



Evaluation of The Relationship of Ischemic Changes on Ecg with Different Characteristics of Pain Syndrome

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Article History	Abstract
Received: 06 June 2023 Revised: 05 Sept 2023 Accepted: 25 Nov 2023	<p><i>The success of effective treatment and prevention of coronary artery disease is largely associated with the early diagnosis of this disease. Currently, a number of diagnostic methods are used to detect CAD, which include survey, electrocardiography (ECG), echocardiography (EchoCG), coronary angiography, various pharmacological tests, and exercise tests (1,2). The most accessible methods for diagnosing coronary artery disease in primary health care, where patients first turn, are a survey and an ECG. However, ECG taken at rest does not always reveal ischemic changes in the myocardium (4,5).</i></p>
CC License CC-BY-NC-SA 4.0	<p>Keywords: Ischemic Heart Disease, Angina Pectoris, Myocardial Ischemia, Pain In The Heart Area, Pain Localization</p>

1. Introduction

The questionnaire method for diagnosing coronary artery disease, proposed by Rose J., Blackburn H. in 1968, is quite simple, economical, accessible and of great importance for detecting coronary artery disease in an outpatient setting and conducting mass preventive examinations of the population. However, this method only detects cases of typical exertional angina when there is a clearly defined pain attack. At the same time, in their practice, doctors encounter cases of atypical or painless course of the disease. In such cases, the value of this questionnaire is significantly reduced (6,5). When assessing the clinical picture of coronary artery disease, the frequency of various pain sensations is important. At the same time, these pain sensations can be manifestations not only of IHD, but also of many other diseases other than IHD. Therefore, the study of the relationship between the presence and amount of pain sensations, on the one hand, and the presence of ECG changes, on the other hand, is to a certain extent a characteristic of the relationship of pain sensations with coronary artery disease (3,7). Purpose of the study. To study the relationship of ischemic changes on the ECG with various characteristics of the pain syndrome.

2. Materials And Methods

The study was conducted in family polyclinics in Bukhara. The survey included 1332 people complaining of pain in the chest and in the left arm. 167 people were diagnosed with coronary artery disease. ECG taken at rest in 117 patients with coronary artery disease revealed ischemic changes, and in 50 patients such changes were not detected. The average age of the surveyed was 51.7±2.6 years. ECG was taken at rest in 12 standard leads. IHD data were analyzed according to the Minnesota code according to the following criteria: a definite myocardial infarction - the presence of cicatricial changes on the ECG (categories 1-1.2 MC); angina pectoris - the presence of a pain syndrome that meets the criteria of the WHO questionnaire, in the absence of categories 1-1.2 MK; painless coronary artery disease - in the presence of ischemic changes on the ECG (categories 4-1.2 and 5-1.2 MK) in the absence of left ventricular hypertrophy, angina pectoris and categories 1-1.2 MK; possible myocardial infarction in history (according to the WHO questionnaire) - in the absence of cicatricial and ischemic changes on the ECG, as well as angina pectoris; possible coronary artery disease, including possible cicatricial changes in the myocardium according to ECG (categories 1-2-8 and 1-3 MK), possible myocardial ischemia (categories 4-3, 5-3 MK), arrhythmic form (categories 6-1.2; 7 -1 and 8-3 MK), myocardial ischemia in the presence of left ventricular hypertrophy (categories 4-1.2 and 5-1.2 in the presence of 3-1.3 MK). Among individuals without ischemic changes on the ECG

taken at rest, the diagnosis of coronary artery disease was established on the basis of positive tests with physical activity. Statistical data processing was carried out on a personal computer using the standard MedCalc application package. Absolute and relative indicators were taken into account, including the average values of quantitative indicators and their standard deviations (M; +δ). The relationship between the quantitative indicators of various traits was studied using correlation analysis (correlation coefficient - r). When assessing the reliability of differences in the studied indicators, Student's criterion (t) was used.

3. Results and Discussion

To study the relationship of pain sensations with ECG changes, the prevalence of pain sensations among individuals with and without ischemic changes on the ECG was studied. Analysis of the obtained data showed that pain sensations among patients with coronary artery disease are significantly more common than among those without this disease (Table 1).

Table 1: The frequency of pain, depending on the presence of ischemic changes on the ECG, on average for 1 month

Presence of coronary artery disease	No coronary artery disease	Ischemic heart disease	
		ECG -	ECG +
Availability ECG changes	No ECG changes		
n	1165,00	50,00	117,00
M	0,83	7,26 *	2,07 * §
± δ	0,33	0,94	0,47

Note: the table shows the reliability of differences in indicators - *) between groups with and without coronary artery disease; § - between groups with and without ECG changes.

Data on the relationship between the frequency and duration of pain syndrome with coronary artery disease do not yet fully reflect the features of the clinical picture of this disease. Therefore, the relationship between pain localization and the presence of ischemic changes on the ECG was further studied. The data obtained (Table 2.) indicate that there is a certain relationship between the localization of pain sensations and the presence of ischemic changes on the ECG. As follows from the data obtained, in all the groups under consideration among persons without pain syndrome, the frequency of ischemic changes on the ECG was significantly higher than the frequency of cases of coronary artery disease without ischemic changes on the ECG. Moreover, these differences were statistically significant in all cases. The prevalence of IHD cases with ischemic changes on the ECG in the absence of pain of various localization did not have significant differences.

Table 2: The prevalence of ischemic changes on the ECG at different localization of pain

Presence of coronary artery disease	No coronary artery disease	Ischemic heart disease		Total CHD
		Without ECG	With ECG	
Pain localization	No coronary artery disease			
Upper third of the sternum				
No pain (n=1281)	88,91	2,89	8,20 *	11,09
There are pains (n=51)	50,98	25,49	23,53 #	49,02 §
Middle and lower third of the sternum				
No pain (n=1252)	89,78	2,56	7,67 *	10,22
There are pains (n=80)	51,25	22,50	26,25 #	48,75 §
Heart area				
No pain (n=742)	90,97	1,75	7,28 *	9,03
There are pains (n=590)	83,05	6,27	10,68 * !	16,95 § !
Left hand				
No pain (n=1241)	90,17	2,18	7,66 *	9,83
There are pains (n=91)	50,55	25,27	24,18 #	49,45 §
Scapular region				
No pain (n=1246)	88,20	3,21	8,59 *	11,80
There are pains (n=86)	76,74	11,63	11,63 !	23,26 § !

Note: the table shows the significance of differences between -*) the frequency of cases of presence and absence of ECG changes;#) the frequency of cases of ECG changes in groups with and without pain; §) frequency of coronary artery disease in groups with and without pain; !) the frequency of cases of ECG changes and coronary artery disease with pain behind the sternum and left arm relative to pain in the heart and subscapular region. At the same time, in the presence of pain, the highest prevalence of ischemic changes on the ECG occurred among those who noted pain behind the sternum and in the left arm. The incidence of CHD with ischemic changes on the ECG among people with pain behind the sternum and in the left arm was 2-2.5 times higher, and in general for CHD - 2-2.9 times higher than among people who noted pain in region of the heart and in the subscapular region. When analyzing the significance of different localization of pain, it turned out that the prevalence of ischemic changes on the ECG and CHD was generally higher among people with pain than among people without pain. However, significant differences were found only for the localization of pain behind the sternum and left arm. Thus, from the presented data it follows that for ischemic changes on the ECG and IHD in general, pain behind the sternum and in the left arm is more characteristic than pain in the heart and in the subscapular region. At the same time, a certain issue was the question of the significance of the number of pain zones in patients with coronary artery disease. To study this issue, the prevalence of ischemic changes on the ECG among individuals with a different number of areas of pain localization was considered (Table 3.). According to the data obtained, there is a direct relationship between the number of areas of pain localization and ischemic changes on the ECG.

Table 3: The prevalence of ischemic changes on the ECG among persons with a different number of areas of pain localization (in%)

Presence of coronary artery disease	No coronary artery disease	No ECG changes	Have ECG changes	Total CHD
Number of regions localizations				
No pain (n=687)	93,30	0,44	6,26	6,70
1 area (n=432)	90,97	1,39	7,64	9,03
2 area (n=178)	65,73	17,42 *	16,85 *	34,27 *
3 area (n=31)	45,16	25,81 *	29,03 *	54,84 *
4 area (n=3)	0,00	33,33	66,67 *	100,00

Note: the table shows the significance of differences relative to the previous group with fewer areas of pain localization.

As the number of locations increases, there is a significant and statistically significant increase in the prevalence of both ischemic ECG changes and cases of CAD without ischemic ECG changes. This process is more typical for an increase in ischemic changes on the ECG.

It should be noted that between the group without pain syndrome and the group with one localization of the pain syndrome, there is a slight increase in the frequency of ischemic changes on the ECG and CHD in general. From the above information, we can conclude that an increase in pain zones is associated with an increased risk of coronary artery disease. At the same time, the value of localization of pain in only one area, as a marker of coronary heart disease, approaches in its significance to the painless form of coronary artery disease. In the available literature, it was not possible to find information about the significance of different pain syndrome colors in assessing the probability of having coronary artery disease. Meanwhile, the identification of the features of the color of the pain syndrome can, to a certain extent, contribute to the timely detection of coronary artery disease, the assessment of its severity and the determination of the prognosis for this disease. Therefore, the relationship between the color of the pain syndrome and the presence of ischemic changes on the ECG was further analyzed.

For this, such variants of the pain syndrome were considered by patients as stabbing, pressing, squeezing and burning. The data obtained (Table 4.) indicate that the color of the pain syndrome is to a certain extent associated with the presence of ECG changes. The prevalence of ischemic changes on the ECG was the lowest among those who reported stabbing pains (10.7%). Among persons who had pressing, compressive and burning pains, the frequency of ischemic changes on the ECG was almost 2 times higher (19.26%; 18.36% and 20.00%, respectively). Cases of coronary artery disease with no ischemic changes on the ECG were also the least common with stabbing pains and most common with burning pains. All cases of coronary artery disease were the least common among people with stabbing pains (16.58%), and most often among people with burning pains (41.54%). In almost all groups under consideration, both in the presence and absence of pain, the frequency of ischemic changes on the ECG was higher than the prevalence of cases of coronary artery disease without ischemic changes on the ECG. The exception is a group of people who have burning pain. In this group, the prevalence of ischemic ECG changes was not significantly different from the incidence of coronary artery disease without ischemic ECG changes. At the same time, it was in this group (the group with burning pains) that the prevalence of coronary artery disease was the highest.

Table 4: The prevalence of ischemic changes on the ECG among individuals with different pain syndrome colors (in%)

Presence of coronary artery disease	No coronary artery disease	Ischemic heart disease		Total CHD
		Without ECG	With ECG	
Pain coloring	No coronary artery disease			
Stabbing				
No pain (n=885)	88,93	2,49	8,59 #	11,07
There are pains (n=374)	83,42	5,88	10,70 #	16,58 §
Pressing				
No pain (n=1124)	89,32	2,67	8,01 #	10,68
There are pains (n=135)	70,37	10,37	19,26 *#	29,63 §
Compressive				
No pain (n=1052)	90,11	2,47	7,41 #	9,99
There are pains (n=207)	72,95	8,70	18,36 *#	27,05 §
Burning				
No pain (n=1194)	88,86	2,51	8,63 #	11,14
There are pains (n=65)	58,46	21,54	20,00 *	41,54 §

Note: the table shows the significance of differences between -

*) the frequency of cases of the presence and absence of ECG changes relative to the group with stabbing pains; #) the frequency of cases of presence and absence of ECG changes in groups with and without pain; §) the frequency of coronary artery disease relative to the group with stabbing pains. From the presented data, it can be concluded that, in general, all types of pain are characteristic of IHD. However, more characteristic are pressing, squeezing and, especially, burning pains.

4. Conclusion

Thus, with ischemic changes in the ECG and coronary artery disease, pain behind the sternum and in the left arm is characteristic, rather than pain in the heart and in the subscapular region. With ischemic changes on the ECG, stabbing pains occurred in 10.7% of cases, pressing in 19.26%, compressing in 18.36%, and burning pains in 20.00% of cases. All cases of coronary artery disease were the least common among people with stabbing pains (16.58%), and most often among people with burning pains (41.54%).

References:

- 1.Балева Е.С., Кром И.Л., Алешкина О.Ю. Объективизация отдалённого клинического прогноза больных ишемической болезнью сердца // Фундаментальные исследования. – 2013. - № 7 (часть 3). – С. 511-513.
2. Бадритдинова Матлюба Нажмидиновна, Рауфов Алишер Анварович, & Язмурадов Фарход Акмурадович (2017). Связь болевого приступа у больных ишемической болезнью сердца при наличии отдельных компонентов метаболического синдрома. Биология и интегративная медицина, (6), 23-36.)
- 3.Нуриллаева Н.М., Многофакторная профилактика ишемической болезни сердца в условиях первичного звена здравоохранения // Автореф. докт. дисс. Ташкент, 2012. С. 46.

- 4.Рекомендации по лечению стабильной ишемической болезнью сердца. ESC 2013 // Российский кардиологический журнал. – 2014. – № 7. – С. 7–79.
- 5.Кардиоваскулярная профилактика 2017. Российские национальные рекомендации // Российский кардиологический журнал. – 2018. – № 6. – С. 7–122.
- 6.Malakar AK, Choudhury D, Halder B, Paul P, Uddin A, Chakraborty S. A review on coronary artery disease, its risk factors, and therapeutics. / J Cell Physiol. 2019 Aug;234(10):16812-16823. DOI: 10.1002/jcp.28350. Epub 2019 Feb 20
- 7.Жураева Хафиза Искандаровна, and Алимова Шахноза Азаматкизи. "Применение опросного метода в ранней диагностике стенокардии в качестве скринирующего теста при профилактических обследованиях населения" Биология и интегративная медицина, no. 6, 2017, pp. 14-22.
- 8.Турсунов Х.Х., Бабич С.М. Особенности течения ИБС в условиях резкоконтинентального климата ферганской долины Узбекистана //Современные проблемы науки и образования. – 2008. – № 3 – С. 31-34.