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FEATURES OF HEART RHYTHM DISORDERS ACCORDING TO HOLTER ECG IN CHILDREN WITH TYPE 1 DIABETES WHO SUFFERED COVID-19

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Abstract: Determine arrhythmia patterns in children with type 1 diabetes who have suffered Covid-19/The study was carried out on the basis of the RSMCE and on the basis of the Department of Propaedeutics of Childhood Diseases, Hematology of TashPMI. We comprehensively examined 79 children with DM1 in the period from 2022. The study methods included ECG and Holter ECG. Systemic inflammation in Covid-19 can provoke a predisposition to arrhythmias in children with diabetes mellitus. These changes prove the high accuracy of monitoring the condition of the heart in patients with Covid-19 in critical condition.

Keywords: diabetes mellitus type 1, children, cardiac arrhythmia, early diagnosis, Covid-19.

Introduction. Patients with type 1 diabetes have increased susceptibility to respiratory syndrome - Covid-19 and increased morbidity and mortality from Covid-19 infection. Mortality from Covid-19 is mainly due to cardiac arrhythmias. Electrolyte abnormalities in patients with type 1 diabetes mellitus may increase the risk of cardiac arrhythmias. Despite these correlations, there has been little study of arrhythmias in children with diabetes mellitus who have suffered Covid-19. While Covid-19 is common in children, there may be more severe manifestations with a tendency to concomitant diseases. [5,6,7]. Deaths from Covid -19 can be caused by cardiac arrhythmias. Electrolyte disorders of the risk of cardiac arrhythmias, in patients with type 1 diabetes, probably lead to the risk of cardiac arrhythmias. In Covid -19, in children with type 1 diabetes mellitus leads to arrhythmias. SARS-CoV-2 attaches to ACE2 receptors throughout the body, including pancreatic beta cells, subsequently disrupting insulin secretion [4]. Damage to beta cells can also occur due to pro-inflammatory cytokines or the occurrence of autoimmunity in genetically predisposed individuals [4]. Covid-19 also causes a wide range of cardiovascular complications, including myocarditis, myocardial infarction, cardiomyopathy, arrhythmia, and cardiac arrest [2]. Arrhythmias can occur against the background of viral diseases due to hypoxia, inflammatory stress [1]. In addition, viral myocarditis can occur with impaired cardiac conduction. Elevation of the cytokine group and inflammation of the conductive tissue is similar to subsequent arrhythmias. [8]. Electrolyte balance disturbances, especially hyperkalemia, exacerbations in type 1 diabetes mellitus, can provoke arrhythmias due to the observed rate of lateral elevation and the frequency of occurrence of compounds in the myocardium [3].

Purpose of the study. To determine the characteristics of heart rhythm disorders in children with type 1 diabetes who have suffered Covid-19

Materials and methods. The study was carried out on the basis of the RSMCE and on the basis of the Department of Propaedeutics of Childhood Diseases, Hematology of TashPMI. We comprehensively examined 79 children with type 1 DM in the period from 2022. The study methods included ECG and Holter ECG.

Results. We examined 79 children with diabetes 1 type of them, the first group was 49 children with diabetes (62%), and the second group of 30 children with type 1 diabetes who suffered Covid-19. Among children, the second determined the first detection

of diabetes mellitus as a complication of Covid-19 was found in (20%).

A characteristic feature of ECG among children with DM experience who suffered Covid-19 was significantly frequent registration of sinus tachycardia in 33% of cases, conduction disorder in 15% of cases, prolongation of the PQ interval in 15% of cases and early ventricular repolarization syndrome (SRBC): in 29.9% of children.

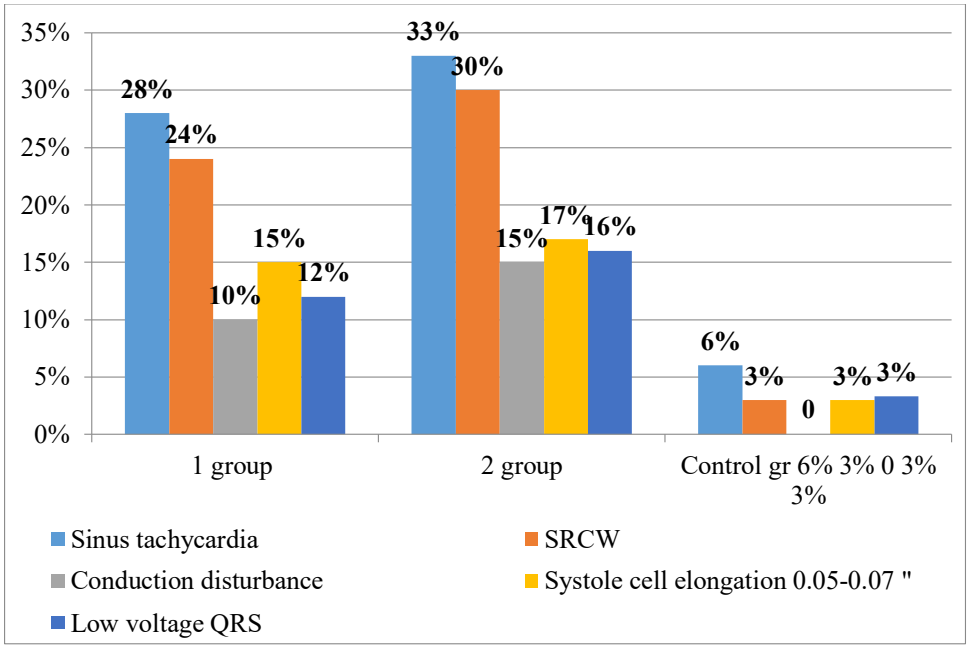

Fig. 1. Results of a standard ECG study.

PQ prolongation was most common in long-term type 1 DM in children. As well as sinus tachycardia, conduction disorders, the presence of SRBC. The presence of flat teeth and low voltage are noted, the severity of which depends on the duration of type 1 DM diseases.

Thus, with an increase in the age of illness, as well as in the event of decompensation of carbohydrate metabolism, the number of pathological changes on the ECG increases, which are characterized by the presence of sinus tachycardia and disorders of repolarization processes.

Analysis of correlation inter-convention showed apositive correlation relationship of disorders of repolarization processes with concomitant pathology of diabetes (r=0.553). A direct correlation relationship was also established depending on the presence of tachycardia in children with type 1 DM (r=0.478). Clinical and ECG studies in terms of diagnosing complications of DM are nonspecific and poorly informative, which is combined with literature data on the clinical manifestation of such complications at 25-40 years of age and the need for special methods for diagnosing DKAN in children.

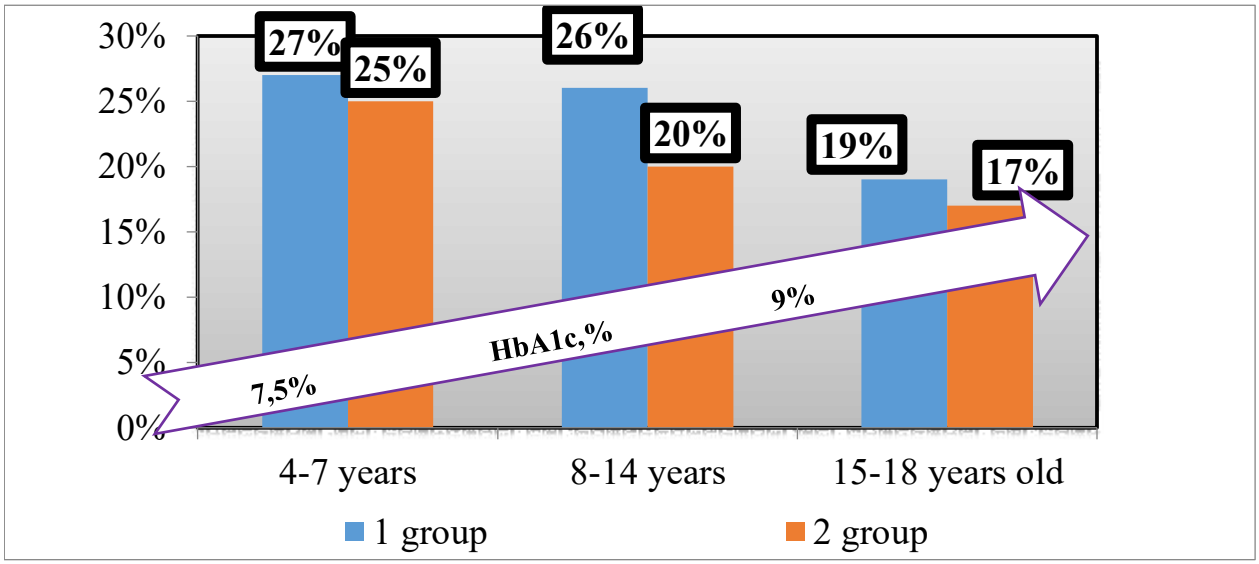

Fig. 2. HRV scores (heart rate variability) by study age group. pNN50, (total average)%

When determining HRV in the age groups, the study determined, both in the first group of the study and in the second group when analyzing BMS in the age groups 4-7 years, 8-14 years and 15-18 years with an increase in glycated hemoglobin, from 7.5% to 9%, a decrease in HRV in the second group of the study. So 4-8 years old 27% of 2 groups versus 25% of 1 group, in the age group 8-14 years old 26% of the second group versus 20% of the first group, and in puberty 15-18 years old, a decrease in pNN50 was also determined (overall average) by Holter monitoring in children with type 1 DM who underwent Covid-19 and 17% of the second group of the study against 19% of the first group of the study.

When determining HRV in the age groups, the study determined that both in the first group of the study and in the second group when analyzing HRV in the age groups 4-7 years, 8-14 years and 15-18 years with an increase in glycated hemoglobin, from 7.5% to 9%, a decrease in HRV in the second group of the study was determined. So 4-8 years old 39.9% of 2 groups versus 55% of 1 group, in the age group 8-14 years old 39% of the second group versus 54.4% of the first group, and in puberty 15-18 years old, a decrease in such an indicator as rMSSD was also determined (total average) by Holter monitoring in children with type 1 DM of Covid-19. 38% of the second study group versus 54% of the first study group.

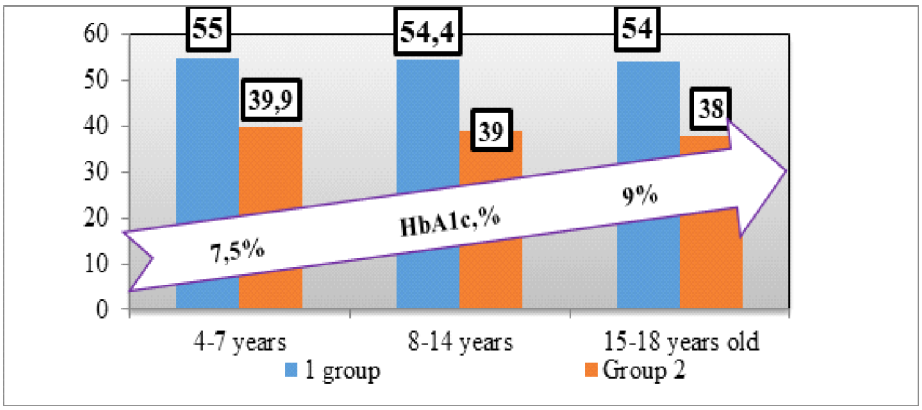

Fig. 3. HRV (heart rate variability) by study age group. rMSSD, (total mean) ms

HRV (cardiovascular autonomic function score) was lower in children with type 1 DM compared to controls and lower in children with type 1 DM with Covid-19 compared to type 1 DM duration, without Covid-19, the temporal region is considered

a marker of parasympathetic function, and these results suggest, that it can be detected early before any manifestation of symptoms and when routine tests are still normal.

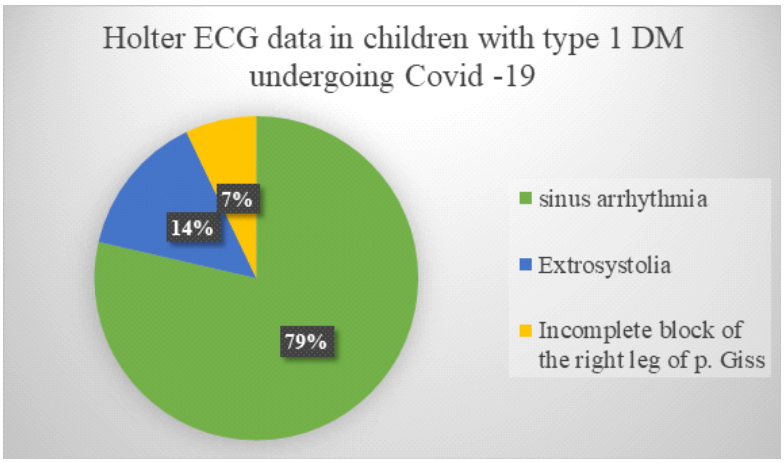

Fig. 4. Holter ECG data in children with type 1 DM who have undergone Covid -19

According to Holter ECG, children with diabetes who suffered Covid-19 experienced sinus arrhythmia (78%), Extrosystolia (14%), incomplete blockade of the right leg of p. Giss (7%). And in children with diabetes without Covid-19, such changes were not observed.

Conclusion. In children with diabetes mellitus who were not tolerated by Holter ECG, only a decrease in variability was observed Systemic inflammation in Covid-19 can provoke a predisposition to arrhythmias in children with diabetes. These changes prove the high accuracy of monitoring the condition of the heart in patients with Covid -19 in critical condition.

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