THE INFLUENCE OF DIABETES MELLITUS ON MORBIDITY AND MORTALITY IN PATIENTS WITH ACUTE MYOCARDIAL INFARCTION IN JABLANICA DISTRICT

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This study examines the influence of diabetes mellitus type 2 (DM type 2) on morbidity and mortality in patients after acute myocardial infarction (AMI). The study included 261 patients with acute myocardial infarction, treated at the General Hospital in Leskovac during the period from January to December 2007. The incidence of diabetes mellitus in patients with AMI was 28.4% (74 patients). The group of patients with both diabetes mellitus and AMI had an equal number of men and women (37), whereas the group of patients without DM type 2 had significantly more males (118, 63.1%) than females (69, 36.9%) (p<0.05). The average age in diabetics with acute myocardial infarction was 66.34±9.34 years, and in non-diabetics 64.29±11.48 years. The youngest diabetic with DM type 2 and acute myocardial infarction was 42, while the youngest non-diabetic was 37 years old. The oldest subject with diabetes and acute myocardial infarction was 82, whereas the oldest subject without DM type 2 was 88 years old. The majority of diabetics with acute myocardial infarction (40.5%) were in the group ranging from 70-79 years of age, while 30.5% of non-diabetics were in the group ranging from 60-69 years of age. Diabetes duration was usually 1-5 years (25.7% of patients). It is characteristic that in 13.5% of patients with acute myocardial infarction, DM type 2 was diagnosed at the time of infarction. The majority of subjects (58.10%) were treated with oral hypoglycemics. The incidence of positive anamnesis for the existence of early cardiovascular disease was much higher in diabetics (68.9%), whereas the proportion of active smokers was considerably lower in diabetics (31.0%). Hypertension was more frequent in diabetics (71.6%). Heart failure was statistically more frequent in patients with both acute myocardial infarction and DM type 2. Fatal outcome was registered more often in the group of subjects with DM type 2 (21.6%), with regard to the group of patients without diabetes mellitus (7.0%). *Acta Medica Medianae 2013;52(3):5-11.*

Key words: *diabetes mellitus, acute myocardial infarction, mortality, morbidity*

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Introduction

Diabetes mellitus (DM) is associated with 2-4 times higher risk of coronary disease, and in clinically proved coronary disease mortality is 3-7 times higher due to accelerated atherosclerosis and higher infarction spot (1,2). DM type 2 is present in 30% of patients with acute coronary syndrome (acute myocardial infarction – AMI, unstable angina pectoris, sudden cardiac death) (3-8).

Prior to introducing coronary care units, mortality in diabetics was 40% and at least two times higher than in patients without diabetes mellitus. The following factors are responsible for this difference in the outcome: higher spread of coronary disease, greater infarction size, additional cardiovascular risk factors and other diseases of target organs. Nowadays, the treatment has improved the survival of both diabetic and non-diabetic patients, but DM still doubles the mortality rate (9-11).

Patients with DM and without prior myocardial infarction have a similar risk of AMI as patients without DM and with prior myocardial infarction. The presence of "silent" infarction contributes to the increased mortality of diabetics, whereas cardiac autonomic neuropathy exists in almost 50% of diabetics with coronary disease and causes systolic and diastolic left ventricle dysfunction. Also, diabetics rarely receive thrombolytic therapy (around 35%), compared with non-diabetic patients (around 47%), due to retinal haemorrhage risk, atypical symptoms and late admission to a coronary care unit (12). However, thrombolytic therapy is not contraindicated in diabetics even if there is retinopathy, and the benefit of this treatment is greater than in non-diabetics. It is also necessary to make corrections

of glycaemic values in the early stages of AMI (13-15).

Aim

The aim of the study was to examine the influence of diabetes mellitus on morbidity and mortality in patients with acute myocardial infarction.

Subjects and Methods

The study included 261 patients with acute myocardial infarction treated in the coronary care unit of General Hospital in Leskovac in the period from January 1, 2007 to December 31, 2007, which was documented by appropriate medical documentation.

All subjects were divided into two groups based on the presence of diabetes. The first group included patients with AMI and DM type 2 and the second one involved patients with AMI without DM type 2. The first group had 74 patients and the second one 187 patients.

During the examination, general methodological approach to data comparison with retrospective study was used. Anamnestic and clinical parameters were analysed with the aim of better AMI characteristics defining in diabetics and non-diabetics. Clinical examination determined the state of cardiovascular system.

Apart from anamnestic data, cardiovascular characteristics and the outcome of the disease were monitored in all the subjects. Data about the type, length and way of treating diabetes, age and gender, place of living and clinical presentation were obtained from the anamnesis.

The data were analysed by standard descriptive methods (mean value, standard deviation and percentage representation) and appropriate statistical tests (Student's t-test and χ^2 test). The value of $p<0.05$ was taken as the significance threshold.

Results

The examination included 261 patients with acute myocardial infarction, out of whom 74 or 28.4% had diabetes mellitus type 2.

Patients with DM type 2 and AMI had an equal gender number: 37 men and 37 women, whereas DM type 2 group had significantly larger number of men, 118 (63.1%), compared with 69 women (36.9%) (Table 1).

The average age of diabetics with acute myocardial infarction was 66.34±9.34 years, and without diabetes 64.87±11.48 years. The youngest diabetic with acute myocardial infarction was 42, and the oldest 82 years old. The youngest patient with acute myocardial infarction without diabetes was 37, and the oldest 88 years old (Table 2).

The largest number of diabetics with acute myocardial infarctation was 30 (40.5%) in the group ranging from 70 to 79 years of age, whereas the largest number of those without diabetes was 57 (30.5%) in the group ranging from 60 to 69 years of age (Table 3).

The majority of subjects with acute myocardial infarction and diabetes mellitus (25.7%) had diabetes mellitus with duration of 1-5 years. It is characteristic that in 10 patients (13.5%) with acute myocardial infarction, diabetes mellitus type 2 was diagnosed at the time of infarction (Table 4).

The majority of subjects with diabetes, i.e. 43 subjects (58.1%), were treated with oral hypoglycaemics, 7 with diet only (9.5%), 12 with insulin (16.2%), and 12 with combined treatment (16.2%) (Table 5).
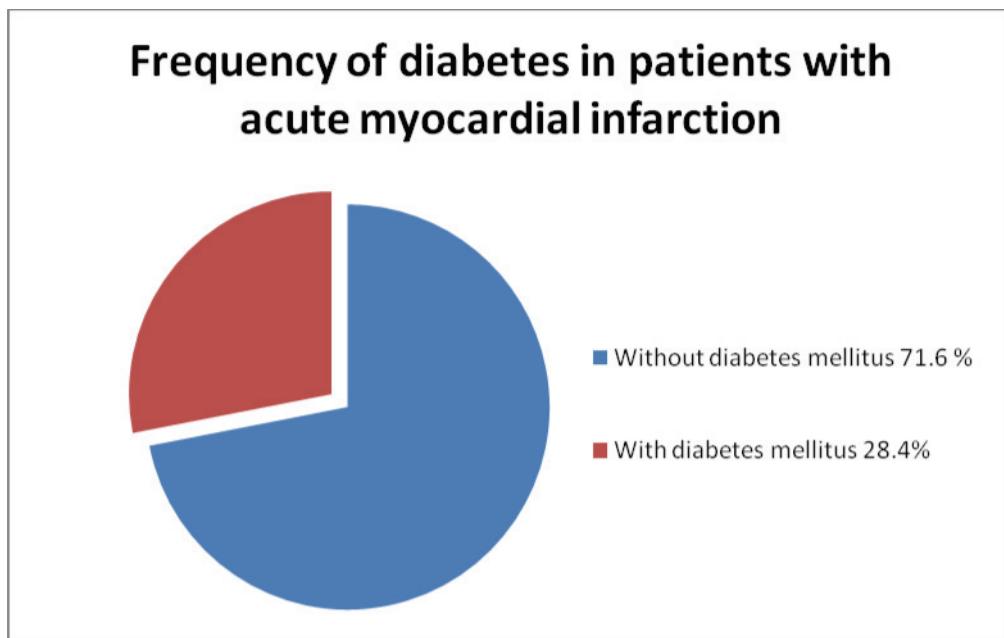
Graph 1. Frequency of diabetes in patients with acute myocardial infarction

Table 1. Distribution of subjects according to gender

Gender	With DM type 2	Without DM type 2	Total
Male	37 / 50.0	118 / 63.1*	155 / 59.4
Female	37 / 50.0	69 / 36.9	106 / 40.6
Total	74 / 100.0	187 / 100.0	261 / 100.0

The data are shown as n / %, *p<0.05 opposite to patients without diabetes mellitus

Table 2. Average age of subjects

	Average age	The youngest subject	The oldest subject
With diabetes mellitus	66.34 ± 9.34	42	82
Without diabetes mellitus	64.29 ± 11.48	37	88
Total	64.87 ± 10.93	37	88

The data are shown as mean value ±SD

Table 3. Distribution of age groups of subjects

	EXISTENCE OF DIABETES				Total	
	Yes		No			
	Number	%	Number	%	Number	%
30-39 years			2	1.1%	2	0.8%
40-49 years	4	5.4%	17	9.1%	21	8.0%
50-59 years	14	18.9%	46	24.6%	60	23.0%
60-69 years	21	28.4%	57	30.5%	78	29.9%
70-79 years	30	40.5%	47	25.1%	77	29.5%
80+ years	5	6.8%	18	9.6%	23	8.8%
Total	74	100.0%	187	100.0%	261	100.0%

Table 4. Diabetes duration

		Diabetes type	
		Type 2	
		Number	%
Diabetes duration	de novo	10	13.5%
	1-5 years	19	25.7%
	6-10 years	17	23.0%
	11-15 years	16	21.6%
	16-20 years	10	13.5%
	over 20 years	2	2.7%
Total		74	100.0%

Table 5. Distribution of subjects with diabetes mellitus according to treatment type

Type of treatment	Diabetes mellitus treatment	
	Number	%
Diet	7	9.5%
Oral hypoglycaemic	43	58.1%
Insulin	12	16.2%
Combined	12	16.2%
Total	74	100.0%

Table 6. Family history of cardiovascular diseases (CVD)

	With diabetes	Without diabetes
Positive anamnesis for CVD	51 (68.92%)**	85 (45.45%)
Negative anamnesis for CVD	23 (31.08%)	102 (54.54%)
Total	74	187

**χ^2= 10.7; p< 0.01 opposite to patients without diabetes

Table 7. Distribution of subjects according to tobacco consumption

	Diabetes			
	Yes		No	
	Number	%	Number	%
Smokers	23	31.08%*	92	49.20%
Non-smokers	51	68.92%	95	50.80%
Total	74	100.0%	187	100.0%

*χ^2= 6.34; p<0.05 opposite to non-diabetics

Table 8. Distribution of subjects according to the presence of hypertension

		Diabetes mellitus			
		Yes		No	
		Number	%	Number	%
Hypertension	Yes	53	71.62%**	98	52.40%
	No	21	28.38%	89	47.60%
Total		74	100.0%	187	100.0%

**χ^2= 7.25; p<0.01 opposite to non-diabetics
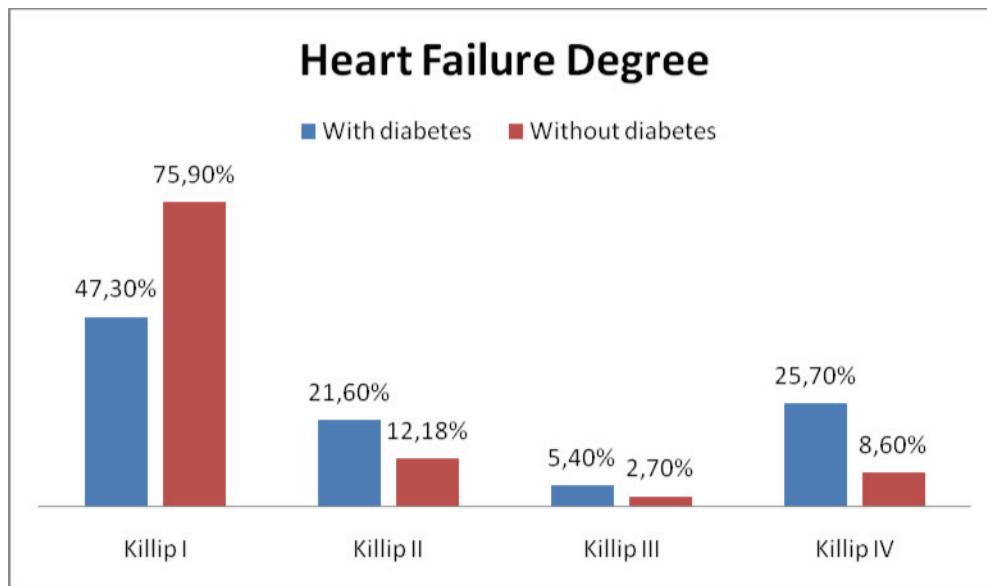
Graph 2. Heart failure in acute myocardial infarction subject to the presence of diabetes
χ^2=11.34, p<0.01, df=3
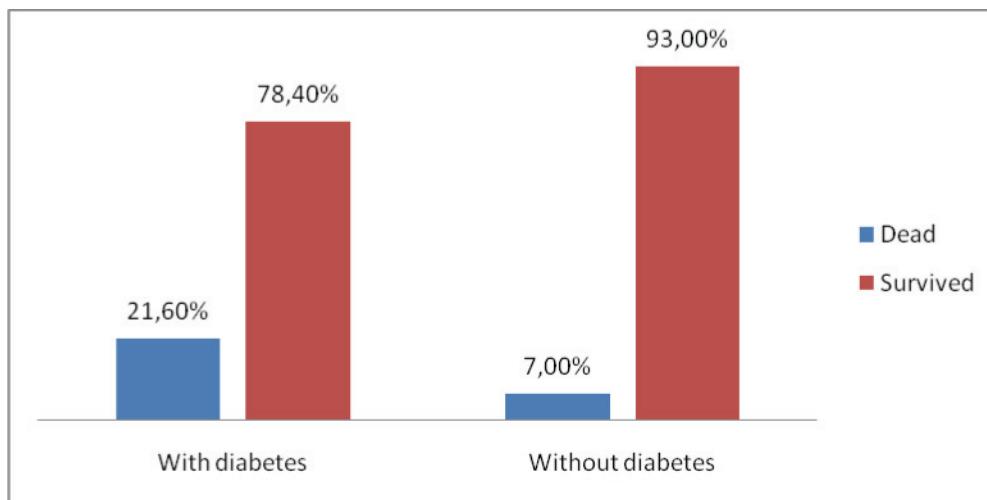
Graph 3. Patient prognosis in acute myocardial infarction subject to the presence of diabetes
χ^2 =11.55; p<0.01; df=1

There is a statistically significant difference in the incidence of positive anamnesis for CVD among diabetics and non-diabetics, with the positive anamnesis for CVD being more frequent in diabetics (68.9% vs. 45.4%, p<0.01) (Table 6)

There is a statistically significant difference in the frequency of active smokers among diabetics and non-diabetics, with the percentage of active smokers being far less in diabetics (31.0% vs. 49.2%, p<0.05) (Table 7).

There is a statistically significant difference in the incidence of hypertension among diabetics and non-diabetics, with hypertension in diabetics being considerably higher (71.6% vs. 52.4%, p<0.01) (Table 8).

There is a statistically significant difference in the degree of heart failure after myocardial infarction in diabetics and non-diabetics. Heart failure was present in the group of subjects with acute myocardial infarction and diabetes (Graph 2).

There is a statistically significant difference in the disease outcome in diabetics and non-diabetics. Fatal outcome was statistically more frequent in the group of patients with diabetes and it was 21.6% (16 patients), compared with the group of subjects without diabetes where it was 7.0% (13 patients) (Graph 3).

Discussion

Diabetes mellitus and coronary heart disease together represent high risk factors in the population of patients. Patients with DM type 2 already have a cardiovascular risk.

The Framingham study found a significant increase in several cardiovascular diseases in DM. American Heart Association marked DM as the most important risk factor for cardiovascular disease, in the same category as smoking, hypertension and hyperlipidaemia. Due to vegetative neuropathy in diabetics, usually there is no classic anginal pain; instead, these patients experience choking, fatigue or sweating, often followed by numerous complications. Myocardial infarction percentage ranges between 14-28% (1-5). Mortality was at its highest rate during the first several hours after the infarction, usually on admission to hospital, and it ranged between 30-50%, with hospital mortality ranging between 10-15%.

Although current treatment has improved the survival of both diabetic and non-diabetic patients, DM still doubles the mortality rate (6). Hyperglycaemia and insulin resistance are two most important factors for early atherosclerosis. Hyperglycaemia is especially one of the most essential independent risk factors for coronary disease (16). Accelerated atherosclerosis in diabetics is often accompanied with arterial hypertension, central obesity, increased plasmin inhibitor 1 activity levels, increased fibrinogen levels, dyslipidaemia, etc. (16).

In the works of many authors, it has been demonstrated that acute myocardial infarction in diabetics has exceptionally unfavourable prognosis due to generalized changes on blood vessels, significant atherosclerosis of coronary arteries, and frequent re-infarctions which can be atypical, painless or with some heart failure symptoms (17-19). However, acute myocardial infarction treatment in diabetics is exactly the same, even the fibrinolytic therapy has proven as far more effective in diabetics with acute myocardial infarction.

Incidence and clinical characteristics of acute myocardial infarction in diabetics have been examined in relation to non-diabetic patients. The incidence of diabetes was 28.4% in treated patients with acute myocardial infarction. Therefore, diabetes in acute myocardial infarction was almost 2.5 times more frequent in comparison to the other population with acute myocardial infarction.

Based on the gender of diabetics with acute myocardial infarction, there was an equal number of 37 men and 37 women. As for non-diabetics, there were 118 men (63.1%) and 69 women (36.9%).

The average age in diabetics with acute myocardial infarction was 66.34±9.34, whereas that number for non-diabetics was 64.29±11.48 years. The youngest subject with diabetes and acute myocardial infarction was 42, while the youngest non-diabetic was 37 years old. The oldest subject with diabetes and acute myocardial infarction was 82, whereas the oldest subject without diabetes was 88 years old. The majority of diabetics with acute myocardial infarction, i.e. 30 patients (40.5%), were in the group ranging from 70-79 years of age. Fifty-seven patients without diabetes (30.5%) were in the group ranging from 60-69 years of age. The group with acute myocardial infarction with diabetes included only patients with DM type 2 (74). The largest number of subjects with acute myocardial infarction and diabetes, 19 of them (26.0%), had diabetes in duration of 1-5 years. It is characteristic that in 10 subjects with acute myocardial infarction (13.7%) diabetes was diagnosed at the moment of infarction, being DM type 2 in all the subjects. The majority of subjects, 43 of them (58.10%), were treated with oral hypoglycaemics, 7 (9.50%) with diet only, 12 (16.20%) with insulin, and 12 (16.20%) with combined treatment.

There is a statistically significant difference in the incidence of positive anamnesis for CVD among diabetics and non-diabetics, with positive anamnesis for CVD being more frequent in diabetics, 68.90% (non-diabetics 45.40%).

Also, there is a statistically significant difference in the frequency of active smokers among diabetics and non-diabetics, with the proportion of active smokers being far less in diabetics, 31.0% (non-diabetics 49.1%).

Furthermore, there is a significant difference in the incidence of hypertension among diabetics and non-diabetics, with hypertension in diabetics being higher, 71.6% (non-diabetics 52.4%).

Prior to introducing coronary care units, mortality in diabetics with acute myocardial infarction was 40% and at least two times higher than in patients without diabetes. The results of this work show that fatal outcome is statistically more frequent in the group of patients with diabetes, 21.6% (16%), in relation to the group of patients without diabetes (7%).

Conclusion

1. The incidence of diabetes in acute myocardial infarction is higher in relation to other population with acute myocardial infarction. This work included 28.4% of diabetics with acute myocardial infarction. That is three times higher incidence of diabetes in acute myocardial infarction with regard to other population with acute myocardial infarction.

2. It is characteristic that in 13.7% of subjects with acute myocardial infarction, DM type 2 was diagnosed at the time of infarction.

3. Hypertension and positive family anamnesis for CVD were statistically more common in diabetics, while there were more smokers in the group of non-diabetics.

4. Heart failure was more common in the group of subjects with acute myocardial infarction and diabetes.

5. Mortality was significantly higher in the group of subjects with diabetes (21.60%), compared with the group of subjects without diabetes (7.0%)

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UTICAJ DIJABETES MELITUSA TIP 2 NA MORBIDITET I MORTALITET KOD BOLESNIKA SA AKUTNIM INFARKTOM MIOKARDA U JABLANIČKOM OKRUGU

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U radu je ispitivan uticaj dijabetes melitusa tip 2 (DM tip 2) na morbiditet i mortalitet bolesnika sa preležanim akutnim infarktom miokarda (AIM). Ispitivanjem je obuhvaćen 261 bolesnik sa akutnim infarktom miokarda, lečen u Opštoj bolnici Leskovac u periodu od januara do decembra 2007. godine. Učestalost dijabetes melitusa kod bolesnika sa AIM iznosila je 28.4% (74 bolesnika). U grupi bolesnika sa dijabetes melitusom i AIM bio je podjednak broj muškaraca (37) i žena (37), a u grupi bez DM tip 2 bilo je značajno više muškaraca, 118 (63.1%), u odnosu na žene, 69 (36.9%) (p<0.05). Prosečna starost kod dijabetičara sa akutnim infarktom miokarda iznosila je 66.34±9.34, a kod nedijabetičara 64.29±11.48 godina. Najmlađi ispitanik sa dijabetes melitusom tip 2 i akutnim infarktom miokarda imao je 42 godine, a bez DM tip 2 37 godina. Najstariji ispitanik sa dijabetesom i akutnim infarktom miokarda imao je 82 godine, a bez DM tip 2 88 godina. Najveći broj dijabetičara sa akutnim infarktom miokarda (40.5%) je u grupi 70-79 godina, dok kod onih koji nisu imali dijabetes (30.5%) je u grupi od 60-69 godina. Trajanje dijabetes melitusa je najčešće 1-5 godina (25.7% bolesnika). Karakteristično je da se kod 13.5% bolesnika sa akutnim infarktom miokarda u vreme infarkta postavila dijagnoza DM tip 2. Najveći broj ispitanika sa DM tip 2 (58.1%) je lečen oralnim hipoglikemicima. Pozitivna anamneza za postojanje ranog kardiovaskularnog oboljenja je značajno češća kod dijabetičara (68.9%), dok je proporcija aktivnih pušača značajno manja kod dijabetičara (31.0%). Hipertenzija je bila značajno češće prisutna kod dijabetičara (71.6%). Srčana insuficijencija je statistički značajno češće bila prisutnija u grupi ispitanika sa akutnim infarktom miokarda i DM tip 2. Smrtni ishod je češće registrovan u grupi ispitanika sa DM tip 2 i iznosio je 21.6%, u odnosu na grupu ispitanika bez dijabetes melitusa (7.0%). *Acta Medica Medianae 2013;52(3):5-11.*

Ključne reči: *dijabetes mellitus, akutni infarkt miokarda, mortalitet, morbiditet*