriorly, laterally, and inferiorly to obtain a group of strong echoes from the posterior left ventricular wall. These echoes were recognized by their characteristic motion anteriorly during ventricular systole and posteriorly during diastole (Feigenbaum *et al*., 1968 and Popp *et al*., 1969).

Formal approval was obtained by the Ethics and Scientific Committee of the Radiological and Ultrasound Departments in the major reference hospitals of Khartoum State. The details of the study were explained fully and carefully to participants and their parents, and written informed consent was obtained from the consecutively enrolled participants.

Data were initially summarized into means, standard deviations (SD); mean ±SD and percentages in a form of comparison tables and graphs. Statistical analysis was performed using the standard Statistical Package for the Social Sciences (SPSS Inc., Chicago, IL, USA) version 16 for windows and P-value was used for significance.

RESULTS

The study population comprised of 67myocardial infarction patients who receive β blocker, made up of 52 (77.6%) males and 15 (22.4%) females [Table 1].

Their ages ranged from 33 to 86 years, with mean age and standard deviation (SD) of 64 ± 14.67 years [Table 2].

In female population, 9 subjects were in the age group above 70 years, representing 60% of the population. The age group of 50-59 years was the smallest (0%) of the population [Table 3].

In the population of males, 19 subjects were in the age group above 70 years, representing 36.5% of the population. The age group of 50- 59 years was the smallest (7.7%) of the population [Table 3].

The mean BMI was 28.51±5.6 kg/m^2. Among them 26.9% had a BMI less than 25 kg/m^2, 28.4% had a BMI between 25 to 30 kg/m^2, 26.9% had a BMI between 30 to 35 kg/m^2 and 17.9% had BMI >35 kg/m^2 [Table 4].

Place of residence was divided into three groups in which (n = 33; 49.3%) from metropolitan area (MA); (n = 20; 29.9%) from nonmetropolitan urban area (UA); (n = 14; 20.9%) and rural area (RA) [Table 5].

Of the 67 patients under study, 8 patients (11.9%) had unknown reason, while 9 (13.4%) had family history, 7 patients (10.4%) had cardiovascular disease, 15 patients (22.4%) had Diabetes mellitus, 12 patients (17.9%) had hypertension, 8 patients (11.9%) were obesity, 8 patients (11.9%) were smoking [Table 6].

The mean and standard deviation (SD) of LVEF before prescribed beta blockers was (43.10±4.2).After receive beta blockers the mean and standard deviation (SD) of LVEF was (57.12±8.6) [Table 7], T-Test for Paired Samples shows there is significant different effect between Two Variables [Table 8]. 48 patients had normal LVEF (>55%), 15 mildly reduced (45%–54%), and 4 moderately reduced (<44%) [Table 9].

Table 1: **Gender of the patient**

gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	male	52	77.6	77.6	77.6
	female	15	22.4	22.4	100.0
	Total	67	100.0	100.0	

Table 2: Mean and standard Deviation of patient age:

Statistics

Age

N	Valid	67
	Missing	0
Mean		64.07
Std. Deviation		14.671

Table 3: **Age against gender**

Age * gender Crosstabulation

Count

		gender		
		male	female	Total
Age	<=39	6	1	7
	40-49	5	2	7
	50-59	4	0	4
	60-69	18	3	21
	>=70	19	9	28
Total		52	15	67

Table 4: Body Mass Index

Body Mass Index

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	19 less than 25	18	26.9	26.9	26.9
	25 less than 30	19	28.4	28.4	55.2
	30 less than 35	18	26.9	26.9	82.1
	great than 35	12	17.9	17.9	100.0
	Total	67	100.0	100.0	

Table 5: Residence of patients

residence

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	metropolitan	33	49.3	49.3	49.3
	nonmetropolitan urban	20	29.9	29.9	79.1
	rural area	14	20.9	20.9	100.0
	Total	67	100.0	100.0	

Table 6: Etiology of MI among patients

etiology

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	unknown	8	11.9	11.9	11.9
	family history	9	13.4	13.4	25.4
	cardiovascular disease	7	10.4	10.4	35.8
	Diabetes mellitus	15	22.4	22.4	58.2
	hypertension	12	17.9	17.9	76.1
	obesity	8	11.9	11.9	88.1
	smoking	8	11.9	11.9	100.0
	Total	67	100.0	100.0	

Table 7: Ejection Fraction before and after received Beta Blockers

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Ejection Fraction % before	43.10	67	4.247	.519
	Ejection Fraction (%)after	57.12	67	8.564	1.046

Table 8: T test for Ejection Fraction

Paired Samples Test

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1 Ejection Fraction % before - Ejection Fraction (%)after	-14.015	7.136	.872	-15.756	-12.274	-16.076	66	.000

Table 9: Distribution of patients Ejection Fraction

Ejection Fraction%

	Frequency	Percent	Valid Percent	Cumulative Percent

Valid	>=55	48	71.6	71.6	71.6
	45-54	15	22.4	22.4	94.0
	30-44	4	6.0	6.0	100.0
	Total	67	100.0	100.0	

DISCUSSION

Coronary heart disease (CHD) is the leading cause of morbidity and mortality in men as well as women all over the world (Chaudhary and Khan, 2003). The incidence and mortality rates of CHD have been halved in all age groups because of population-wide improvements in the major risk factors, particularly smoking, cholesterol, and blood pressure (Capewell *et al*., 2000). In fact, the figures in young patients may be lower than actual because of atypical presentation and reluctance to submit themselves for further investigations (Klein and Nathan, 2003).

Two-dimensional echocardiography has recently gained popularity as a noninvasive diagnostic aid in the evaluation of various forms of heart disease.

Although M-mode echocardiography is valuable in detecting wall motion changes related to ischemia (Corya *et al*., 1975), and occasionally in predicting the clinical course of patients after myocardial infarction, two-dimensional echocardiography, with its expanded view in real-time of the left ventricle, has enhanced our ability to evaluate wall motion changes caused by coronary artery disease (Kisslo *et al*., 1977 and Morganroth *et al*., 1994).

The purpose of this study was to provide information about the benefits of beta-blockers at improvement of ejection fraction in patients with myocardial infarction.

The present study is one of the first echocardiographic studies of patients treated with beta blockers for myocardial infarction focusing on ejection fraction.

Our study revealed that the percentage of the elderly MI patients were more than in young MI patients, it comprised 53 patients in old group (79.1%), whereas 14 patients in young group (20.1%).This finding was supported by Kam *et al*. (2002) who found that elderly MI patients were more likely compared to young MI patients.

On other hand, our study revealed that BMI has significant difference. These findings were in agreement with Jousilahti *et al*. (1996) who reported that obesity is a risk factor for AMI, but is also strongly associated with other factors in the development of coronary heart disease, such as hypertension and diabetes mellitus, as well as dyslipidaemia and inflammation**.**

In our study, we found that percentage of the patients from metropolitan area (MA) were more than nonmetropolitan urban area (UA) and rural area (RA). This finding was in agreement with (Pandey,2010) who reported that interpretation of results shows 70% of MI cases were from rural population of Jhalawar and with (Chauhan,2013) who found Data also suggests that although the prevalence rates of CVD in rural population will remain lower than that of urban populations.

Our study revealed that Diabetes mellitus is more prevalent in MI patients. Also, our study revealed that hypertension is more prevalent. These findings were in agreement with (Gonzalez *et al*., 1992 and Gonzalez *et al*., 1996) who reported that the incidence rate of MI accords with the high prevalence of classic cardiovascular risk factors among this population, such as diabetes, hypertension, and dyslipidemia.

The result of this study shows significant increase in ejection fraction ($p<0.001$) after received beta blockers. This finding was supported by (Anane *et al*. (2012) who found that a significant increase in the LVEF occurred after treatment with the β-blockers, and with (Campen *et al*. 1998) who reported that in almost all studies, significant increase in the LVEF occurred after treatment with beta-blockers.

CONCLUSION

This study has demonstrated that a significant increase in the LVEF occurred after treatment with the beta blockers. However, this type of analysis did not allow an accurate statistical comparison of the various beta-blockers, for which a meta-analysis with data for individual patients is needed. Nevertheless, the differences in improvement were small and, importantly, mean the baseline LVEF values for the different beta-blocker studies were almost identical.

Again this study has shown that the association of LVEF and mortality changes substantially across the full spectrum of LVEF. This information clarifies the role of LVEF in advanced heart failure patients and will help clinicians provide better estimates of prognosis. In addition, understanding that arrhythmias and worsening heart failure contribute to substantial mortality observed in patients with reduced LVEF may help target future interventions in this population.

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