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ORIGINAL ARTICLE

Ejection fraction and blood pressure variabilities in acute myocardial infarction patients and its relationship with serum electrolytes

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ABSTRACT

Background: In patients with acute myocardial infarction, age, BMI, blood pressure, and electrolytes all influence ejection fraction improvement following percutaneous coronary intervention (PCI) . Many studies have looked into the long-term consequences of these factors, but none have found evidence that they have an impact on PCI efficacy.
Aim: To evaluate the effectiveness of percutaneous coronary intervention (PCI) and predict prognosis in AMI patients by measuring blood pressure and serum electrolytes.
Methods: It is a study that will last for a lengthy period of time. Before and after angioplasty, the EF of 40 patients with acute myocardial infarction (AMI) was measured in this research. The data were analysed using the SPSS 23 statistical package.
Results: The effects of age (P = 0.34) and BMI (P = 0.49) on EF improvement are not well understood. The difference between those with initial high blood pressure and those without (P = 0.12), although not significantly different. Although serum calcium levels (P = 0.74) were normal, elevated sodium and potassium levels (P = 0.05) were shown to be associated with lower EF improvement. The concentrations of sodium and potassium in the blood were found to have a P value of 0.07.
Conclusion: After PCI, patients with AMI have a better prognosis if they are older and have a normal BMI; nonetheless, greater blood sodium and potassium levels have a worse prognosis.
Key words: Acute Myocardial Infarction; Percutaneous Intervention; Ejection Fraction; Serum Electrolytes

INTRODUCTION

It is necessary to have efficient heart pumping. For example, increasing muscular activity necessitates a greater consumption of oxygen than during rest. The ejection fraction (EF) is a measure of the efficiency of the heart. Acute myocardial infarction occurs when the blood supply to a specific part of the heart is decreased or cut off completely (AMI). Diabetes, high blood pressure, obesity, and smoking are all associated with a high BMI (Body Mass Index). Patients with acute myocardial infarction (AMI) who have constricted coronary arteries are treated with PCI. PCI is a procedure that can be used instead of CABG. Angioplasty is a procedure that increases blood flow in the coronary arteries. Many individuals recover and become more productive as a result of their treatment.

Cardiovascular contractility is influenced by a number of factors. One important factor influencing cardiac contractility is the quantity of serum calcium in the blood. The strength of heart muscle contraction is determined by the interaction between myosin and actin. The concentration of calcium ions in cardiac myocytes has an effect on binding. It is released when the sympathetic nervous system is activated, and it is responsible for the feeling of being high. All of the factors that can alter myocardial contractility include preload, afterload, and heart rate.

Patients with acute myocardial infarction typically have systemic hypotension. It has been suggested in certain research that hypotension at arrival to the hospital is a predictor of mortality in AMI patients. Despite the use of thrombolytic therapy, the mortality rate remains high. The efficacy of thrombolytic treatment may be altered by systemic blood pressure. According to certain study, pulse pressure may have an impact on the mortality of AMI patients. A recent study found that higher systolic, diastolic, and pulse pressures were associated with worse outcomes in individuals with acute myocardial infarction. As a result, effective BP control is crucial in this population. The goal of this study was to evaluate the efficiency of percutaneous coronary intervention (PCI) and to predict prognosis in patients with acute MI.

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MATERIALS AND METHODS

The participants in this study were 40 AMI patients. Every single one of them was a man. This was a longitudinal study in which an intervention was implemented. Individuals with anaemia, valvular heart disease, myocarditis, and cardiac tamponade were excluded from the research, as were patients with endocrine illnesses such as thyroid dysfunction, nutritional deficiencies such as Vitamin B1 insufficiency, pericardial effusion, and atrial fibrillation. The patients gave their informed consent to participate in this experiment.
This was done as soon as the patient was admitted to the cardiology emergency department. During the general examination, the patient's blood pressure was measured (sphygmomanometer). The EF of the heart was assessed by echocardiography within 5–7 hours of the diagnosis of AMI. Following coronary angiography, patients were treated with coronary angioplasty (PCI). Following angioplasty, ECHO performed an evaluation of EF. The EF before and after PCI were compared to see which was better.

Patients who have had relief from chest pain and discomfort, as well as an increase in EF from baseline, have shown improvement in two criteria.

RESULTS

A total of 40 AMI male patients participated in the study. The standard deviation is 9.18 years, which is a large number. All of the patients' information was gathered and evaluated.

Table shows that 69.7% of patients were above the age of 52, and that EF improvement declines with age (P=0.36), as demonstrated in the study. Following PCI, only 72.2% of patients older than 52 years showed improvement, compared to 84.9% of patients younger than 52 years who showed improvement after PCI. Approximately 61.5% of the patients were overweight or obese, compared to 26.6% who had a normal BMI and a small number who were underweight (6.9%). P=0.51 indicates that the improvement in EF diminishes with increasing BMI. Patients with a BMI of 24 kg/m2 showed less improvement than those with a normal BMI or a BMI of 18kg/m2. All four underweight people saw an increase in their EF. Patients with normal systolic blood pressure (SBP) account for 52% of all patients; 38.6% have high

SBP; and 9.4% have low SBP. The diastolic blood pressure is normal. In patients with normal SBP, over 80% saw an improvement in EF following PCI, compared to 81% in patients with low SBP and 74.4% in patients with high SBP. Patients with abnormal SBP showed reduced improvement in EF (P=0.91 compared to those with normal SBP). In this study, 80.2% of patients had a normal pulse rate, while 16.1% had tachycardia and the other patients had bradycardia (6.2%). Treatment improved 79.6% of patients with normal pulse rates; patients with bradycardia improved 32.8%, and those with hypertension improved 88.6% of the patients treated with it. As a result, boosting PR has a positive effect on EF (P=0.14). Normal calcium levels were found in 57.7% of patients, hypocalcemia was found in 43.27% of patients, and hypercalcemia was found in only 1.4% of patients. After PCI, the EF of patients with normal blood calcium levels increased by 74.7%, whereas the EF of patients with hypocalcemia improved by 80.3%. Only one patient experienced hypercalcemia, and his ejection fraction improved as a result. Patients with normal blood calcium levels experienced reduced improvement in EF (P = 0.72).

Table 1: characteristics and Blood parameters of patients categorized by improvement in EF after coronary angioplasty

Parameters	Mean±SD	*P*-value
BMI* (kg/m^2)	18.04 ± 2.04	0.49
Age group (years)	40.56± 8.72	0.40
SBP (mmHg)	140± 5.42	0.88
PR (/min)	50± 8.92	0.12
Na+ (mEq/lt)	120±6.73	0.05
K+ (mEq/lt)	3.01±0.04	0.04
Ca++ (mEq/lt)	4.21±0.06	0.74

DISCUSSION

Our exploratory work revealed that the factors tested have an influence on EF; however, only serum sodium and potassium levels were found to be statistically significant (P = 0.06) in our study. According to one study, those who have high blood pressure had a poor prognosis. In our study, people with hypotensive or hypertensive blood pressure improved EF somewhat less than those with normal blood pressure (P = 0.91). Thus, results are ambiguous in relation to BP. In the group as a whole, the improvement in EF increases with increasing PR (P = 0.14). Tachycardia can therefore have a modestly favourable effect on the enhancement of EF.

The consumption of sodium elevates blood pressure. This increasing blood pressure placed more strain on the arterial wall, resulting in decreased flow. As a result, the serum sodium level may have an indirect effect on PCI results through altering blood pressure. Increasing the serum sodium level has a negative effect on improvement (P = 0.05). Blood pressure is regulated by the amount of potassium in the blood. Cardiac rhythm issues can be caused by elevated potassium levels. According to our findings, raising serum potassium level has a negative effect on EF improvement (P = 0.05).

Serum calcium has long been recognised as having a role in the physiology of the cardiovascular system. A proper blood calcium level is required for normal myocardial contractility. The patients with normal serum calcium levels showed less improvement than the patients with abnormal serum calcium levels, in contrast to previous research findings.

Age has a detrimental influence on the result of coronary angioplasty, according to the data, despite the fact that the difference is not statistically significant (P = 0.38). After 50 years, the cardiac index continues to decline steadily. In a number of studies, it has been demonstrated that older AMI patients who receive conservative therapy had a higher mortality rate than younger AMI patients. According to early study, AMI patients above the age of 40 saw reduced improvement following PCI.

Those who are overweight or obese have a bad prognosis after having heart surgery. P = 0.52 indicates that the improvement in EF diminishes with increasing BMI. Surprisingly, all four underweight people had an improvement in their ejection fraction. we didn't evaluate parathyroid hormone or vitamin D levels, we couldn't draw any more conclusions on the relationship between blood calcium and EF improvement. It is not possible to exclude out confounding factors such as primary and secondary hyperparathyroidism. Second, we only examined serum electrolytes in individuals who were admitted to the hospital as a result of an emergency. Third, the sample size is insufficient to make an accurate prediction of the outcome. A hospital study also runs the risk of sample selection bias, which is problematic.

CONCLUSION

Increasing blood sodium and potassium levels are related with poor prognosis, while decreasing age and maintaining BMI are associated with good prognosis in AMI patients following PCI.

Conflict of interest: Nil

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