

# Prevalence and etiological factors of heart rhythm and conduction disorders among those who sought medical help from a cardiologist at the outpatient stage

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## **Abstract:**

The study included 652 patients with persistent rhythm and conduction disturbances who consulted a cardiologist of a consultative-diagnostic polyclinic during 2 years. Possible etiological factors of arrhythmias occurrence in the examined patients were identified. In 48 (8.84%) patients no visible causes of rhythm disturbances were revealed. This group of patients underwent magnetic resonance imaging (MRI) of the heart to clarify the nature of arrhythmias. In 32 patients cardiac MRI made it possible to determine the probable cause of cardiac rhythm disturbances, with a high frequency of myocarditis signs detected at MRI ( $\frac{1}{3}$  of patients examined).

**Keywords:** rhythm and conduction disorders, aetiology of arrhythmias, idiopathic rhythm disorders, cardiac magnetic resonance imaging..

## INTRODUCTION.

Heart rhythm disorders are now observed worldwide and have become an important medical and social problem in countries. Rhythm disturbances are so great that it is an important factor in the development of a number of diseases.

Addressing malignancies increases life expectancy by 1 year, and addressing arrhythmias increases life expectancy by 4 years. Cardiac arrhythmias represent a global epidemic and its prevalence has doubled in the last 30 years.

In Russia, >24% of the population is overweight. An increase in body mass index (BMI) of 5 kg/m<sup>2</sup> has been shown to increase the risk of cardiac arrhythmias by 30%. During a year 1300 thousand people die of cardiovascular diseases (CVD) in Russia, arrhythmic deaths occur in more than 100 thousand people [1]

Heart rhythm disorders (HRD) are one of the causes of mortality and disability of patients with CVD. In this regard, the problem of LRS remains urgent. Cardiac rhythm disturbances are common in individuals of different ages, among healthy individuals and individuals suffering from a wide variety of diseases [2]. Meanwhile, the prevalence of various LDCs in the initial outpatient medical care, the structure of various types of LDCs in the total number of visits, as well as the predominant etiological factors are insufficiently studied.

Among the diagnostic methods of arrhythmia investigation, in addition to electrocardiography, daily electrocardiogram (ECG) monitoring and stress methods, electrophysiological study is becoming increasingly important. However, it cannot always answer the question about the etiological nature of LDC. In this aspect, some researchers attach special importance to noninvasive imaging methods [3], including echocardiography (ECG), myocardial scintigraphy, computed tomography-chest angiography, and cardiac magnetic resonance imaging (MRI). Cardiac MRI shows promise, especially in cases of so-called idiopathic LDCs. There is anecdotal evidence that MRI allows risk stratification in patients with IHD [4], which is important for timely intervention in patients with unfavorable prognosis. Cardiac MRI has become a highly sensitive and specific tool for the diagnosis of myocarditis. MRI has a unique potential to detect structural changes characteristic of myocarditis, such as intracellular oedema, increased capillary permeability, hyperemia and, in more severe cases, 'honeycomb' myocardial necrosis with subsequent tissue fibrosis [5]. The diagnostic value of cardiac MRI with contrast in detecting myocarditis is about 80% [6].

**Purpose of the study:** to determine the prevalence of cardiac rhythm and conduction disorders, their structure and etiological factors in the total number of visits to a cardiologist, to identify a group of patients with idiopathic LDCs.

### Material and Methods

The study included 652 patients with persistent cardiac rhythm and conduction disorders aged from 17 to 89 years (mean age was 67.8±15 years). During 2 years, 4,373 patients consulted a cardiologist of the consultative and diagnostic polyclinic. All of them underwent electrocardiography on the day of the visit. In 652 of them some or other LDC and (or) conduction abnormalities (recorded during ECG registration on the day of the visit, as well as on previous ECGs and Holter daily monitoring) were detected during the visit. These patients were included in the study (522 men, 130 women), which accounted for 14.9% of those who sought medical care.

Out of 652 patients, 545 patients with clinically significant LDCs during daily ECG monitoring were identified, i.e. the number of ventricular extrasystoles (VE) and supraventricular extrasystoles (SVE) exceeded the acceptable norm according to A. Dabrowski et al. [7] (individuals with bradyarrhythmia's and blockades were not included in the analysis due to the small number of this group). The groups of patients were comparable in age, sex, severity of the course of the underlying disease, spectrum of concomitant pathology and the volume of treatment. These patients were divided into 3 groups in order to assess the frequency of ventricular and supraventricular arrhythmias:

- Group 1: 96 patients with predominant LDC of VE type - 80 men and 16 women, mean age 68 (18-89) years;

- Group 2: 343 patients with predominant LDC of VTE type - 271 men and 72 women, mean age 67 (17-83) years;

- Group 3: 106 patients with combined LDC (VE and VTE) - 94 men and 12 women, mean age 65 (18-87) years. The mandatory scope of examination for a patient included medical examination, laboratory tests - clinical blood analysis, biochemical analysis (potassium, sodium, magnesium, chlorine, glucose, lipid composition, creatinine, total protein), thyroid hormones, coagulogram; instrumental studies - ECG, ECG diurnal monitoring, chest X-ray, EchoCG.

### Seeking medical attention

Indicator	Total	Abs. cancers	%	Abs. cancers	%	Abs. cancers	%
over ventricular extrasystoles	371	234	56,9	137	35,9	137	21
ventricular extrasystoles	357	313	54,8	44	6,8	44	6,8
Atrial fibrillation	299	39	6	260	39,9	260	39,9
Paroxysmal LVAD	163	91	14	72	11,04	72	11,04
Paroxysmal VT	52	45	6,9	7	1,07	7	1,07
<b>Atrioventricular blockade</b>							
• I	80	26	4	54	8,3	54	8,3
• II	17	6	0,92	11	1,7	11	1,7
• III	8	2	0,3	6	0,92	6	0,92
• sick sinus syndrome	65	5	0,77	60	9,2	60	9,2
Intraventricular blockade	273	24	3,68	249	38,1	249	38,1
Interval prolongation QT	3	3	0,46	0	0	0	0

SVE, supraventricular extrasystoles; VE, ventricular extrasystoles; SVT, supraventricular tachycardia; VT, ventricular tachycardia; SSSS, sinus node weakness syndrome.

### Results

An attempt to identify the leading cause of arrhythmia in patients of the examined groups showed that ischaemic heart disease (IHD) made the maximum contribution to the development of LRS (Table 2). It should be noted that in the group with predominantly supraventricular rhythm disturbances (SVRD) patients with a history of pulmonary embolism (PTE), chronic heart failure (CHF) of II-IV functional class (FC) were significantly more frequent, presence of a pacemaker, oncological diseases, hyperthyroidism, hyperkalaemia and hypercholesterolemia, as well as exacerbation of gastrointestinal diseases; patients with acquired heart defects and

hypercholesterolemia predominated in the group with combined LDCs, and in the group with

predominantly ventricular arrhythmias (VRA) there were more patients with prosthetic aortic valve. It turned out that in the group with predominantly VRS there were significantly more male smokers with a history of CHD, and in the group with predominantly VRS there were statistically significantly more perimenopausal women.

As shown in the figure, 93% of patients in the group with predominantly LVD, 87% in the group with combined LDC, and 75.8% in the group with predominantly LVD noted the presence of acute or chronic psych emotional overstrain at the time of seeking medical care for LDC.

Psychosocial stress is of exceptional importance in the genesis of arrhythmias [8]. Stress is an integral part of our life. The term itself (stress - pressure, tension) means a complex mental and physiological state arising in response to a variety of influences. Each of us quite often experiences a state of tension under certain circumstances. But it is not the circumstances themselves, but our reaction to them that causes stress.

### **Conclusions**

1. The prevalence of heart rhythm disorders in the structure of visits to a cardiologist is 14.9%, the main contingent is represented by elderly and old people. 2. The leading cause of arrhythmias development was ischaemic heart disease. The predominant background disease was hypertension. In the group with predominantly supraventricular arrhythmias, patients with a history of pulmonary embolism, chronic heart failure of functional class II-IV, pacemaker, hyperthyroidism, hyperkalemia, hypercholesterolemia, oncological diseases, exacerbation of gastrointestinal tract diseases were significantly more frequent, and there were significantly more perimenopausal women. In the group with predominantly ventricular rhythm disturbances, there were more patients with prosthetic aortic valve, and there were significantly more male smokers with a history of coronary heart disease. In the group with combined rhythm disturbances, patients with acquired heart defects and hypercholesterolemia predominated. The main provoking factor of arrhythmia development was psycho-emotional stress. 3. In 48 patients (8,84%) the identification of arrhythmia nature, according to traditional methods of investigation, was difficult, in 32 patients of this category magnetic resonance imaging of the heart allowed to establish a probable cause of rhythm disturbance ( $\frac{2}{3}$  of all examined patients). The high frequency of myocarditis signs detection ( $\frac{1}{3}$  of examined patients) is noteworthy.

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