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STUDY OF THE VARIABILITY OF SOME ENZYMATIC PARAMETERS IN HEART DISEASES

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Kay words: *enzymatic parameters, heart disease, degree of damage*

INTRODUCTION

Statistics show that the number of cardiovascular patients increases with age. In the first years of childhood, congenital heart diseases are encountered due to the poor development of the circulatory system in the embryo. Some heart diseases allow a long and normal life, others being serious are incompatible with life. Cardiovascular diseases of rheumatic origin occur in people over 30 years of age, with a more significant number of patients in the Nordic countries exposed to cold and humidity. Hypertensive disease and atherosclerosis occur in the elderly and are closely related to each other, each accelerating the evolution of the other.

In addition to the three major causes of heart disease: rheumatic diseases, hypertensive disease and atherosclerosis, there are other diseases that cause serious disorders in the functioning of the circulatory system. Detected on time and systematically monitored, the heart patient will benefit from the best results and will be relieved of unnecessary suffering. Therefore, cardiovascular care is not only addressed to cardiopaths themselves but especially to healthy or potential cardiac patients by applying measures to prevent this disease. In our country, an organized campaign has started in recent years, in continuous development, regarding the prophylaxis of cardiovascular diseases.

MATERIALS AND METHODS

We studied the variability of some enzymes that have value in the context of diagnosing heart disease, along with other functional tests, namely: the group of aminotransferases (transaminases), alanine aminotransferase (ALT or GPT) and aspartate aminotransferase (AST or GOT), an enzyme in the trans-phosphatase group, CK (creatine kinase), creatine kinase-MB (CKMB, one of three forms - isoenzymes - of the enzyme creatine kinase (CK), and lactate dehydrogenase (LDH), an enzyme in the dehydrogenase group.

The research was performed on patients with heart disease, hospitalized in the cardiology departments of the Bacău County Emergency Hospital, during 2020. The working group included people with cardiovascular diseases such as hypertension (25 patients), heart failure (25 patients), valvulopathies (25 patients) and myocardial infarction (25 patients).

The ARHITECTPLUS c4000 automatic analyzer was used to determine the studied enzymatic parameters, the results being recorded automatically (fig. 1).

Fig. 1. The ARHITECTPLUS c4000 automatic analyzer

RESULTS AND DISCUSSIONS

From what can be seen from plate I, graph 1, in patients with **hypertension**, in the group studied women are in a slightly higher proportion (56%) than men (44%).

Decades of age between 51-80 years (plate I, graph 2) show more significant changes, either due to associated diseases, but especially the advanced age that allowed the onset of metabolic disorders. The most obvious changes in enzymatic parameters in patients with hypertension are observed especially in LDH (52%), GOT (24%), CKMB (24%), GPT and CK (16%). The LDH showed values higher than the upper limit of normal (plate 1, graphs 3, 4,5,6,7).

In the group with **heart failure** we have older patients, who during their lives, suffered several diseases, whose cumulative evolution determined the appearance of irreversible metabolic changes that negatively influenced the existing heart disease, as a major disease. Thus, the presence of metabolic diseases, such as diabetes, have influenced the cardiovascular rhythm by affecting the caliber of the vessels (their narrowing) and the metabolism of the heart muscle.

In **heart failure**, the percentage of women is double (68%) compared to that of men (32%) (plate 2, graph 8).

The disease occurs mainly in patients aged between 61-70 years (32%) and 81-90 years (24%) (plate 2, graph 9), and the enzymatic parameters appear pathologically altered in the case of LDH (59%), CKMB (36%), GOT (24%), GPT and CK (12%) (plate 2, graphs 10, 11,12,13,14).

In the group with **valvulopathies** we again find a double percentage of women (68%) compared to men (32%); (plate 3, graph 15).

The decades of age at which the most obvious changes are observed are between 71-80 years (44%) and slightly younger 51-60 years (24%); being a disease that usually occurs in people who are a little older (plate 3, chart 16). There are changes in the parameters (plate 3, graphs 17, 18, 19, 20, 21) to LDH (60%), CKMB (40%), GOT (32%), CK (20%), GPT (16%).

Graph 10 shows that in the myocardial infarction a higher share of the female gender (80%) to the detriment of the male gender (20%); (plate 4, graph 22).

Decades of age that have a higher weight (plate 4, graph 23), in people who have suffered a myocardial infarction are between 51-60 years (36%) and 71-80 years (43%), its appearance being the result external factors (stress, poor nutrition, etc.) as well as the presence of certain diseases (atherosclerosis).

The most obvious changes in parameters occur in LDH (60%) and CKMB (56%) enzyme with specificity in myocardial infarction; the rest of the enzymatic parameters show the following values: GOT (32%), GPT (17%) and CK (16%) (plate 4, graphs 24, 25, 26, 27, 28).

CONCLUSIONS

- Of the groups of heart diseases studied (hypertension, valvulopathies, heart failure and myocardial infarction) the least affected in terms of enzymes was hypertension.
- The major enzymatic damage was noticed in the group a myocardial infarction in the following order: LDH (60%), CKMB (56%), GOT (32%), and in the group with valvulopathies: LDH (60%), CKMB (40%) and GOT (32%).
- The explanation for the damage of these enzymes can be attributed to the disruption of the process of cellular expiration and oxidative phosphorylation, which take place in the mitochondria, where two of the enzymes involved are based (LDH and GOT).
- It is found that in all the heart diseases studied, women are slightly predominant in percentage, although statistics show a predominance of men.
- These heart conditions can also occur due to lifestyle, unhealthy diet, stress, depression, lack of physical activity, smoking, alcohol consumption, increased number of hours at work.

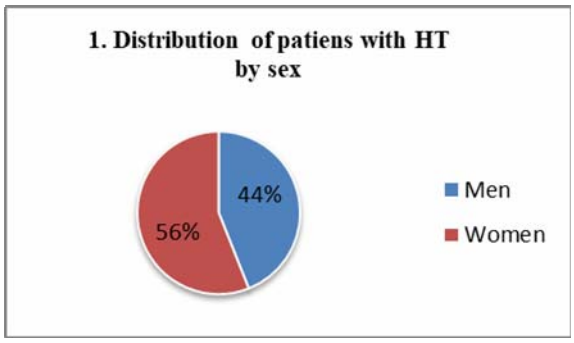
ABSTRACT

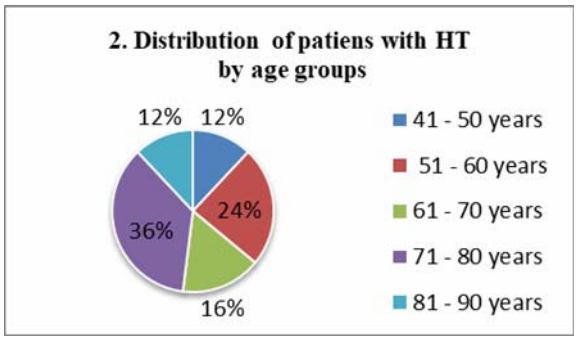
Enzymes with value in the context of diagnosing heart disease: the group of aminotransferases (transaminases), alanine aminotransferase (ALT or GPT) and aspartate aminotransferase (AST or GOT), an enzyme in the trans-phosphatase group, CK (creatine kinase), creatine kinase-MB (CKMB, one of three forms - isoenzymes - of the enzyme creatine kinase (CK), and lactate dehydrogenase (LDH), an enzyme in the dehydrogenase group.

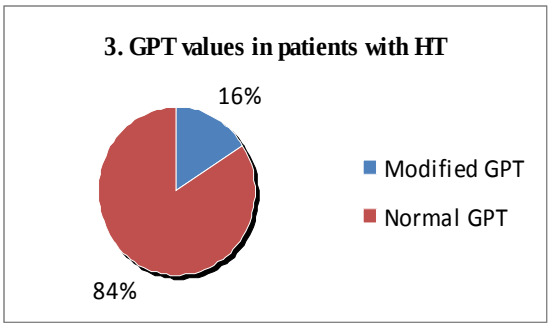
The major enzymatic damage was noticed in the group a myocardial infarction in the following order: LDH (60%), CKMB (56%), TGO (32%), and in the group with valvulopathies: LDH (60%), CKMB (40%) and TGO (32%).

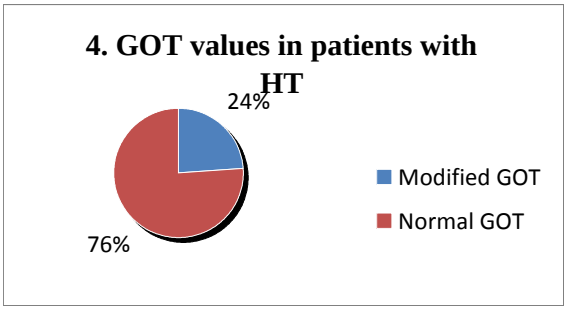
The algorithm of changes of these enzymes allows to determine the stage of pathogenesis of lesions of the circulatory organs, to evaluate the effectiveness of therapy for cardiovascular diseases, helps to propose a set of laboratory and instrumental tests for monitoring patients.

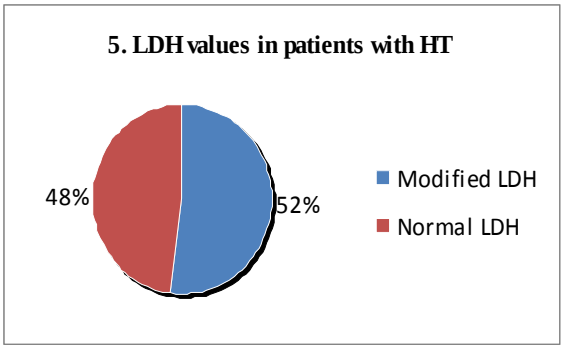
PLATE 1
Variability of enzymatic parameters in patients with **hypertension (HT)**

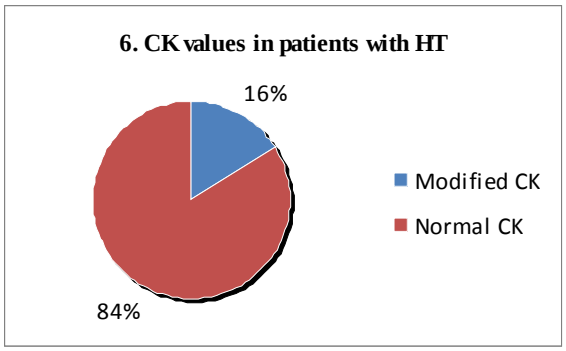












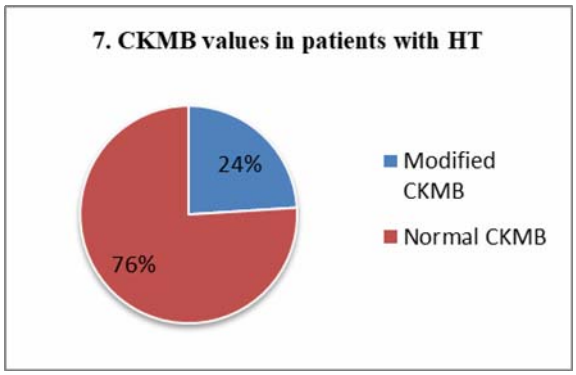
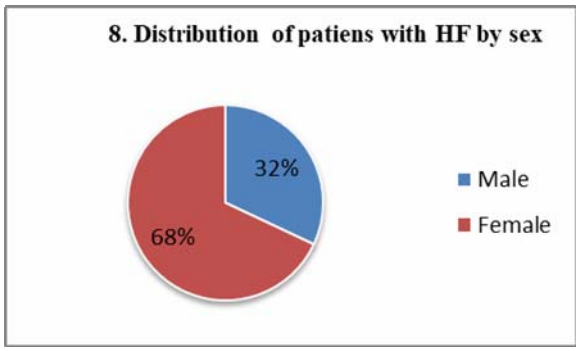
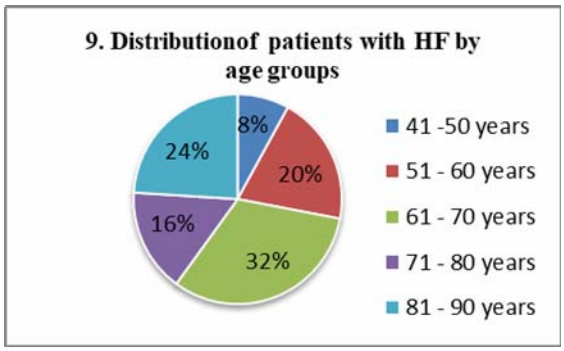
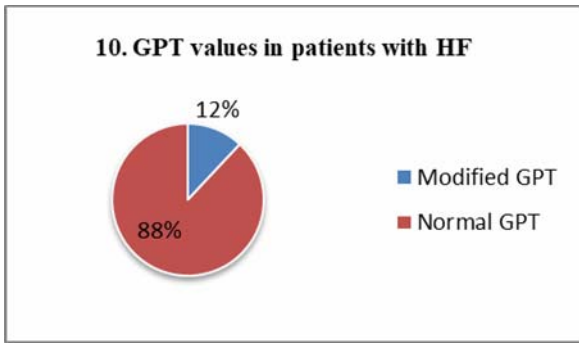
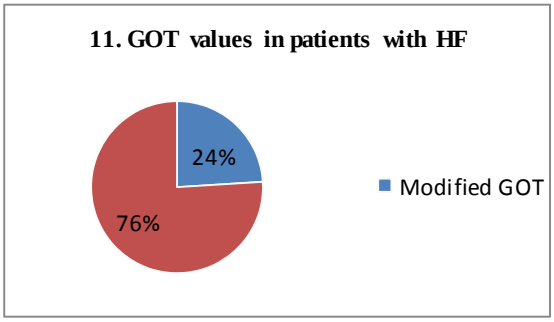


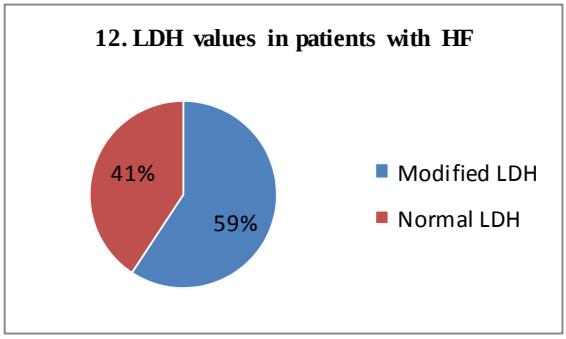
PLATE 2
Variability of enzymatic parameters in patients with **heart failure (HF)**

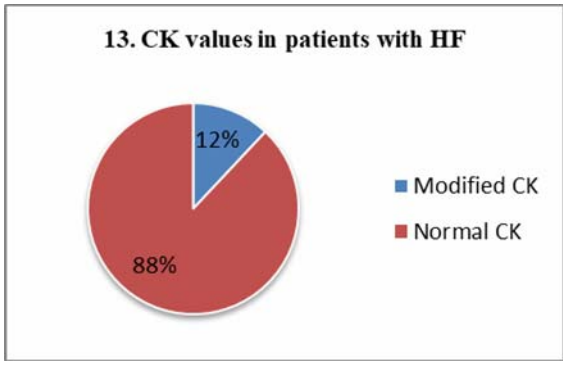












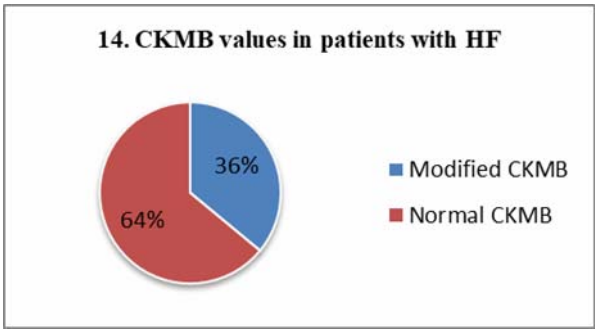
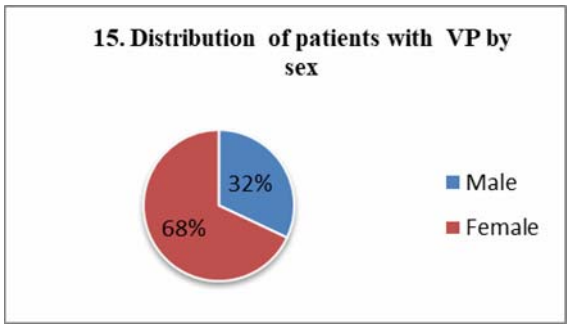
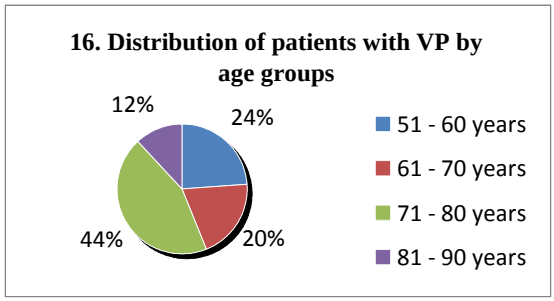
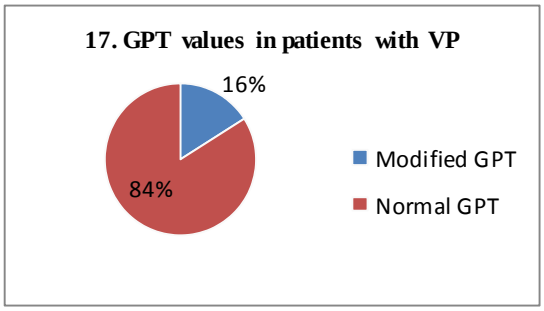
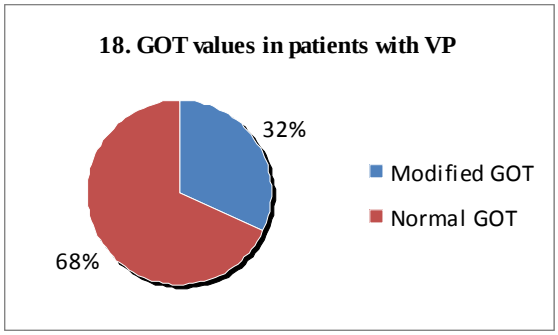


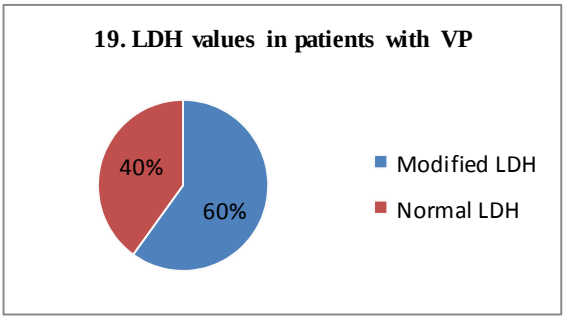
PLATE 3
Variability of enzymatic parameters in patients with **valvulopathy (VP)**

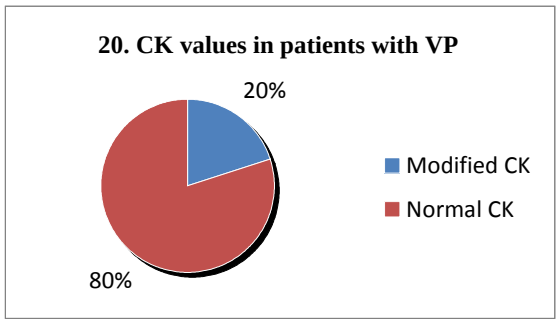












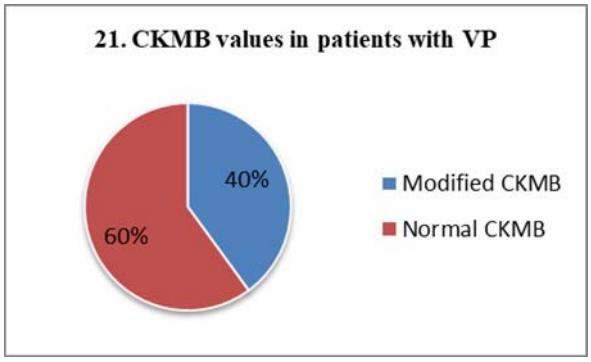
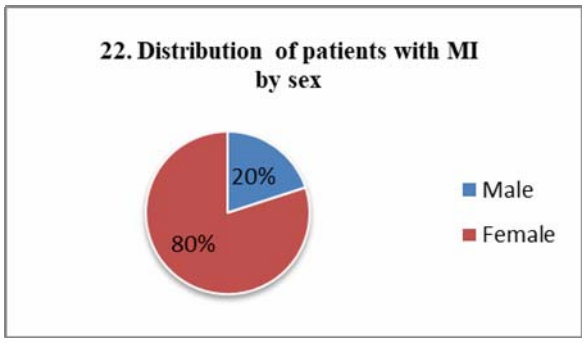
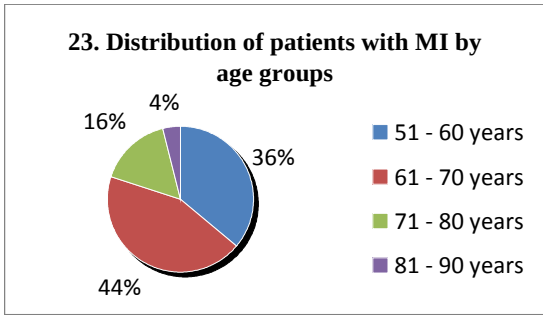
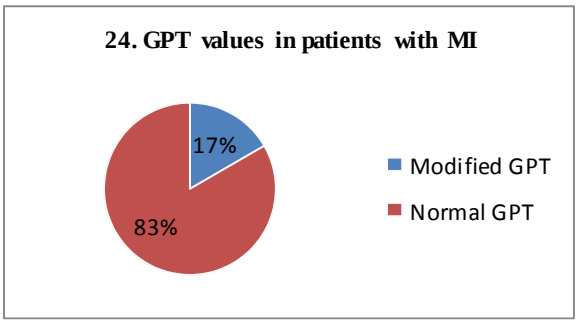


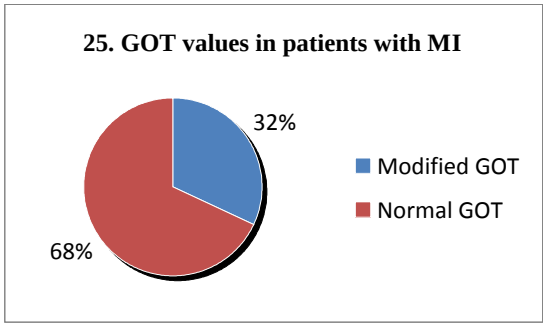
PLATE 4

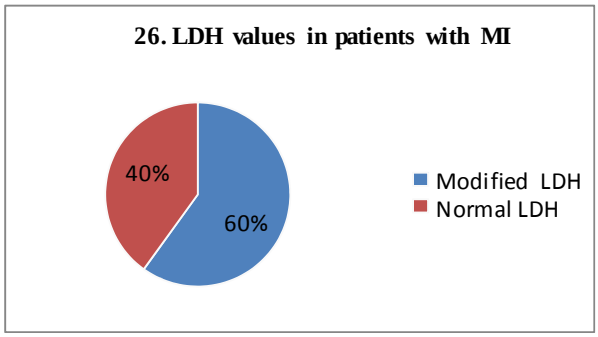
Variability of enzymatic parameters in patients who have suffered a **myocardial infarction (MI)**

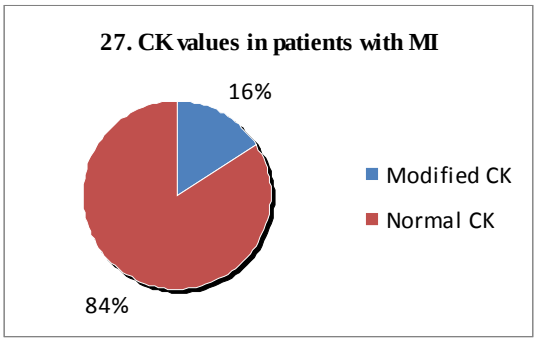


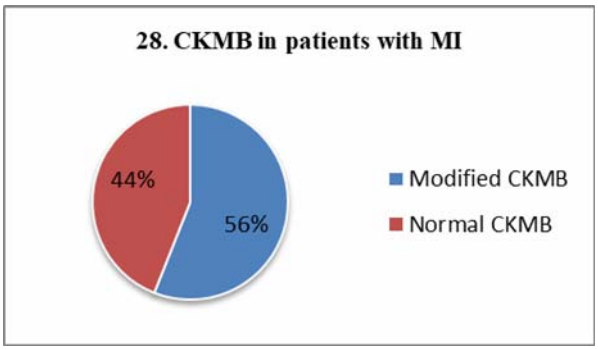












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