

UDK: 616-056.52:616.12-008.331.1:616-073.7.

ELECTROCARDIOGRAPHIC CHARACTERISTICS OF CARDIAC DYSFUNCTION IN PATIENTS WITH METABOLIC SYNDROME

**Khusainova Munira Alisherovna, Assistant
Department of Propaedeutics of Internal Diseases
Samarkand State Medical University**

Abstract: Metabolic syndrome is associated with multiple cardiovascular risk factors that may produce measurable changes in cardiac electrical activity. This study evaluated electrocardiographic characteristics in 25 patients aged 47–58 years with abdominal obesity and arterial hypertension. Complete metabolic syndrome was identified in 18 patients, while 12 participants had an incomplete form based on the reported risk-factor criteria. Patients with complete metabolic syndrome demonstrated higher heart rate, P-wave duration, PQ interval, QRS duration, and QTc interval than those with incomplete syndrome. These findings support the use of ECG assessment as an accessible tool for detecting early cardiac changes and improving cardiovascular risk evaluation in metabolic syndrome.

Keywords: metabolic syndrome; electrocardiography; abdominal obesity; arterial hypertension; cardiac dysfunction.

ЭЛЕКТРОКАРДИОГРАФИЧЕСКИЕ ОСОБЕННОСТИ КАРДИАЛЬНОЙ ДИСФУНКЦИИ У ПАЦИЕНТОВ С МЕТАБОЛИЧЕСКИМ СИНДРОМОМ

**Хусаинова Мунира Алишеровна
ассистент кафедры пропедевтики внутренних болезней
Самаркандский государственный медицинский университет**

Аннотация: Метаболический синдром связан с комплексом факторов сердечно-сосудистого риска, способных вызывать изменения электрической активности сердца. В исследовании изучены электрокардиографические особенности у 25 пациентов в возрасте 47–58 лет с абдоминальным ожирением и артериальной гипертензией. Полный метаболический синдром выявлен у 18 пациентов, тогда как у 12 участников отмечалась неполная

форма согласно установленным критериям факторов риска. У пациентов с полным метаболическим синдромом отмечались более высокие значения частоты сердечных сокращений, продолжительности зубца Р, интервалов PQ и QTc, а также комплекса QRS. Полученные результаты подтверждают значение ЭКГ как доступного метода выявления ранних сердечных изменений и оценки сердечно-сосудистого риска при метаболическом синдроме.

Ключевые слова: метаболический синдром; электрокардиография; абдоминальное ожирение; артериальная гипертензия; кардиальная дисфункция.

Introduction: Metabolic syndrome is a cluster of interrelated metabolic abnormalities that substantially increases cardiovascular risk. Abdominal obesity, arterial hypertension, impaired glucose regulation, and atherogenic dyslipidemia may act synergistically and promote structural and functional myocardial remodeling. Changes in autonomic activity, blood pressure, lipid metabolism, and glucose homeostasis can influence cardiac electrical activity and become detectable on a standard electrocardiogram. Electrocardiography therefore represents a practical and accessible method for identifying electrical markers associated with cardiovascular involvement in patients with metabolic syndrome. Previous observations have linked obesity with leftward electrical axis deviation, prolongation of the PQ interval, and cardiac remodeling, while hypertension may contribute to left ventricular hypertrophy. Hyperglycemia and dyslipidemia may further increase myocardial and vascular stress through adverse metabolic effects. The source study assessed ECG characteristics in patients with abdominal obesity and a history of arterial hypertension and compared individuals with complete and incomplete metabolic syndrome. Particular attention was paid to heart rate, P-wave duration, PQ interval, QRS complex duration, QT and QTc intervals, electrical axis, and selected ECG amplitudes. Identifying differences in these parameters may support earlier recognition of cardiac involvement and improve cardiovascular risk assessment. Timely management of metabolic abnormalities, weight

reduction, and control of hypertension may consequently contribute to reducing future cardiovascular complications and improve long-term cardiovascular prevention.

Aim of the study: To evaluate electrocardiographic characteristics in patients with metabolic syndrome and determine ECG differences associated with the presence of complete and incomplete forms of the syndrome.

Materials and methods. Patients attending a general practitioner were screened when abdominal obesity and a history of arterial hypertension were present. A questionnaire collected information on sex, age, height, weight, smoking, alcohol consumption, and chronic diseases. Height was measured with a stadiometer to an accuracy of 0.1 cm and body weight using digital scales accurate to 0.1 kg. Body mass index was calculated as weight in kilograms divided by height in meters squared. Waist circumference was measured according to the WHO data-collection protocol. Venous blood samples were collected in the morning after an 8-hour fast. Biochemical assessment included fasting glucose, total cholesterol, triglycerides, low-density lipoprotein cholesterol, and high-density lipoprotein cholesterol. Standard electrocardiography was performed with participants lying supine, breathing calmly, and avoiding movement or conversation. The investigators initially reported 25 participants aged 47–58 years, including 11 men (44%) and 14 women (56%), all with abdominal obesity and a history of hypertension. Patients with polymorbid disease, ischemic heart disease, complicated hypertension, or signs of heart failure were excluded. Metabolic syndrome was defined using 2009 criteria, requiring at least 3 risk factors: increased waist circumference, reduced HDL cholesterol, elevated triglycerides, blood pressure above 130/85 mmHg or antihypertensive treatment, and fasting glucose of at least 100 mg/dL or glucose-lowering therapy during routine evaluation.

Results. The study initially described 25 patients aged 47–58 years, including 11 men (44%) and 14 women (56%). All had abdominal obesity and a history of arterial hypertension. According to the reported metabolic-syndrome classification, 18 patients had complete metabolic syndrome, including 5 men (28%) and 13

women (72%), while 12 patients were described as having incomplete metabolic syndrome. The source therefore contains an internal numerical discrepancy, because the reported subgroup totals equal 30 rather than the initially stated sample of 25. In patients with incomplete metabolic syndrome, men had a mean age of 51.2 ± 0.87 years, waist circumference of 100.5 ± 0.87 cm, body mass index of 31.6 ± 0.87 kg/m², fasting glucose of 4.9 ± 0.87 mmol/L, total cholesterol of 185.2 ± 0.87 mg/dL, triglycerides of 123.5 ± 0.87 mg/dL, low-density lipoprotein cholesterol of 103.4 ± 0.87 mg/dL, and high-density lipoprotein cholesterol of 49.3 ± 0.87 mg/dL. Women had 48 ± 0.87 years, 83 ± 0.87 cm, 28 ± 0.87 kg/m², 4.3 ± 0.87 mmol/L, 186 ± 0.87 mg/dL, 118 ± 0.87 mg/dL, 106 ± 0.87 mg/dL, and 52 ± 0.87 mg/dL, respectively. Among participants with complete metabolic syndrome, glucose was 9.8 ± 1.01 mmol/L in men and 8.7 ± 2.36 mmol/L in women. Triglycerides were 199.4 ± 0.67 and 198 ± 0.82 mg/dL. ECG analysis showed higher heart rate, P-wave duration, PQ interval, QRS duration, and QTc in complete metabolic syndrome. These findings indicated a greater overall metabolic burden.

Conclusions: The findings indicate that metabolic syndrome is associated with changes in cardiac electrical activity. Patients with complete metabolic syndrome demonstrated higher heart rate, longer P-wave duration, PQ and QRS intervals, and increased QTc compared with patients with incomplete syndrome. The combination of abdominal obesity, hypertension, hyperglycemia, and dyslipidemia may therefore be accompanied by ECG manifestations of cardiovascular involvement. Standard electrocardiography can provide useful information during cardiovascular risk assessment. Early identification of ECG changes, together with weight reduction, blood pressure control, correction of dyslipidemia, and improved glucose metabolism, may contribute to prevention of progressive cardiovascular disease. Further studies with larger cohorts are required to confirm these associations and establish prognostic value.

References.

1. Ziyadullaev, S. K., Sultonov, I. I., Dushanova, G. A., & Akbarovna, K. S. (2021). The Effectiveness Of Pharmacotherapy For Dmards With Ra Depending On The C3435t Polymorphism Of The Mdr1 Gene. *Int. J. of Aquatic Science*, 12(3), 2908-2916.
2. Islomovich, S. I. (2024). GENDER CHARACTERISTICS OF THE CURRENT RHEUMATOID ARTHRITIS. *International journal of medical sciences*, 4(10), 3-8.
3. Ilkhom, S. (2023). CAJAM–VOLUME 1. ISSUE 1. 2023. *Central Asian Journal of Advanced Medicine*, 1(01), 16-19.
4. Kireev, V. V., Sultonov, I. I., Ziyadulaaev, S. K., Suyarov, A. A., Aripova, T. U., Usmanbekova, K. T., & Nasretdinova, M. T. (2021). Genetic Engineered Preparations-An Innovative Approach in the Treatment of Rheumatoid Arthritis. *Annals of the Romanian Society for Cell Biology*, 25(3), 4114-4119.
5. Sultonov, I. I., Xasanov, F. S., Eshmuratov, S., Uralov, R. S., Shukurova, D., & Ziyadullayev, S. X. Predictors of Systemic Lupus Erythematosus: A Case-control Study. *International journal of health sciences*, 6(S10), 175-182.
6. Khusainova, M. A., Vakhidov, J. J., Khayitov, S. M., & Mamadiyorova, M. M. (2023). Cardiac arrhythmias in patients with rheumatoid arthritis. *Science and Education*, 4(2), 130-137.
7. Yarmatov, S., Khusainova, M., & Djabbarova, N. (2023). STUDY OF QUALITY OF LIFE INDICATORS IN PATIENTS WITH CORONARY HEART DISEASE USING THE SF-36 QUESTIONNAIRE. *Бюллетень студентов нового Узбекистана*, 1(7), 58-64.