

Prevalence of Cardiovascular Risk Factors Among Patients with Acute Myocardial Infarction and New Left Bundle Branch Block in North East Romania

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The prevalence of coronary artery disease, a major contributor to cardiovascular disease, is related to the increasing prevalence of modifiable risk factors. The aim of our study was to determine the risk factors for acute myocardial infarction among patients from North East Romania. We evaluated patients with acute myocardial infarction with or without left bundle-branch block, hospitalized in Georgescu Institute of Cardiovascular Disease Iasi for three years. The results of our study show that patients with acute myocardial infarction and new left bundle branch block have a more recent history of hypertension, dyslipidemia and smoker status compared to patients without left bundle branch block. Nearly two thirds of patients included in the study (65.47%) had an elevated cholesterol level, with a high prevalence of dyslipidemia in patients with myocardial infarction and new left bundle branch block. More than two-thirds of patients with new left bundle branch block had a history of arterial hypertension (69.04% vs. 50.0%, $p = 0.354$), especially grade 2 hypertension, with a slight predominance in those with new left bundle branch block, but without statistically significant differences between the two groups (45.23% vs. 30.95%, $p = 0.358$). Early identification of modifiable risk factors is vital to set the strategy for prevention and special attention must be paid to smoking. An adequate control of cardiovascular risk factors would result in a significant reduction of coronary events in patients from the North East part of Romania.

Keywords: risk factors, acute myocardial infarction, clinical study, coronary events.

Cardiovascular disease (CVD) is currently the most common cause of morbidity and mortality worldwide, with the highest rate in Eastern Europe (58%) compared to developed countries, where cardiovascular disease mortality decreased to 38% [1]. Epidemiologic studies have played an important role in elucidating the factors that predispose to cardiovascular disease and highlighting opportunities for prevention [2].

Left bundle branch block (LBBB) is generally associated with a more reserved prognosis as compared with the normal intraventricular conduction. It may represent the first manifestation of a serious cardiovascular pathology and may cause a left ventricular systolic dysfunction [3]. An extremely important element for the practitioner physician is the management of a patient with angina and new left bundle branch block.

The prevalence of LBBB in patients presenting in the emergency compartment with suspected acute myocardial infarction is low and ranges from 1 to 9% [4]. Less than half of them are diagnosed with an acute coronary syndrome and/ or an increase in myocardial cytolysis enzymes [5, 6]. This may explain why patients with acute myocardial infarction and left bundle branch block often receive inadequate, late and less aggressive treatment compared to patients with acute myocardial infarction, although the first have a higher mortality and also an increased incidence of heart failure [7, 8].

All current guidelines on the prevention of CVD in clinical practice recommend the assessment of total CVD risk since atherosclerosis is usually the product of a number of risk factors [1,9]. Prevention of CVD in an individual should be adapted to his or her total cardiovascular risk: the higher the risk, the more intense the action should be [10].

Experimental part

The aim of this study was to determine the risk factors for acute myocardial infarction (AMI) among patients presenting with acute myocardial infarction and new LBBB in North East Romania.

We evaluated patients with acute myocardial infarction with or without left bundle-branch block, hospitalized in Georgescu Institute of Cardiovascular Disease Iasi for three years. Between January 2011 to December 2013 in our clinic were hospitalized 387 patients with acute myocardial infarction and one coronary lesion and a sum-total of 82 patients were included in the study. According to the presence of new left bundle branch block, they were divided into two groups:

- 42 patients with acute myocardial infarction and new left bundle branch block;
- 42 patients with acute myocardial infarction without left bundle branch block.

All subjects were reviewed for cardiac history and risk factors, hypertension, diabetes mellitus, hyperlipidemia, smoking and history of coronary artery disease.

After the physical examination, parameters such as systolic and diastolic blood pressure, heart rate, height and weight were noted.

For the evaluation of obesity, we calculated the Body Mass Index (BMI) and then the patients were classified in one of the following categories:

- BMI = 18.5 - 24.99 kg / m² - normoponderal;
- BMI = 25 - 29.99 kg / m² - overweight;
- BMI = 30 - 34.99 kg / m² - grade 1 obesity;
- BMI = 35 - 39.99 kg / m² - grade 2 obesity;
- BMI > 40 kg / m² - grade 3 obesity.

Patients were considered diabetic if they had a history of diabetes, blood glucose values ≥ 126 mg / dL, or were treated with oral antidiabetics or insulin.

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Statistical analyses were performed using the Statistical Program for Social Sciences (version 17.0 SPSS Inc.). Data were labeled as nominal or quantitative variables. Nominal variables were described using frequencies. Quantitative variables were tested for normality of distribution by means of Kolmogorov-Smirnov test and were described by median and percentiles or by mean and standard deviation, whenever the case. The frequencies of nominal variables were compared with a chi-square test. Differences in the means and medians or between groups were analyzed using t-test or Mann-Whitney test when appropriate. Comparisons were made among patients with acute myocardial infarction and new left bundle branch block and those with acute myocardial infarction without left bundle branch block. Institutional review board approval was obtained for data collection, follow-up and data analysis.

Results and discussions

Age

Patients enrolled in the study were between 40 and 83 years old, with a mean age of 62 ± 10.35 years. However, analyzing these patients separately in the two groups, we found that the mean age of patients with acute myocardial infarction and new LBBB was 67 ± 9.31 years compared to 58 ± 10.39 years in the control group (fig. 1). Thus, patients with acute myocardial infarction and new LBBB had a higher mean age at the onset of the acute coronary event compared to controls, the difference being statistically significant ($p = 0.007$). Analyzing the distribution of patients by age, we found that more than half (54.76% and 23 patients) of the patients with acute myocardial infarction LBBB had less than 60 years at the onset of the acute coronary event and were male.

Age is an important risk factor for CVD and especially for the coronary artery disease. Prevalence of CVD increases with age both in women and men, but coronary events occur 10 years later in women compared to men. Third Report of the National Cholesterol Education Program (NCEP) Expert Panel on detection, evaluation and treatment of high blood cholesterol in adults (Adult Treatment Panel III) final report, considers the age of 55 years and over a risk factor for women equivalent to 45 years for men [11]. However, the greatest difference in coronary mortality is seen in women in whom the mortality due to acute myocardial infarction is double in male population. On the contrary, no more differences are observed at older ages between women's and men's mortality rates [11].

More recent data show that myocardial infarction increased in women between the ages of 35 and 54 years, in contrast to the decrease in appearance in men of similar age [12]. This trend can highlight a multitude of factors, such as: awareness of disease among women, unhealthy

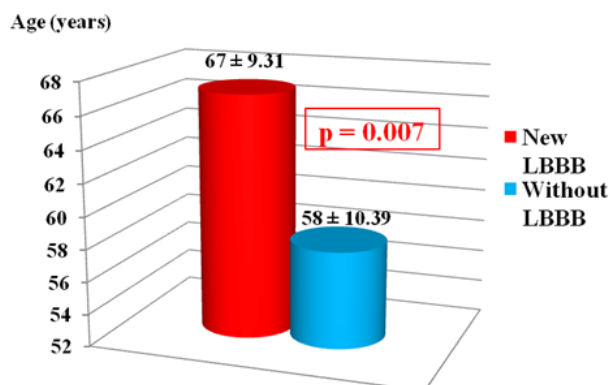


Fig.1. Mean age of patients included in the study

lifestyle changes and also differences in therapeutic approach.

Smoking

Smoking is one of the most important risk factor for coronary artery disease. In our study, we noticed that more than half of the patients without left bundle branch block were smokers or ex-smokers (57.14%), compared to 35.71% of those with left bundle branch block, but without a statistically significant difference between the two groups ($p = 0.076$) (fig.2).

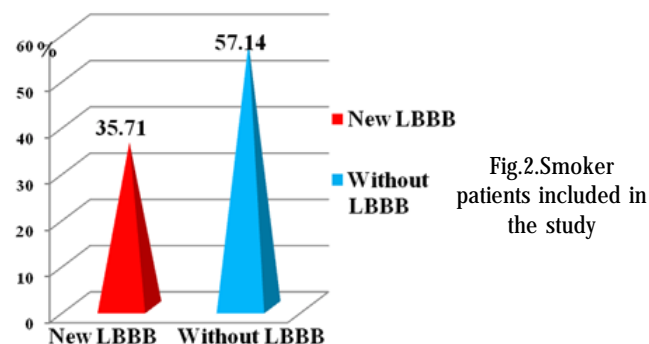


Fig.2. Smoker patients included in the study

Smoking increases the sympathetic tone, the blood pressure and reduces oxygen supply to myocardium. In addition to accelerating the atherosclerotic process, long-term smoking enhances the oxidation of low density lipoproteins and limits the endothelium vasodilatation. Smoking can cause spontaneous platelet aggregation, increases adhesion of monocytes to cellular endothelium and alters the secretion of antithrombotic and fibrinolytic factors released by endothelium. Smoking may have worse effects on women. Thus, among the smoking female, the age of death occurs about 14.5 years earlier and in the case of men, smokers die 13.2 years earlier than non-smokers [13,14]. It is estimated that smoking is responsible for about 10% of all cardiovascular deaths [15]. Cessation of smoking is the most important intervention in preventive cardiology. After an acute coronary event, quitting smoking reduces cardiovascular mortality by 36% [15].

Hypertension

More than two-thirds of patients with new LBBB had a history of arterial hypertension (69.04% vs. 50.0%, $p = 0.354$). Depending on the degree of hypertension, we observed that most of the patients from both groups had grade 2 hypertension with a slight predominance in those with new LBBB, but without statistically significant differences between the two groups (45.23% vs. 30.95%, $p = 0.358$) (fig. 3).

Starting at an arterial blood pressure of 115/75 mmHg, the risk of cardiovascular disease doubles for each increase in blood pressure by 20/10 mmHg. Worldwide, the

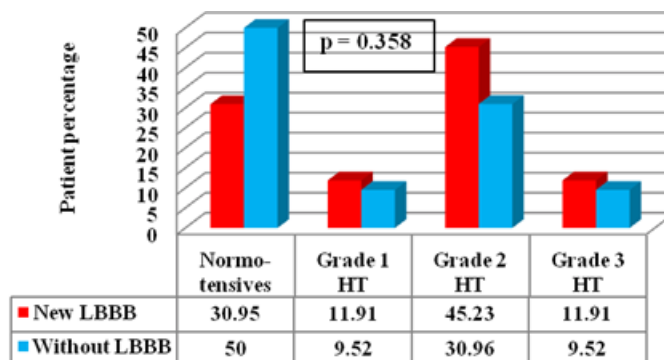


Fig.3. The hypertension (HT) status of patients included in the study

incidence of hypertension was around 40% in 2008. It was also found that hypertension is higher in poorly developed and developing countries (40%) compared to developed countries (35%) [16]. The presence of hypertension is higher in women but varies with age and it is more common in men younger than 45 years. Between 45 and 64 years, the presence of hypertension is similar in both sexes, and after 65 years it appears especially in female population.

Data from NHANES study between 1999 and 2004 showed that in women hypertension is more commonly treated but reaching the therapeutic target is less. Although the hypertension is associated with the development of heart failure both in men and women, the impact among women is higher. The risk of occurrence of heart failure in hypertensive versus normotensive patients is double in men and three times higher in women. In STEMI, women compared to men have a more frequently history of hypertension [16].

Dyslipidemia

Nearly two thirds of patients included in the study (65.47%) had an elevated cholesterol level, with a high prevalence of dyslipidemia in patients with myocardial infarction and new LBBB. Half of the patients in the control group had normal cholesterol levels, compared with only 19.04% in the other group, the differences being statistically significant ($p = 0.003$). Analyzing the total cholesterol values in the two groups, we observed a mean cholesterol level of 234.36 mg/dL vs. 212.23 mg/dL for patients in the control group. There were 4 patients with a total cholesterol value ≥ 300 mg/dL. We analyzed the high density lipoproteins (HDL) cholesterol levels according to the local laboratory reference values for the two sexes, the limit values being between 35-90 mg/dL for male and between 42-98 mg/dL for female. A surprising result is that a relatively small but equal number of patients in both groups had protective HDL cholesterol values, only 4 patients in each group. There were no statistically significant differences ($p = 0.250$) between low density lipoproteins (LDL) cholesterol levels, nearly 40% of patients having elevated levels of this parameter. The mean LDL cholesterol value was 138.63 mg/dL. More than half (52.38%) of the patients with left bundle branch block had elevated triglyceride levels, compared to 40.47% in the control group. We also noticed that 9 patients had triglyceride levels above 200 mg/dL (fig.4).

There is a strong and positive correlation between the total cholesterol and LDL cholesterol level and the cardiovascular risk, both in men and women, with and without cardiovascular disease. The metaanalyses of numerous trials have highlighted the clear relationship between the decrease of LDL cholesterol level and

reduction of cardiovascular disease. Each reduction of 10 mmol/L induces a 20-25% decrease in cardiovascular mortality and non-fatal myocardial infarction. Recent studies have confirmed that lowering the LDL cholesterol level to approximately 70 mg/dL is associated with the lowest risk of recurrence of cardiovascular events [17].

Diabetes mellitus

Most patients included in the study had no history of diabetes. However, several patients with acute myocardial infarction and new left bundle branch block had this metabolic disorder, but with no statistically significant differences between the two groups (28.57% vs. 21.42%, $p = 0.183$). All diabetic patients included in the study had type 2 diabetes mellitus and most of them received oral antidiabetic agents.

Patients with diabetes mellitus have two to eight times higher risk of developing cardiovascular events than non-diabetics of the same age, and 75% of the deaths recorded at diabetic patients are caused by cardiovascular events. Women with diabetes have a higher cardiovascular risk than men: at women, diabetes increases the cardiovascular risk three to seven times and only two to three times in men [18]. Furthermore, the risk of fatal coronary events is 3.5 times higher in women with diabetes versus those without diabetes [19].

Although there is a clear evidence of relationship between elevated blood glucose levels and cardiovascular events, there is no evidence about the glycemic target in order to reduce the frequency of cardiovascular events [20]. For cardiovascular prevention, a value of HbA1c below 7.0% is currently recommended.

Obesity

We noticed a preponderance of overweight status in patients included in the study, but without statistically significant differences (54.76% vs. 40.47%, $p = 0.126$). Analyzing patient distribution by body mass index, we noticed that none of the patients with new left bundle branch block had grade 2 or 3 obesity, most of them being normoponderal and overweight (fig.5).

Although both obesity and sedentarism have contributed independently to coronary artery disease, obesity confers a higher risk than physical inactivity over a 20-year period.

The incidence of obesity is rising in developed and developing countries where it is more than double as compared to the underdeveloped countries [21,22].

In developed countries, obesity is associated with low economic status. In contrast, in the developing countries there is a positive relationship between economic status and obesity, both in women, men and children. Even a modest 5-10% body weight reduction has multiple beneficial effects: lowers the arterial blood pressure,

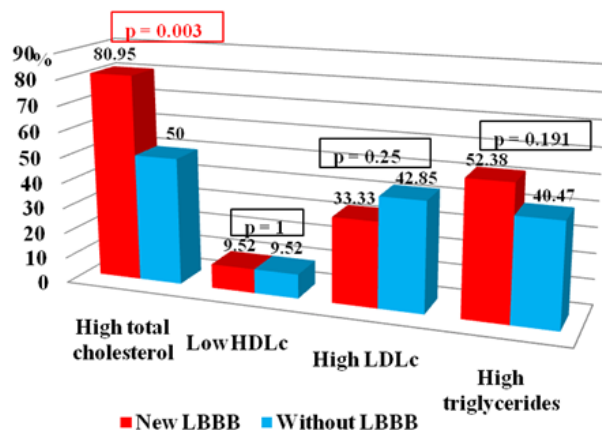


Fig.4. Lipid status of patients included in the study

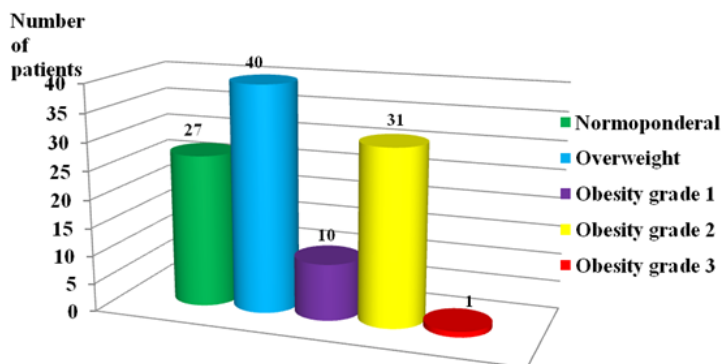


Fig.5. Weighted status of patients included in the study

improves lipid profile, glucose tolerance and insulin sensitivity and also improves sleep apnea [23-25].

Interestingly, overweight people defined by a body mass index between 25 and 30 Kg/m² have a lower cardiovascular and general mortality than those with normal weight.

Conclusions

Knowing the risk factors that contribute to the development of coronary artery disease plays an important role in the prevention of an acute coronary syndrome. The results of our study show that patients with acute myocardial infarction and new left bundle branch block have a more recent history of hypertension, dyslipidemia and smoker status compared to patients without left bundle branch block. Early identification of modifiable risk factors is vital to set the strategy for prevention and special attention must be paid to smoking, particularly in young individuals. An adequate control of these cardiovascular risk factors would result in a significant reduction of coronary events in patients from the North East part of Romania.

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