Assessment of the Quality Of Life and Severity of Depression in People with Circulatory System Diseases

Saida Alirzaevna Magomedova
Angela Sergeevna Damadaeva
Dagestan State University,
43-a Gadzhiyev Street, Makhachkala, Republic of Dagestan

Abstract
Every fifth patient with diseases of the circulatory system (DCS) suffers from a major depressive disorder (MDD). Along with a high level of comorbidity with cardiovascular pathology, depression is associated both with an increase in morbidity and with more unfavorable outcomes of coronary heart disease. In the Republic of Dagestan, DCS ranked first among the main classes of causes of death among the adult population during the last 5 years. This study is aimed at the examination of the association of the risk of coronary events with the severity of depression and the quality of life in people with coronary heart disease. A cross-sectional study was conducted in which 1,786 patients of both sexes over the age of 59 years, suffering from ischemic heart disease, were randomly included. The assessment of the degree of cardiovascular risk in patients with coronary heart disease, depending on the severity of depression, showed the presence of statistically significant differences in the groups with different levels of severity of depression (χ^2 = 160.66, 2057.06, 166.19, p = <0.001). The quality of life in terms of the physical and psychological component according to SF36 in all patients, regardless of the degree of risk of coronary events, was below the average population value. The results of the study testify to the need to review the screening activities, as well as the preventive treatment for elderly patients with coronary heart disease, as a special social risk group.
Keywords: circulatory system diseases, coronary heart disease, quality of life, depression, SF36, PHQ9

INTRODUCTION

The diseases of circulatory system (DSC) and depression are currently the two most common causes of disability in high-income countries. According to the researchers' forecasts, the same picture will be observed in all countries by 2030 [1].

Approximately 1 of 5 patients with DCS suffers from a major depressive disorder. In addition to the high level of comorbidity with cardiovascular pathology, the depressions were associated with an increase in the incidence in the number of DCS cases and with more unfavorable outcomes of coronary heart disease (CHD), even after control over the traditional risk factors for cardiovascular disease [2].

Historically, age, sex, hereditary complications in cardiovascular diseases, smoking, hypertension, diabetes, cholesterol, obesity, and physical inertia have been recognized as "traditional risk factors" for cardiovascular diseases. In recent decades, the studies have shown that the psychosocial factors play an equal role in predicting the morbidity and mortality from cardiovascular diseases [3].

The INTERHEART study, which examined the modifiable risk factors for the development of acute myocardial infarction (MI) in 25,000 patients from 52 different countries, showed that psychosocial factors were stronger risk factors for myocardial infarction than diabetes, smoking, hypertension and obesity. The psychological factors considered in this study included depression, the locus of control, the perceived stress and the life events. Based on the results of this and other studies, depression was officially recognized as an ischemic heart disease (IHD) risk factor in the 2010 Global Burden of Disease Study [4-5].

The improvement or restoration of the quality of life is an important aspect in the treatment of patients with DSC. The cross-sectional epidemiological studies of the patients with cardiovascular pathology confirm a strong relationship between depression and quality of life. It can be argued that depression is in fact the most important factor in the level of overall quality of life. In patients with chronic heart failure, the level of depression is more significant in predicting the quality of life level than the socio-demographic variables, lifestyle problems such as alcohol and smoking, the severity of heart failure or concomitant diseases [6-8].

In the Republic of Dagestan, DCS rank first among the main classes of causes of death among the adult population. In 2015, the DCS mortality rate in the Republic was 222.0 per 100 thousand people [9]. The high socioeconomic and economic importance of the problems of the DCS requires conducting the population studies to research the associated risk factors and to develop the therapeutic and preventive measures.

PURPOSE

This study is aimed at the research of the association of the risk of coronary events with the severity of depression and the quality of life in people with coronary heart disease.

METHODS AND MATERIALS
The design of the study

This cross-sectional study included randomly 1,786 patients of both sexes over the age of 59 years, suffering from IHD and undergoing the treatment on an outpatient basis at the clinics in the Republic of Dagestan.

Table 1: Identification of the individual overall risk of coronary complications

Risk category	Target CS LDL	Starting level of low-density lipoprotein (LDL) cholesterol for lifestyle changes and drug administration
High risk: IHD or its equivalents (10-year risk > 20%)	<2.6 mmol/l Target: <1.81 mmol/l	≥ 2.6-3.36 mmol/l – Drug therapy + lifestyle change
Moderately high risk: 2 or more risk factors (10-year risk of 10-20%)	< 3.36 mmol/l	≥ 3.36 – 4.14 mmol/l – lifestyle change, possible drug therapy
Minimum risk: 0-1 risk factors	< 4.14 mmol/l	≥ 4.14 – 4.9 mmol/l - lifestyle change, possible drug therapy

The age group over 59 years was selected taking into account that the cardiovascular pathology is much more frequent in this age group than in the other age groups. For the analysis, the cities with the population of 30 thousand or more people were selected: Makhachkala, Buinaksk, Derbent, Izberbash, Kaspiysk, Kizilyurt, Kizlyar and Khasavyurt, to ensure the quality of the results of the survey for the urban population of the republic.

The formation of the database

The data collection is performed using the method of survey using the specific questionnaires to determine the risk of coronary events, the severity of depression and the quality of life by means of telephone interviews of the patients for which the data were provided by the accounting organizations. All patients gave the oral informed consent to participate in the study and received a guarantee of complete confidentiality of the personal data. The database for this study was being formed from October 2016 to March 2017.

The evaluation of the risk of coronary complications

To determine the individual total risk of coronary events in the participants of the study, the authors used the methodology recommended in the IIIrd report of the experts of the National Cholesterol Educational Program (NCEP) "High blood cholesterol in adults – detection, evaluation and treatment" in order to assess the overall risk of coronary events during the next 10 years in every individual patient [10] (Table 1).

Assessment of depression

To determine the severity of the symptoms of depression, the authors used the PHQ9 health assessment questionnaire, recommended by the American Heart Association Science Advisory.

Table 2: The interpretation of the results using the PHQ-9 questionnaire [13]

PHQ-9 (points) result	Severity of depression
0-4	No – minimum
5-9	Mild
10-14	Moderate
15-19	Average
20-27	Severe

PHQ9 is an extended version of PHQ2 and differs by the inclusion of seven additional symptoms for the assessing of depression. This mechanism was validated in a variety of population studies, including the study of depression in patients with IHD. According to different authors, the sensitivity level varied from 0.87 to 0.88, and the specificity level was from 0.79 to 0.84 [11-12] (Table 2).

Life quality assessment

The life quality assessment study was conducted using the SF36 questionnaire. The answers to the 36 questions of the questionnaire were grouped into eight scales: Physical Functioning (PF), Role-Physical Functioning (RP), Bodily Pain (BP), General Health (GH), Vitality (VT), Social Functioning (SF), Role-Emotional (RE) and Mental Health (MH). The points of each scale ranged between 0 and 100, where 100 represented the total health; all scales formed two indicators: mental and physical well-being.

The results were presented in the form of assessment in points for 8 scales grouped in such a way that a higher score indicates a higher level of quality of life.

The scales were summarized in two components: "Physical" and "Psychological" component of health [14]:
1. Physical health component (PH):
• Physical functioning.
• Role-physical functioning due to physical condition.
• The intensity of pain.
• General health.
2. The psychological component of health (Mental Health – MH):
• Mental health.
• Role-physical functioning due to emotional state.
• Social functioning.
• Vital activity.

Taking into account the fact that in the Republic of Dagestan there were no earlier population-based studies to determine the quality of life of healthy people living in urban areas, the authors used the data taken from the population study of the quality of life of the residents of rural settlements in the Republic of Dagestan [15].

Procedure of statistical analysis

The statistical analysis included the description of central trends as an average for continuous quantitative variables corresponding to a normal distribution. The qualitative data were presented in the form of absolute data and their percentage expression.

For categorical data, the statistical significance of differences in groups was determined by calculating the chi-square criterion (χ^2); for quantitative data, the Student's T-test was calculated. A P-value of less than 0.05 was taken as critical. The statistical analysis procedure was performed using SPSS 20 for Windows.

RESULTS OF THE STUDY

In the course of the study, it was found that among all the patients examined, the majority were represented by the people with a moderately high risk of coronary artery disease (76.76%). At the same time, this distribution was statistically significantly different between the groups of men and women and amounted to 74.15% and 79.14% respectively. For the following 10 years, 15.75% of males and 10.05% of females are attributed to the group of high risk of coronary complications. The rest of the patients were represented by the cases with minimal risk – 12.77% (10.11% males and 10.80% females) (Figure 1).

The evaluation of the degree of cardiovascular risk in patients with IHD, depending on the severity of depression, showed the presence of statistically significant differences in the groups with different severity levels of depression (χ^2 = 160.66, 2057.06, 166.19 at p = <0.001).

The persons with a minimal risk more often showed no symptoms of depression – 75.94%, a small proportion of patients showed the symptoms of mild depression – 16.58% and only 7.49% of patients suffered from moderate depression. The group of patients with a moderately high risk of coronary events was mainly represented by the people with moderate depression according to PHQ-9 questionnaire – 67.98%, at the same time, about one third of patients – 30.12% – were attributed to the moderate depression group, less than 1% showed the symptoms of a severe depression. A group with a high risk of coronary complications in the next 10 years was of great interest. In this group, a significantly larger proportion of patients had the symptoms of moderate depression – 49.56% and more than 3% had the symptoms of severe depression (Table 3).
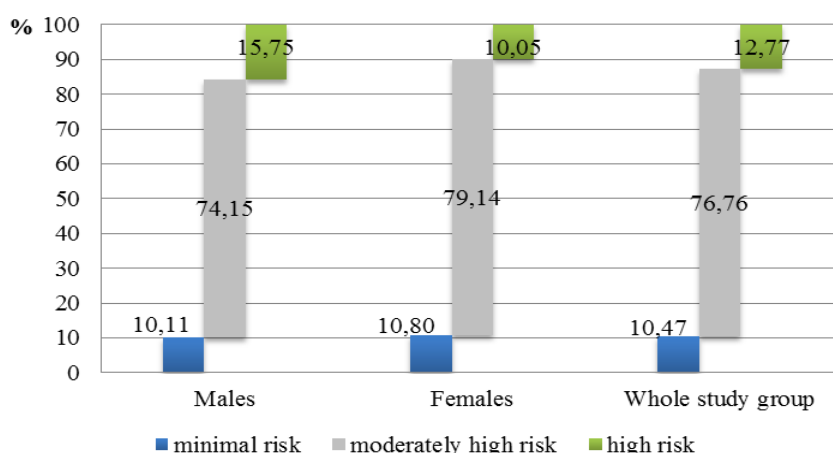

Figure 1 – Risk of coronary complications in the study group, n = 1786

Table 3: The risk of coronary events in patients with IHD, depending on the severity of depression

Risk Category	Severity of depression PHQ-9					χ^2	D.f.	p-value
	No – minimum	Mild	Moderate	Average	Severe			
Minimum	75.94	16.58	7.49	0	0	160.66	2	<0.001
Moderately high	0	1.53	67.98	30.12	0.36	2057.06	3	<0.001
High	0	4.39	42.11	49.56	3.95	166.19	3	<0.001

Table 4: The risk of coronary complications in patients with IHD depending on the component of physical health (SF36)

Risk Category	Life quality (Physical health – PH)		t-test	D.f.	p-value
	Average population value PH	Average value in the study group PH			
Minimum	65.28	58.17	0.326	1	0.388
Moderately high	65.28	39.21	3.106	1	0.003
High	65.28	34.85	3.985	1	0.003

Table 5: The risk of coronary events in patients with IHD, depending on the component of mental health (SF36)

Risk Category	Life quality (Mental Health – MH)		t-test	D.f.	p-value
	Average population value MH	Average value in the study group MH			
Minimum	67.53	54.91	-3.849	1	<0.001
Moderately high	67.53	40.32	2.149	1	0.02
High	67.53	38.11	3.720	1	<0.001

The analysis of the risk of coronary events in patients with IHD, depending on the physical health component according to SF36, showed no statistically significant difference in the minimum risk group (58.17) and the average population value PH (65.28) (t = 0.326; D.f. = 1; p = 0.388). In the group with a moderately high level of risk, the average PH value (39.21) was significantly lower than the population average (65.28) (t = 3.106, D.f. = 1, p = 0.003). The quality of life index was significantly lower than the average population value in the IHD group with a high risk of coronary events, 34.85 versus 65.28 (t = 3. 985, D.f. = 1, p = 0.003) (Table 4).

When analyzing the psychological health indicators in patients with IHD, classified by the degree of risk of coronary complications in the next 10 years, the statistically significant differences were found by the authors in all groups. The group with the minimum risk was significantly inferior in terms of MH index to the average population value – 54.91 versus 67.53 (t = -3.849, D.f. = 1, p < 0.001). The patients with moderately high risk had a significantly lower MH value (40.32) than healthy residents of the republic (67.53) (t = 2.149, D.f. = 1, p = 0.02). The average overall value according to the mental health scale (SF36) was significantly lower in the group with a high coronary risk compared to the other risk groups and, as a consequence, with an average population value – 38.11 versus 67.53 (t = 3.720; D.f, = 1; P < 0.001) (Table 5).

DISCUSSION

The state of depression is highly prevalent at various pathological conditions: arterial hypertension (AH), IHD, stroke, chronic lung diseases, oncological diseases, diabetes, acquired immune deficiency syndrome, Parkinson's disease, as well as in case of loss of sight and hearing [16-20].

A number of studies showed that such diseases as IHD and stroke are the risk factors for the development of depression in old age. The population study participated by 10,547 women aged 47-52 years with no acute cerebrovascular accident (ACA) in a history, showed that the depression was associated with a two-fold increase in the risk of stroke within the next 12 years. The similar study involving 80,574 women aged 54-79 years with no depression in a history showed that the depression was associated with an increased risk of stroke within the next 6 years with a risk ratio of 1.29 [18, 21-22].

Also, depression is an independent risk factor for the development of cardiovascular diseases. In particular, depression is a predictor of the development of IHD in healthy people [16, 23]. The presence of depression in patients with cardiovascular diseases complicates their course. In this case, depression predetermines the quality of life of patients with IHD, and this relationship does not depend on the severity of the course of the disease. In assessing the quality of life of 503 patients with angina using the Seattle questionnaire 18 months after MI, the depressed patients had significantly different quality of life indicators than the patients without depression. A study of 5,388 patients with a verified diagnosis of coronary artery

disease and/or hypertension showed that when depression was identified during the clinical primary examination, the risk of death from cardiovascular disease increased 1.64 times, and the risk of overall mortality increased 1.82 times [24-26]. Most of the evidence suggests that incompliance with the healthy lifestyle, especially physical inactivity, is the main cause of the excess risk of cardiovascular diseases related to depression. The prospective cohort Heart and Soul Study, involving 1,024 patients with persistent coronary artery disease, showed that the people with the symptoms of depression had a 50% higher incidence of adverse cardiovascular events than those with no symptoms of depression. The risk was slightly lower with subsequent correction for the concomitant diseases and the left ventricular ejection fraction, but it still remained significant [27-33].

In this PHQ-9 study, the authors found that the patients with a moderately high risk and a high risk of coronary complications in the next 10 years were significantly more likely to suffer from moderate, average and severe depression, compared to the patients with low risk. The quality of life for the physical (PH) and mental component (MH), assessed using the SF36 questionnaire in all patients with IHD, regardless of the degree of risk of coronary events, was below the population value, with the exception of the physical component in the minimum risk group, which appeared to be significantly less affected at this level of risk of the disease than the mental component.

CONCLUSION

Cardiovascular diseases are the main cause of death, disability and the burden of disease in developed countries. Depression is common in patients with DCS and is associated with higher mortality and morbidity rates. There is sufficient evidence to support the introduction of exercises, psychotherapy and antidepressants to reduce the level of depression in patients with DCS. Despite the fact that the studies have not shown any clear results with the consistent algorithms in this regard, depression is a fundamental determinant of the quality of life. Moreover, this is the main determinant of the adherence of a patient to the appropriate medical and life strategies. Many issues remain open and require further research to develop the therapeutic and preventive tactics for such risk factors as depression in patients with DCS at the national level.

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