Secondary Prevention Measures after Acute Myocardial Infarction: Comparison between Diabetics and Non-Diabetics at a Saudi Teaching Hospital

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Key Words

Secondary prevention · Myocardial infarction · Diabetics · Non-diabetics · Saudi Arabia

Abstract

Objective: To compare between the use of secondary prevention measures after acute myocardial infarction in diabetic and non-diabetic patients who were admitted to the King Abdulaziz University Hospital. **Method:** All patients admitted with a definitive diagnosis of acute myocardial infarction between January 1995 and December 1999 were studied. Patients' age, sex, body mass index, development of heart failure, peak serum creatinine phosphokinase, duration of hospital stay, use of aspirin, beta-blockers or angiotensin-converting enzyme (ACE) inhibitors on discharge and outcome were reported. **Results:** A total of 184 patients were studied, 53% were diabetics and 47% non-diabetics.

The mean age for diabetics was 56 years with a male:female ratio of 3.9:1, while for non-diabetics it was 53 years with a male:female ratio of 7.7:1 ($p = 0.05$, $p = 0.09$, respectively). Diabetic patients had a higher incidence of heart failure compared to non-diabetics, 57 versus 43% ($p = 0.05$), and had a longer hospital stay, 12 versus 10 days ($p = 0.03$). Aspirin was used by 97% of the diabetics and 94% of the non-diabetics ($p = 0.4$), while beta-blockers were used by 43 and 44% ($p = 0.9$) and ACE inhibitors by 67 and 51% ($p = 0.03$), respectively. **Conclusion:** There is no difference in the use of aspirin and beta-blockers between diabetic and non-diabetic patients. ACE inhibitors were used more by diabetics. There is underutilization of beta-blockers by diabetics and non-diabetics. Physicians should be encouraged to use beta-blockers as secondary prevention measures after acute myocardial infarction as they have substantial benefits and are of generally low treatment cost.

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Introduction

It is well known that diabetic patients have a worse outcome after myocardial infarction (MI) than non-diabetic patients [1, 2]. The effectiveness of beta-blockers as a secondary prevention measure after acute MI was appraised by Yusuf et al. [3]. Several large trials have demonstrated that the long-term administration of beta-blockers to patients after acute MI improves survival [4–6]. Although the percentage of patients receiving beta-blockers after acute MI has recently increased, physicians still reportedly prescribe beta-blockers for less than one third of the patients [7] and cardiologists for less than one half [8]. Chowdury et al. [9] have reported that diabetic patients do not receive optimal secondary prevention measure when compared to their non-diabetic counterparts, although the mortality associated with MI is reduced considerably in diabetic patients treated with angiotensin-converting enzyme (ACE) inhibitors and beta-blockers compared to non-diabetic patients treated with the same drugs [10].

The aim of our study is to compare the use of secondary prevention measures in diabetic and non-diabetic patients admitted to the King Abdulaziz University Hospital with a diagnosis of acute MI over a 5-year period.

Method

King Abdulaziz University Hospital is a 400-bed teaching hospital in Jeddah, Kingdom of Saudi Arabia. The medical charts of patients admitted to the hospital with a definitive diagnosis of acute MI between January 1995 and December 1999 were reviewed. Definitive diagnosis of acute MI was made by the presence of at least two of the following criteria: (1) a history of prolonged chest discomfort, (2) electrocardiographic changes consistent with ischaemia or necrosis, (3) elevated cardiac enzymes [11]. Patients were divided into two groups according to the presence or absence of diabetes mellitus. Diagnosis of diabetes mellitus was

made according to the WHO criteria [12]. Patients' age, sex, body mass index (body weight in kilograms divided by height in square metres) as well as the development of heart failure (whether on admission or as a late complication), peak serum creatinine phosphokinase, duration of hospital stay, use of aspirin, beta-blockers, ACE inhibitors on discharge and outcome were recorded. Cardiac enzyme analyses were performed using enzymatic colorimetric method with the normal range being from 0 to 195 IU/l.

Statistical Analysis

Analyses were performed using the SPSS 7.5 (Statistical Package for Social Science). Mean $\pm$ SD was determined for qualitative data, and frequency was determined for categorical variables. For continuous variables t test was used when comparing two groups. Chi-square was used to analyse group differences for categorical variables. All tests were two-tailed, and a p value of <0.05 was considered significant.

Results

A total of 184 patients were included in the study. Ninety-seven patients (53%) were diabetics and 87 (47%) were non-diabetics. The mean age for diabetics was 56.4 ± 11 years and 52.6 ± 14 years for non-diabetics ($p = 0.05$) with a male:female ratio of 77:20 (3.9:1) and 77:10 (7.7:1), respectively ($p = 0.09$). The mean body mass Index was 26.5 ± 3.5 for diabetics and 25.2 ± 4.2 for non-diabetics ($p = 0.07$). Heart failure developed in 55 of the 97 (57%) diabetics and 38 of the 87 (43%) non-diabetics ($p = 0.05$). The mean peak serum creatinine phosphokinase was higher in the diabetics ($1,607 \pm 1,431$ IU/l) than non-diabetics ($1,289 \pm 1,052$ IU/l; $p = 0.04$). Diabetic patients stayed longer than non-diabetics in the hospital, 11.6 ± 2 versus 9.9 ± 4.8 days ($p = 0.03$). Aspirin was given to 175 patients (95%), beta blockers to 80 (44%) and ACE inhibitors to 108 (59%). As shown in table 1, no significant difference was observed in the use of aspirin and beta-blockers between diabetics and non-diabetics but ACE

Table 1. Comparison between diabetics and non-diabetics in the use of secondary prevention measures

Variables	Diabetics (n = 97)		Non-diabetics (n = 87)		p value
	n	%	n	%	
Aspirin	94	97	82	94	NS
Beta-blockers	42	43	38	44	NS
ACE inhibitors	65	67	44	51	S

S = Statistically significant, $p < 0.05$.

inhibitors were used more by diabetics than non-diabetics on discharge. Seven of the 97 (7.2%) diabetic patients and 2 of the 87 (2.3%) non-diabetics ($p = 0.06$) died. Three of the 80 (3.8%) patients who were taking beta-blockers also died versus 77 of 80 (96%) who were alive ($p = 0.05$).

Discussion

Diabetic patients were older than non-diabetics and had a higher ratio of females, which is similar to what has been reported by others [13–15]. The incidence of heart failure in diabetics presenting with acute MI was higher than in non-diabetics as they lacked recovery in wall motion score index and had a larger infarct size [16–18], an observation that is consistent with our findings. There was no difference between diabetics and non-diabetics in the use of aspirin and beta-blockers but ACE inhibitors tended to be used more by diabetics, which could be related to their higher incidence of heart failure. The use of ACE inhibitors in the early treatment of patients with MI and left ventricular dysfunction had been shown to improve ventricular ejection fraction, retard left ventricular dilatation following extensive MI, and lower myocardial oxygen consumption [19–21]. There is an

underutilization of beta-blockers worldwide [7, 8, 22]. Only 44% of our patients were using beta-blockers on discharge with no significant difference between diabetics and non-diabetics.

Physicians have been reluctant to treat diabetics with beta-blockers because of the risk of worsening diabetes or of masking hypoglycaemic symptoms. Although it is true that blood glucose concentration may increase with the use of some beta-blockers [23], many studies have confirmed the benefits of beta-blockers in patients with diabetes mellitus [24, 25]. Another reason for the underutilization of beta-blockers in diabetics could be the higher incidence of heart failure and the fear of worsening their heart failure condition. Chadda et al. [26] and others [22, 27, 28] have reported that patients can benefit from beta-blockers regardless of their ejection fraction. Many studies have shown that the use of beta-blockers after MI reduces mortality rate [23, 27, 29]. The use of beta-blockers has been shown to be an independent predictor of a 1-year cardiac survival following hospital discharge for all diabetics [2]. Evidence supports the benefit of propranolol, timolol, metoprolol and atenolol in reducing mortality rate after MI [6, 27, 30, 31].

Conclusion

There is underutilization of beta-blockers in both diabetics and non-diabetics, not only in our hospital but also in others [7, 8] despite the substantial benefits and generally low treatment cost. Concern that side effects af-

fect the usefulness of beta-blockers has to be tempered by the low yearly withdrawal from beta-blockers in long-term trials [27] and physicians should be encouraged to use beta-blockers as secondary prevention measures after MI.

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