IJACT, Volume 3, Issue 1, 2025 ISSN: 2995-5378
http://medicaljournals.eu/index.php/IJACT

INTERNATIONAL JOURNAL OF ALTERNATIVE AND CONTEMPORARY THERAPY

The Course of Ischemic Heart Disease and Metabolic Syndrome Elderly Patients

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Abstract: To understand how ischemic heart disease and metabolic syndrome develop and progress in elderly patients, and to explore effective ways to diagnose, manage, and treat these conditions in this age group.

189 elderly patients were involved in the study, and they were divided into two groups based on the presence or absence of metabolic syndrome (MS). The first group consisted of 125 patients with both Ischemic heart disease (IHD) and MS (the main group), while 64 patients had Ischemic heart disease (IHD) without MS (the control group). The study examined components of metabolic syndrome, including obesity, hypertension, hyperglycemia, and hyperlipidemia in all patients. Complaints were assessed, and objective indicators such as body mass index (BMI), heart murmurs, and lung wheezing were analyzed.

That stable angina was recorded in 68% of cases in the IHD + MS group, which is significantly higher than in the IHD without MS group (45%, $p<0.01$). The presence of MS is presumed to increase the risk of angina. In the UTI + MS group, 25% of the patients had experienced a myocardial infarction, whereas this figure was 15% in the UTI without MS group ($p<0.05$). This indicates that the presence of MS increases the risk of developing myocardial infarction. Chronic heart failure (CHF) was observed in 35% of cases in the IHD + MS group, which is significantly higher compared to 20% in the IHD without MS group ($p<0.05$). MS may contribute to CHF through increased cardiac load and inflammatory processes.

Patients in the IHD + MS group scored significantly lower in quality-of-life measures compared to the IHD without MS group. Metabolic syndrome drastically reduces the quality of life physically, mentally, and socially.

Keywords: Ischemic heart disease (IHD), metabolic syndrome (MS), elderly patients, hypertension.

Introduction Relevance. Ischemic heart disease (IHD) and metabolic syndrome (MS) are among the leading causes of death and disability worldwide. Both conditions are urgent due to the commonality of risk factors, the high likelihood of complications, and the need to strengthen prevention, diagnosis, and treatment measures in the healthcare field.

According to the World Health Organization (WHO), in 2021, 32% of all global deaths due to cardiovascular diseases were attributed to IHD. Metabolic syndrome includes conditions such as high blood pressure, hyperglycemia, hyperlipidemia, and obesity [1,5,6].

The relationship between MS and IHD is significant, with the presence of MS increasing the risk of developing IHD by 2-3 times (Grundy et al., 2004). MS is widespread globally, with 34.7% of the adult population in the United States being diagnosed. The connection between IHD and MS manifests in the following ways: the increase in IHD among patients with MS is associated with higher activity of the sympathetic nervous system, which exacerbates IHD (Eckel et al., 2005). Elevated blood sugar levels accelerate endothelial damage and the development of atherosclerosis (Reaven GM, 1988). Hypertension, in turn, is noted as associated with IHD and MS, with high levels of angina recorded,

increasing the risk of myocardial infarction [2,3,4]. The study aimed to examine, assess the impact of metabolic syndrome (MS) on the urinary tract infection (UTI), and determine its clinical significance.

Methods

A total of 189 elderly patients were involved in the study, and they were divided into two groups based on the presence or absence of MS. The first group consisted of 125 patients with both IHD and MS (the main group), while 64 patients had IHD without MS (the control group). The study examined components of metabolic syndrome, including obesity, hypertension, hyperglycemia, and hyperlipidemia in all patients. Complaints were assessed, and objective indicators such as body mass index (BMI), heart murmurs, and lung wheezing were analyzed. The 95% confidence intervals for each indicator were calculated. The inclusion of patients based on age criteria was done according to the WHO's 2016 age classification. Exclusion criteria included middle-aged and young patients, acute myocarditis, acute myocardial infarction (within 30 days of the onset of illness), unstable angina, acute cerebrovascular insufficiency (within 6 months), acute renal failure, acute liver failure, and severe endocrine diseases.

Results:

The data obtained (Table 1) shows that stable angina was recorded in 68% of cases in the IHD + MS group, which is significantly higher than in the IHD without MS group (45%, $p<0.01$). The presence of MS is presumed to increase the risk of angina. In the IHD + MS group, 25% of the patients had experienced a myocardial infarction, whereas this figure was 15% in the IHD without MS group ($p<0.05$). This indicates that the presence of MS increases the risk of developing myocardial infarction. Chronic heart failure (CHF) was observed in 35% of cases in the IHD + MS group, which is significantly higher compared to 20% in the IHD without MS group ($p<0.05$). MS may contribute to CHF through increased cardiac load and inflammatory processes.

Table 1. Analysis of patient's complaints

Complaints	IHD + MS n=125	IHD without MS n=64	% difference	P
Burning pain	85 (68%)	32 (50%)	+18	p < 0,05
Shortness of breath	94 (75%)	26 (40%)	+35	p < 0,01
Dizziness and headache	69 (55%)	19 (30%)	+25	p < 0,05
Pain in the heart area	78 (62%)	31 (48%)	+14	p < 0,05
General weakness	100 (80%)	42 (65%)	+15	p < 0,05
Heartbeat	50 (40%)	13 (20%)	+20	p < 0,01

Clinical Types of Ischemic Heart Disease (IHD)

Heart Rhythm Disorders: Arrhythmias were recorded in 40% of cases in the IHD + MS group, compared to 22% in the IHD without MS group ($p<0.01$). It is hypothesized that cardiac arrhythmia may often result from hypertension or hyperglycemia associated with MS. Asymptomatic ischemia was observed in 20% of the IHD + MS group and 25% in the IHD without MS group. This suggests that among different types of IHD, patients with MS are significantly more likely to experience stable angina, myocardial infarction, CHF, and arrhythmias. Asymptomatic ischemia occurred at similar rates regardless of the presence of MS. These findings indicate that MS is a significant factor in exacerbating UTI complications.

Changes Recorded in the EGG

Electrocardiogram (ECG) Changes in Patients with Ischemic Heart Disease (IHD) and Metabolic Syndrome (MS):

The ECG changes were compared between groups of patients with IHD + MS and those without MS. The findings included the following analyses:

ST Segment Depression: Recorded in 85 patients (56%) in the IHD + MS group, compared to 32 patients (50%) in the CHD without MS group, with a percentage difference of 18% ($p<0.05$). This indicates clearer signs of myocardial ischemia in the IHD + MS group.

T-Wave Inversion: Observed in 69 patients (55%) in the IHD + MS group and in 19 patients (30%) in the CHD without MS group, with a difference of 25% ($p<0.01$). These results confirm stronger electro cardiological manifestations of ischemic disease in the CHD + MS group.

Left Ventricular Hypertrophy: Found in 50 patients (40%) in the IHD + MS group compared to 13 patients (20%) in the IHD without MS group, with a percentage difference of 20% ($p<0.05$). This suggests that heart remodeling associated with hypertension is characteristic of MS.

Heart Rhythm Disorders: Detected in 52 patients (42%) in the IHD + MS group versus 16 patients (25%) in the IHD without MS group, showing a 17% difference ($p<0.05$). This indicates more frequent electro cardiological disturbances in the IHD + MS group.

Conclusion: ECG changes in the IHD + MS group were significantly more frequent and severe compared to the IHD without MS group. The findings demonstrate that MS has a substantial impact on the electrophysiological state of ischemic disease, confirming its significant role in exacerbating IHD complications.

Descussion

We analyzed the echocardiography (ECHO) results of the patients involved in the next stage of the study. According to the results, the left ventricular ejection fraction (LVEF) in the IHD + MS group was $49.5 \pm 6.2\%$, significantly lower than in the IHD without MS group ($56.3 \pm 5.8\%$, $p < 0.01$). This indicates the severe progression of ischemic disease and decreased pump function of the left ventricle (Table 3).

The thickness of the left ventricular wall in the CHD + MS group was 12.1 ± 1.5 mm, higher than in the CHD without MS group (10.8 ± 1.2 mm, $p < 0.05$). Diastolic dysfunction was observed in 65% of cases in the CHD + MS group, compared to 40% in the CHD without MS group ($p < 0.01$). Diastolic dysfunction indicates a reduced ability of the heart to fill with blood due to ischemic disease and metabolic disturbances.

Left ventricular dilation was recorded in 38% of cases in the CHD + MS group and 20% in the CHD without MS group ($p < 0.05$). This condition appears as a consequence of ischemic damage to the left ventricle and complications of hypertension. Pericardial effusion was present in 15% of the CHD + MS group and 8% of the CHD without MS group ($p > 0.05$), with no significant difference between the cases.

Mitral regurgitation was recorded in 45% of cases in the CHD + MS group and 25% in the CHD without MS group ($p < 0.05$). In conclusion, the ECHO results in CHD + MS patients showed more severe anatomical and functional changes in the heart due to the influence of ischemic disease and metabolic syndrome. The low ejection fraction of the left ventricle, hypertrophy, and diastolic dysfunction clearly confirm the negative impact of metabolic syndrome on CHD.

Quality of Life of Patients (Based on SF-36 Scores)

Analyzing the data presented in Table 4, we observe that the Physical Functioning (PF) score in the CHD + MS group was 45 points, significantly lower than the 62 points in the CHD without MS group ($p < 0.01$). Role Physical (RP) score in the CHD + MS group was 50 points, also significantly lower than the 68 points in the CHD without MS group ($p < 0.01$). Patients struggled with household tasks due to obesity, hypertension, and fatigue associated with MS. The General Health (GH) score was 42 points in the CHD + MS group, compared to 58 points in the CHD without MS group ($p < 0.01$). Mental Health (MH) scored 40 points in the CHD + MS group and 55 points in the CHD without MS group ($p < 0.01$), with depression, fatigue, and physical limitations negatively affecting mental well-being. The Bodily Pain (BP) score was 38 points in the CHD + MS group and 50 points in the CHD without MS group ($p < 0.05$). Social Functioning (SF) scored 48 points in the CHD + MS group and

65 points in the CHD without MS group ($p < 0.01$). The overall Health Transition (HT) score was 44 points in the CHD + MS group, compared to 63 points in the CHD without MS group ($p < 0.01$). The general health status was rated lower in the CHD + MS group.

In conclusion, patients in the IHD + MS group scored significantly lower in quality of life measures compared to the IHD without MS group. Metabolic syndrome drastically reduces the quality of life physically, mentally, and socially.

Summary. It was noted that the rates of stable angina, myocardial infarction, chronic heart failure, and arrhythmias were significantly higher in the CHD + MS group compared to the CHD without MS group. Ischemic changes (ST segment depression, T wave inversion) and heart rhythm disorders were significantly higher in the CHD + MS group, with confirmed reliable differences. The CHD + MS group showed more cases of lower left ventricular ejection fraction, hypertrophy, diastolic dysfunction, and chamber dilation, indicating the severe progression of ischemic disease and the impact of metabolic syndrome. Patients in the CHD + MS group had lower physical, mental, and social quality of life scores compared to those without MS, highlighting the strong negative impact of metabolic syndrome on patient quality of life.

The analysis of MSC components by the gender of patients.

Based on the table data, the following comparative analyses were obtained. Out of 125 total patients with obesity, 94 had obesity. This figure included 45 men (47.87%) and 49 women (52.13%). For hypertension, out of 125 patients, 100 cases were observed. The occurrence rate among men was 59% (n=59), while among women, it was 41% (n=41), with a significant difference between the groups ($p<0.05$).

In cases of hyperglycemia, 106 patients were recorded, with 58 men (54.72%) and 48 women (45.28%) observed. For hyperlipidemia, 113 patients were found in the overall group, with 59 men (52.21%) and 54 women (47.79%). Regarding triglycerides, 95 patients had elevated levels, with 41 men (43.16%) and 54 women (56.84%).

Furthermore, 88 patients in the overall group were diagnosed with high LDL cholesterol, with 38 men (43.18%) and 50 women (56.82%). Regarding HDL cholesterol, 42 men (41.18%) and 60 women (58.82%) were recorded, with a significant difference between the groups ($p<0.05$).

In conclusion, this analysis indicates significant differences between men and women in hypertension and LDL cholesterol levels, while no significant differences were noted in other indicators between the groups.

1st picture. Analysis of the distribution frequency of MS components by patient gender (n)

Although the number of men was higher than women for all components of metabolic syndrome (MS), no statistically significant differences were identified between the types of metabolic syndrome.

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