# CAUSES OF ARRHYTHMIA DURING PREGNANCY

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## ABSTRACT

38 patients (average age 27.1 ± 5.7 years) were examined in the II–III trimester of pregnancy. All patients were divided into three groups: group 1 included 18 women with cardiac arrhythmias and organic changes in the cardiovascular system, in the 2nd - 14 patients with idiopathic arrhythmias, in the 3rd (control group) – 6 practically healthy women with normal sinus rhythm. According to Holter electrocardiogram monitoring data, rhythm disturbances corresponding to Class III–IV according to the Laun–Wolf classification (1971) were recorded with the same frequency in both main groups for 24 hours. The maximum number of ventricular extrasystoles was registered in the 2nd group, supraventricular - in the 1st. Complex cardiac disorders rhythms occur in pregnant women both against the background of cardiovascular pathology and in the absence of organic changes, which requires careful dynamic monitoring of such patients.

**Key words:** heart rhythm disorders, arrhythmia, pregnancy.

## INTRODUCTION

Cardiac arrhythmias and conduction disorders during pregnancy remain one of the important problems both in terms of finding possible causes of their development, and in terms of treatment approaches and prognosis for mother and fetus. Unfortunately, there are no official statistics on the prevalence of these disorders during pregnancy. Scant literature data indicate that at the end of the last century, arrhythmia was registered in 5.0–15.7% of pregnant women. At the same time, in a retrospective analysis of 5,650 birth histories conducted by in the period from 2011 to 2014 in one of the major cities of Uzbekistan, it was revealed that cardiac arrhythmias and conduction disorders were recorded with a frequency of 31.7% and, in addition to conduction disorders along the legs of the Gis bundle, they were represented by sinustachycardia, infrequent supraventricular extrasystole (ISES) and ventricular extrasystole (VES) and extremely rarely paroxysmal tachycardia. The prognostic value of arrhythmias, in our opinion, is determined not so much by their possible connection with the organic pathology of the heart, as by those hemodynamic disorders that occur as a result of their development, they can lead to decompensation of cardiac activity and other complications in both the mother and fetus. There are no documented cases of maternal mortality from primary arrhythmias, although experts believe that

arrhythmias can lead to fatal outcomes. In a British confidential investigation into deaths from cardiovascular diseases, 9% of such cases were identified as the syndrome of “sudden cardiac death in adults". However, there are reports of deaths due to arrhythmia in patients without hemodynamic disorders and significant anatomical changes on the part of the cardiovascular system (CVS). Perhaps some patients of reproductive age can also be considered at risk, especially during pregnancy, since during this period pronounced hemodynamic, hormonal, vegetative and metabolic changes occur in the body. Researchers at the beginning of the last century described gender differences in electrophysiological processes in the myocardium. Thus, H.C. Bazett et al. It was noted that women have a heart rate (Heart rate) is higher than in men, and the duration of the QT interval on an electrocardiogram (ECG) is longer, even after heart rate correction. Other authors confirmed these data and pointed out that at rest, the QT interval in women is 10-20 ms longer than in men, and these differences become more pronounced during menstruation. In addition, women have a shorter duration and lower voltage of the QRS complex, as well as a shortening of the duration of the P wave and the PR interval. Also, non-specific changes are more common in women the repolarization process. At first glance, these differences can be explained by the initially smaller size of the heart in women, but they persist after correction of heart and body weight. The obtained data are associated with the effect of female sex hormones that affect the functioning of calcium and potassium channels. In particular, estrogens have been found to increase the duration of the QT interval by affecting the fast and slow current of sodium ions and the sodium-calcium exchanger. This observation has been confirmed in subsequent studies., in which participation in the regulation of the heart rhythm of the autonomic nervous system was noted. Gender characteristics relate not only to electrophysiological processes, but also to the nature of arrhythmias. In several epidemiological studies, it has been revealed that supraventricular tachycardia with narrow QRS complexes, arising by the mechanism of re-entry in the atrioventricular node, occurs in women in 2 times more often than in men. On the contrary, supraventricular tachycardia, which occurs by the mechanism of re-entry in the atrioventricular node with the involvement of an additional pathway, occurs 2 times more often in men. However, data on the nature and possible causes of arrhythmias during pregnancy are few, and any research in this direction remains very relevant, primarily for practical medicine.

## MATERIALS AND METHODS

38 pregnant women (average age 27.1 ± 5.7 years) in the II–III trimester of gestation were under observation. All patients, along with a routine examination, including a blood test for electrolytes (potassium, sodium) and thyroid hormones (triiodothyronine, thyroxine, thyroid-stimulating hormone), underwent echocardiography on an apparatus Logic-400 using M-, In-mode and Dopplerography,

Holter ECG monitoring for 24 hours on monitors Medilog Prima and Schiller MT-200. When analyzing ECG monitoring data by The following parameters were taken into account for Holter: the main driver of the rhythm, the average heart rate (day / night / day), the number of ISES and VES (for 1 hour and 1 day), as well as the class of VES according to the Laun–Wolf classification in the Ryan–Kenn modification.

Statistical processing of the results of the study was carried out using the Biostatistics software package, version 4.03, using standard methods of variation statistics and Student's criterion to assess differences in paired measurements of indicators. The differences were considered significant at $p < 0.05$.

## RESEARCH RESULTS AND THEIR DISCUSSION

Various cardiac arrhythmias 32 patients were registered, 6 women had a normal sinus rhythm. When analyzing anamnesis data It was revealed that 24 women (63.2%) had no bad habits, 14 patients (36.8%) smoked before pregnancy or continued to smoke at the time of examination, while the number of cigarettes per day ranged from 2 to 30, and the average pack-years ratio was 5.3 ± 1.8. Almost half of the patients had a burdened heredity for cardiovascular diseases, obesity and/or diabetes mellitus: arterial hypertension in one or both parents occurred in 55.6% of cases, myocardial infarction or cerebrovascular accident – in 8.2%, obesity – in 33.1%, diabetes mellitus – in 4.5%. Before the onset of a real pregnancy, no complaints were made about interruptions in the work of the heart, the woman's heartbeat. Approximately from the middle of the I–beginning of the II trimester of pregnancy, patients with arrhythmias began to be disturbed by a feeling of interruptions and “fading” in the work of the heart, palpitations, sometimes having a paroxysmal character, weakness, increased fatigue, which was the reason for his additional examination. As a result of the examination, more than half of the women with arrhythmias (18) revealed various changes in the cardiovascular system (Group 1), 14 patients with arrhythmias had no somatic pathology (Group 2) and 6pregnant women with sinus rhythm who made up the control group were practically healthy (group 3).

According to the clinical and instrumental examination, hypertrophic cardiomyopathy without obstruction of the outflow was diagnosed in group 1 left ventricular tract (n = 3), open oval window (n = 3), dilated cardiomyopathy without signs of heart failure (n = 4), mitral valve insufficiency of rheumatic genesis (n = 4), non-operated ventricular septal defect (n = 6), corrected tetrad of Fallot (n = 1) and post-myocarditis cardiosclerosis (n = 10). Mitral valve prolapse (MVP) was quite common (n = 30), including grade I mitral regurgitation was detected in 9 cases, grade II in 21. According to the results of Holter ECG monitoring in patients of this group, more often in total, extrasystole was detected, while the number of extrasystoles for 1 day ranged from 8 to 50 thousand.

Couplets were recorded in 6 patients (13-80 in 1 day), triplets in 4 patients (3-150

in 1 day), and ventricular tachycardia runs (1-5 in 1 day) occurred in 5 women with a heart rate from 156 to 229 in 1 min. These rhythm disturbances corresponded to class III–IV according to the Laun–Wolf classification. Interesting data were obtained by analyzing the monitoring results Holter ECG in patients with idiopathic arrhythmias who had no somatic pathology (group 2). In patients of this group, ISES were recorded with approximately the same frequency and significantly more often VES in comparison not only with the 3rd, but also with the 1st group. It is known that PMV, not being an organic pathology of the cardiovascular system, is often accompanied by various arrhythmias, which served as the basis for a more detailed analysis of the nature of arrhythmias in patients with PMV. As can be seen from the presented data, in the group of patients with PMV, as well as in the other two groups, there were both ISES, and VES. However, if ISES in patients with PMV were registered extremely rarely, then the average number of Their GES was comparable to the same indicator in the group of idiopathic heart rhythm disorders and was recorded significantly more often in comparison with patients who had other changes in the cardiovascular system.

Physiologically, pregnancy is accompanied by pronounced changes in central and peripheral hemodynamics, which increase with In the second trimester, they are manifested by an increase not only in the stroke volume (by 30-45% of its value before pregnancy), but also in the minute volume of the heart, reaching a maximum (33-50% of the initial level) at the 26-32 th week of pregnancy. During pregnancy, physiological tachycardia develops: heart rate by the end of pregnancy exceeds the heart rate before pregnancy by 15-20 in 1 minute. There is also a decrease in the total peripheral vascular resistance in by an average of 12-34%. These hemodynamic factors in patients with organic changes in the cardiovascular system can lead to cardiac arrhythmias, which was noted in this study.

The gestational period is characterized by a physiological increase in the activity of the renin-angiotensin-aldosterone system, which contributes to an increase in the volume of circulating blood, mainly due to an increase in plasma volume by about 40%. In addition, systemic vasodilation is an important factor in the adaptation of CVS to pregnancy, in the development of which not only plays a role increased secretion of nitric oxide and other vasodilating factors, but also an increase in the level of estrogens and progesterone, which contribute to an increase in the sensitivity of adrenoreceptors to hormones of the sympathetic-adrenal system. From the very beginning of pregnancy to childbirth, β-adrenoreactivity increases and decreases α-adrenoreactivity, which is a necessary condition for reducing the contractile activity of the myometrium in order to carry a fetus. Density beta-adrenergic receptors increase in myometrium under the action of progesterone. By itself, the activation of beta-adrenergic receptors It can contribute to the development of arrhythmia, as we found earlier.

Apparently, the so-called “idiopathic arrhythmias", according to researchers, are

largely due to the proarrhythmogenic effect of the sympathicoadrenal system, the functional activity of which increases under the influence of female sex hormones. An increase in ectopic activity in patients with MVP is also associated with autonomic dysfunction, which is traditionally perceived by cardiologists as an option, especially in the absence of hemodynamically significant mitral regurgitation It is normal and rarely requires therapy. It is known that in MVP there is a genetically determined defect in collagen synthesis, a decrease in the intracranial magnesium level, in conditions of deficiency of which fibroblasts produce defective collagen of the mitral valve flaps. Clinically, MVP is often manifested by disorders of the autonomic regulation of the heart rhythm, which are recorded with a frequency of more than 70%. During pregnancy, even in practically healthy women, activation of the sympathetic-adrenal system is noted, which in patients with MVP can lead to arrhythmias, and a large the number of high-grade HES in the same patients can have an effect on intracardiac hemodynamics and in the presence of additional risk factors (electrolyte imbalance, infectious process, stress, etc.) provoke stable ventricular tachyarrhythmias.

## CONCLUSION

Thus, the results of the study indicate that complex cardiac arrhythmias can occur in pregnant women both against the background of cardiovascular pathology, including congenital and acquired heart defects, post-myocarditis cardiosclerosis, MVP with minor mitral regurgitation, and in the absence of organic changes from internal organs and metabolic processes, which requires careful dynamic monitoring for such patients and in case of hemodynamic instability or with the development of life-threatening arrhythmias of timely adequate therapy.

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