

# Frequency of Cardiovascular Disease in Diabetic Patients

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## ORIGINAL PAPER

### SUMMARY

Introduction: Diabetes mellitus (DM) presents the most frequent metabolic disorder and most common endocrine disease. Chronic complication of diabetes is caused by bad regulation of disease for a longer time, duration of the disease and other risk factors (such as atherosclerosis). Aim: The aim of this research was to establish frequency of visiting diabetic and non diabetic patients with cardiovascular diseases in the emergency room. Subjects and methods: We were observing diabetic and non diabetic patients in the period of two years with focus on their reasons for coming in to the emergency room. Patients were separated in groups by ECG results. Results: There is a significant difference in reasons for visiting the emergency room between diabetic and non diabetic patients with cardiovascular disease. Conclusion: With this research we showed that diabetic patients with cardiovascular diseases are more often visiting the emergency room than non diabetic patients.

**Keywords:** diabetic patients, emergency room, cardiovascular diseases, visit frequency.

## 1. INTRODUCTION

Diabetes mellitus (DM) with its late complications represent a major problem as to the patient, also to the team doctor who cares about its health, mostly diabetologist, family members, and even society as a whole, due to the impairment of work ability and disability, which carry the late complications. Unregulated diabetes mellitus and duration of illness are risk factors for the occurrence of late complications (1,2,3).

The essence of the late complications of diabetes is a progressive narrowing of lumen of small and large blood vessels that lead to ischemia of the major blood vessels, diabetic macroangiopathy, which affecting blood vessels of the heart, brain and limbs, and microangiopathy diabetic changes that affect the blood vessels of the eye, kidney and nerves. Ischemia implies a lack of oxygen due to inadequate perfusion, which occurs due to imbalance between the demand for oxygen and oxygen in blood flow. The most common cause of myocardial ischemia is atherosclerotic changes in epicardiac coronary artery disease. By reducing the lumen of coronary arteries, atherosclerosis reduces myocardial perfusion due in resting phase and limits the corresponding increase in perfusion when the demands for greater flow increase in effort or excitement. Coronary blood flow may be limited due to spasm, blood clot, and more rarely

to coronary embolism. Often there are two or more factors such as ischemia increased need due to hypertrophy of the left ventricle of hypertension and reduction of oxygen supply due to atherosclerosis and severe anemia (4,5,6).

Acute myocardial infarction commonly occurs due to sudden reduction of coronary flow as a result of thrombus caused occlusion of the coronary artery that was previously atherosclerotic narrowed. In most cases heart attack occurs when atherosclerotic plaque make fissure, rupture or create ulceration and when local or systemic conditions stimulate thrombogenesis, and the rupture site created thrombus, which close the coronary artery (6). Electrocardiography (ECG) is a graphical record of electric potential created by the heart. ECG leads show the actual difference in potential between the electrodes and may show acute ischemia, lesion, and the old change—myocardial necrosis. Spectrum of clinical picture that includes unstable angina, non-Q infarction, infarct with Q spike with one name is called acute coronary syndrome (6).

## 2. GOAL

The aim of our study was to determine the frequency of occurrence in diabetic patients compared to nondiabetics, at the Department for emergency medical assistance due to coronary syndrome.

## 1. MATERIAL AND METHODS

Based on data from all protocols from 1 January 2005 until 31 December 2006 we have verified all the patients, who came to the emergency room medical care for any services other than those that arose in the pediatric service. We sort the patients as diabetics and nondiabetics who had symptoms of coronary syndrome, and after recording ECG and classified those with normal and pathological ECG. In particular, we followed patients who were reported in the Emergency room, especially patients who are treated on site.

Based on data of the Institute of Public Health is known to us the total number of inhabitants of Sarajevo Canton, as well as data on the number of diabetics. In 2005 in the Canton of Sarajevo there was 403 028 inhabitants, of which 9 810, or 2.43% of diabetics. In 2006 in the Canton of Sarajevo was 414 246 inhabitants, of which 10 727 or 2.58% of diabetics.

On site	2005		Diff	95% CI	Chi square	DF	Significance level
	DM	ND					
Normal ECG	892	815					
Pathological	727	524					
Total	1619	1339					
percent of pathological	44.90	39.13	5.77	2.196%-9.315%	9.763	1	Pro.0018

On site	2006		Diff	95% CI	Chi square	DF	Significance level
	DM	ND					
Normal ECG	463	803					
Pathological	473	602					
Total	936	1405					
percent of pathological	50.53	42.85	7.68%	3.556%-11.776%	13.035	1	Pro.0003

TABLES 2 and 2b. Statistical analysis of the ECG, patients treated on site in 2005 and 2006.

On site	2005 & 2006		Diff	95% CI	Chi square	DF	Significance level
	DM	ND					
Normal ECG	3681	3783					
Pathological	3237	2563					
Total	6918	6346					
percent of pathological	46.79	40.39	6.4	4.712%-8.802%	54.835	1	Pro.001

TABLE 3. All patients for both years-analysis of ECG

## 2. METHODOLOGY

The study was retrospective, since it included data for 2005 and 2006. The research has been used descriptive method and functional test. Technology of work was as follows:

Anamnesis data from protocols:

- data about diabetes
- podatak about the existence of late complications of diabetes (myocardial infarction)
- reason to come to ER (chest pain or choking)
- ECG recording: recording of ECG, on ECG machine in patients with acute coronary syndrome symptomatology

Based on the findings of ECG, we created a division in the normal and pathological ECG. On the basis of other diagnoses we classified patients as diabetics and nondiabetics. All the data we followed for months and years, and are statistically processed.

Ambulatory							
	2005		Diff	95% CI	Chi-square	DF	Significance level
	DM	ND					
Normal ECG	1247	1043					
Pathological	966	734					
Total	2213	1777					
percent of pathological	43.65	41.31	2.34	-0.748%-5.415%	2.112	1	Pro.0.1461

Ambulatory							
	2006		Diff	95% CI	Chi-square	DF	Significance level
	DM	ND					
Normal ECG	1079	1122					
Pathological	1071	703					
Total	2150	1825					
percent of pathological	49.81	38.52	11.29	8.201%-14.344%	50.460	1	Pro.0001

TABLES 1A and 1b. Statistical analysis of the ECG, patients from the ambulatory in 2005 and 2006.

## 3. RESULTS

Results are shown in tables and graphs.

Statistical analysis of ECG in 2006 in the emergency department found a statistically significant difference in the number of pathological ECG in 2006 of diabetics-DM compared to nondiabetics-ND.

Statistical analysis of ECG in 2005 and 2006 done on the site reported a statistically significant difference in the number of pathological ECG - in 2005 and 2006 year between diabetics-DM compared to nondiabetics-ND.

Total number of pathological ECG was significantly higher in diabetics compared to nondiabetics in 2005 and 2006 both in ambulances and on site.

## 4. DISCUSSION

In Framingham study that lasted for 35 years and followed 5209 respondents, aged from 30 to 62 years, which identified risk factors for developing coronary heart disease, it is proved that diabetics are two times more likely to get cardiovascular disease compared to nondiabetics (7).

In the MRFIT study (Multiple Risk Factor Intervention) for 12 years are followed 5000 men with diabetes type 2, who had diabetes with another risk factor, hypertension, hyperlipidaemia or smoking and came to the conclusion that those with diabetes with one risk factor have three times higher mortality than compared group of nondiabetics with multiple risk factors (8).

Coutinho and colleagues investigated the relationship of hyperglycemia and cardiovascular disease in 95783 patients.

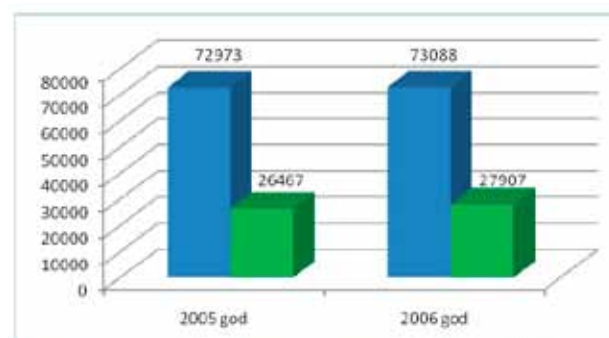


FIGURE 1. Total number of patients examined in the ambulatory and on site in 2005 and 2006 (BLUE - ambulatory exam; GREEN - field exam)

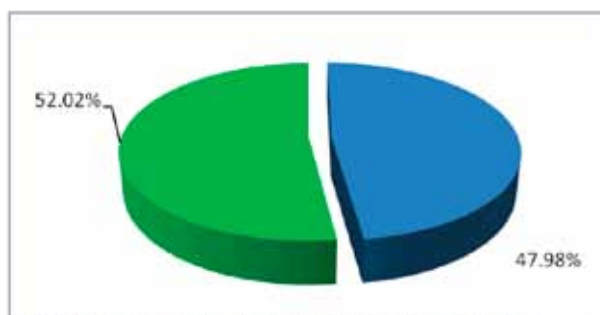


FIGURE 2.A. Shows the percentage of patients (with and without diabetes) examined in the central ambulatory and on site in 2005.

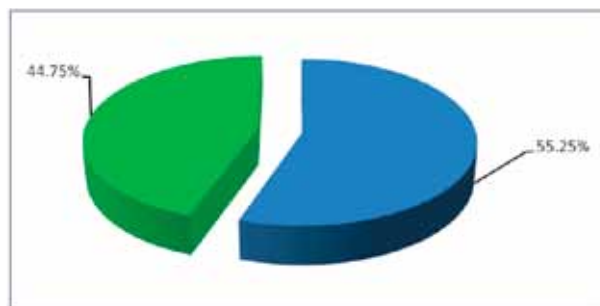


FIGURE 2.B. Shows the percentage of patients (with and without diabetes) examined in the central ambulatory and on site in 2006.

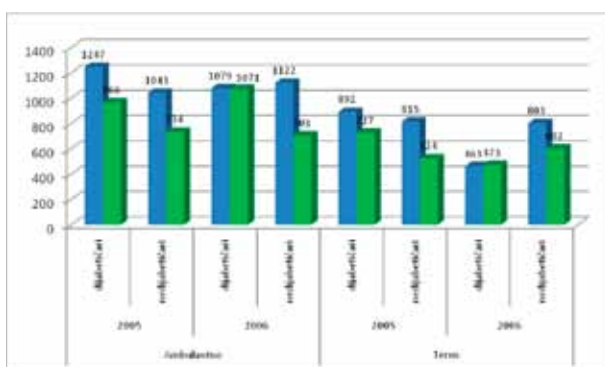


FIGURE 3. Shows the number of ECG (BLUE - normal ECG; GREEN - pathological ECG) examination in diabetics and nondiabetics examined in the central ambulatory and on site in 2005 and 2006.

The study lasted for 12.4 years, where was recorded 3 707 cardiovascular events, and they compared glycaemia after fast and 2 hours postprandial (9).

Haffner and associates performed studio with 1 373 patients nondiabetics and 1059 patients with diabetes, following them for seven years, and concluded that diabetics have a much higher risk of myocardial infarction in relation to nondiabetics (10).

CHD Equivalent prospective study, which lasted for eighteen years in Finland, which followed the risk of coronary heart disease in diabetics and nondiabetics demonstrated that diabetes is a major risk of coronary heart disease, especially among women (11).

UK Prospective Diabetes Study Group published in 1998 results of the UKPDS study, which followed and treated blood pressure disorders with ACE inhibitors, along with monitoring of glycemic control and late complications. They concluded that the benefit of aspirin as primary prevention in hypertensive diabetics reduced by 2.5 times risk of myocardial infarction in 1000 patients per year (12).

In our work we have shown that diabetics from the Sarajevo Canton much often seeks doctor assistance at the Institute for emergency medical assistance, in ambulances, and on site due to coronary syndromes in relation to nondiabetics. There is a significant difference in the number of services provided to diabetics, but we must point out that some diabetics during one month often seeks emergency medical assistance more than once, but in relation to the percentage of diabetics in the Canton of 2.50% is a large number of services.

## 5. CONCLUSION

Based on our investigations we have come to the following conclusions:

- The increasing number of total examinations in ambulances, and on site in 2006 compared to 2005.
- The increasing number of examinations related to coronary syndrome, in ambulances and on site in 2006 compared to 2005.
- From the total number of ECG examinations, more than half of it was pathological.
- A larger number of pathological ECG was recorded in diabetics compared to nondiabetics.
- Coronary syndrome is more common in diabetics than nondiabetics.

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