Russian Journal of Cardiology 2021;26(9):4670
doi:10.15829/1560-4071-2021-4670
https://russjcardiol.elpub.ru

ORIGINAL ARTICLES
ISSN 1560-4071 (print)
ISSN 2618-7620 (online)

Behavioral risk factors and clinical course of cardiovascular diseases and other noncommunicable diseases during quarantine in various regions of Russia

Mamedov M. N.[1], Druk I. V.[2], Turusheva E. A.[2], Eremina E. Yu.[3], Morozova T. E.[4], Iskenderov B. G.[5], Sapozhnikov A. N.[6], Drozdetsky S. I.[7], Badalov N. G.[4]

Aim. To assess the behavioral risk factors and the clinical course of cardiovascular diseases (CVDs) and other noncommunicable diseases (NCDs) during quarantine in various regions of Russia.

Material and methods. This multicenter cohort cross-sectional study included 205 men and women from 6 Russian cities. Further, 4 of them (Saransk, Nizhny Novgorod, Penza, Ulyanovsk) were combined into one group — the Volga region. The study included men and women aged 30-69 years with one or more NCDs (hypertension, coronary artery disease with or without myocardial infarction, type 2 diabetes, chronic obstructive pulmonary disease/asthma and cancer in patients receiving chemotherapy and/or radiation therapy) who were self-isolated during coronavirus disease 2019 (COVID-19) pandemic. For all patients, a questionnaire was used, which included socio-demographic parameters, behavioral risk factors, status of the underlying disease, incidence of COVID-19 and its complications. Self-assessment of the state of health was carried out using the European Quality of Life Questionnaire.

Results. In every third Muscovite, the intensity of physical activity decreased, and in the groups of patients from Omsk and the Volga region, it was 45% and 43%, respectively. An increase in meal frequency and an impairment of eating habits in Moscow and Omsk was noted in 18,2% and 18,7% of participants, while in Volga region subjects, these parameters were 2 times higher (42,4%). At the same time, no significant changes of alcohol consumption and smoking was revealed in the cohorts. Hypertensive crises during a pandemic were noted in all three subgroups, but more of them were recorded in the Volga region — in every third patient ($p<0,05$ compared to Moscow), in the Omsk group — in every fourth patient, and among Muscovites — no more than 5%. Clinical deterioration in patients with angina was noted in 15% of cases, while the smallest number was noted in Omsk subjects (5,3%), three times less than in other subgroups. Changes in intensity and regimen of hypoglycemic therapy were noted in patients from Omsk, while 30% of them ($p<0,05$ compared with the Volga region) increased the doses of medications taken. Chronic obstructive pulmonary disease was registered in the group with the largest number of Volga region patients — 14,1% ($p<0,05$ compared to Omsk), while 17% of patients in this group increased the dose of drugs. Any cancer was recorded in 13,6% of Muscovites, while in the other two groups — about 5%. The largest number of patients from the Volga region noted a health decline over the past year (30,8%), while every fifth patient from Omsk (19,6%) and 13,6% of Muscovites reported health changes.

Conclusion. During quarantine and self-isolation, changes in dietary habits and physical activity decline were noted among patients with NCDs, while alcohol consumption and smoking remained practically unchanged. The change in clinical status was characterized by an increase in hypertensive crisis incidence, an increase in doses of antihypertensive and hypoglycemic medication. Depending on the region, the health decline was noted by 13-31% of patients with NCDs.

Keywords: quarantine, self-isolation, regional characteristics, risk factors, noncommunicable diseases.

Relationships and Activities: none.

[1]National Medical Center for Therapy and Preventive Medicine, Moscow; [2]Omsk State Medical University of the Ministry of Health of Russia, Omsk; [3]N. P. Ogarev Mordovian National Research State University, Saransk; [4]I. M. Sechenov First Moscow State Medical University, Moscow; [5]Penza Institute of Advanced Training of Doctors — branch of the Russian Medical Academy Continuing Professional Education of the Ministry of Health of the Russian Federation, Penza; [6]Ulyanovsk State University, Ulyanovsk; [7]Volga Research Medical University of the Ministry of Health of the Russian Federation, Nizhny Novgorod, Russia.

Mamedov M. N.* ORCID: 0000-0001-7131-8049, Druk I. V. ORCID: 0000-0001-8317-7765, Turusheva E. A. ORCID: 0000-0003-3410-0213, Eremina E. Yu. ORCID: none, Morozova T. E. ORCID: 0000-0002-3748-8180, Iskenderov B. G. ORCID: 0000-0003-3786-7559, Sapozhnikov A. N. ORCID: none, Drozdetsky S. I. ORCID: 0000-0001-6998-8406, Badalov N. G. ORCID: 0000-0002-1407-3038.

*Corresponding author:
mmamedov@mail.ru

Received: 12.08.2021
Revision Received: 17.09.2021
Accepted: 24.09.2021

For citation: Mamedov M. N., Druk I. V., Turusheva E. A., Eremina E. Yu., Morozova T. E., Iskenderov B. G., Sapozhnikov A. N., Drozdetsky S. I., Badalov N. G. Behavioral risk factors and clinical course of cardiovascular diseases and other noncommunicable diseases during quarantine in various regions of Russia. *Russian Journal of Cardiology*. 2021;26(9):4670. (In Russ.) doi:10.15829/1560-4071-2021-4670

Around the world, the coronavirus disease 2019 (COVID-19) pandemic is characterized by high morbidity and socio-economic losses, which has led to changes in health system functioning and priorities [1]. This affected the quality of care for patients with noncommunicable diseases (NCDs), which is a serious medical and social problem in general [2]. On the other hand, in the first months of COVID-19 spread, it was shown that elderly patients, smoking, obesity, hypertension, male sex, cardiovascular disease (CVD), diabetes, chronic obstructive pulmonary disease (COPD), cancer, as well as their comorbidity are predictors of complications, including death [3, 4].

The World Health Organization, as one of the main measures for COVID-19 prevention, recommended restrictions, such as quarantine and self-isolation of the population, which has led to alterations in care for NCD patients. This was due to the overload of medical institutions and limited admission of patients in primary health care institutions. All these circumstances influenced the clinical course of NCDs and behavioral habits of patients [5, 6].

In 2020, the first foreign publications on the consequences of restrictive measures on the provision of elective and emergency care for patients with NCDs appeared [7]. In Russia, this topic has been little studied. However, for the development of measures to prevent quarantine consequences, the study of risk factors (RF) and clinical status of NCD patients is relevant [8, 9].

The aim was to assess the behavioral risk factors and the clinical course of CVDs and NCDs during quarantine in various regions of Russia.

Material and methods

This multicenter cohort cross-sectional study included 205 men and women from 6 Russian cities (Moscow, Omsk, Saransk, Nizhny Novgorod, Penza, Ulyanovsk). Four cities were united into one group on a regional basis — Volga region. The study included men and women aged 30-69 years with one or more NCDs, who were self-isolated during the COVID-19 period. NCDs included hypertension, coronary artery disease with or without myocardial infarction, type 2 diabetes, COPD/asthma, and cancer in patients receiving chemotherapy and/or radiation therapy.

There were following exclusion criteria: mental disorders and severe somatic diseases, including with decompensation.

Survey. All patients were surveyed using a questionnaire prepared by the National Medical Research Center for Therapy and Preventive Medicine. It included personal data, socio-demographic characteristics, changes in behavioral RFs, including smoking, alcohol intake, diet and physical activity, clinical status of the underlying disease, received therapy, psychosomatic status (level of anxiety, depression and chronic stress) before and after the pandemic. The incidence of COVID-19 was also analyzed.

The questionnaire was the main document with material for statistical processing.

Smokers were defined as those who smoked at least one cigarette per day. There were following types of smoking status: never/former/current smoker.

Alcohol consumption was assessed according to the following criteria:

— never consumed alcohol (quit drinking);

— for men: low and moderate — <168 g ethanol per week, high — ⩾168 g ethanol per week;

Self-assessment of the health status changes over time was carried out using the European Quality of Life Questionnaire (EQ-5D).

Instrumental investigations. All patients were measured blood pressure (BP) and heart rate. BP was measured with a standard sphygmomanometer while sitting, after a 5-minute rest, on the patient's right arm. Systolic BP was recorded when Korotkov sound 1 appeared (phase I), diastolic BP — when sounds disappeared (phase V). The BP level was assessed twice with an interval of about 2-3 minutes. The average of two measurements was included in the analysis.

To assess anthropometric characteristics, height and body weight were measured, followed by body mass index (BMI) calculation. BMI (Quetelet index) was calculated as the ratio of body weight in kilograms to the square of height in meters

Table 1

Socio-demographic characteristics of the cohort patients

	Moscow, n=22 (10,7%)	Omsk, n=91 (44,4%)	Volga region, n=92 (44,9%)
Age, years	58,9±2,5	58,3±2,9	65,3±3,1
Sex (male/female)	11/11	38/57	35/56
Pre-pandemic employment status Employed	13 (59%)	56 (60,9%)	41 (45%)
Education Higher	7 (31,8%)	34 (37,4%)	40 (43,5%)
Employment status during pandemic			
Regular mode	6 (27,3%)	31 (34%)	20 (21,7%)
Remote	7 (31,8%)	1 (1%)	8 (8,7%)
Temporarily unemployed	0	9 (9,8%)	12 (13%)
Lost job	0	0	1 (1%)
Marital status			
Married	19 (86,4%)	60 (65,9%)	57 (62%)
Divorced	1 (4,5%)	8 (8,8%)	9 (9,8%)
Widower (widow)	1 (4,5%)	17 (18,7%)	25 (27,2%)
Never married	0	6 (6,6%)	1 (1%)

(BMI = m/h^2, where m — body weight (kg), h — height (m)).

Monitoring of material collection and training of researchers. Materials for publication were collected during the routine health care provision to hospitalized patients. The collection of material was carried out with the participation of primary care physicians. The study was conducted from June to October 2020. An online training was carried out on protocol and questionnaire statement. The questionnaires were randomly checked by independent experts. The results were processed at the National Medical Research Center for Therapy and Preventive Medicine.

Statistical analysis. Statistical analysis was carried out using the Scipy 1.1.0, NumPy 1.14.3 libraries for Python 3.6.5 (Python Software Foundation, USA) and the R 3.6.1 environment. The significance of differences between two independent samples was assessed using the nonparametric Mann-Whitney U-test. The chi-squared test and Fisher's exact test were used to test the relationship between categorical variables. The equality hypothesis test in more than two groups was performed using the Kruskal-Wallis test. Pairwise multiple comparisons were made with Holm correction. The differences were considered significant at $p<0,05$.

Results and discussion

The present study considered changes in behavioral RFs and clinical status of patients with NCDs in three Russian cities and regions during quarantine and self-isolation. According to the international study involving 202 doctors from 47 countries, during the pandemic, routine health care for NCD patients was moved to the virtual space [5]. In all these countries, patients with diabetes, hypertension and COPD were most affected. Moreover, 80% of doctors reported that their patients' mental health deteriorated during the pandemic and quarantine restrictions. The authors conclude that in order to avoid an increase in morbidity and mortality from diseases not related to COVID-19, it is necessary to use all resources to monitor patients with NCDs.

A number of large-scale studies have been carried out in Russia, including with creation of registers to assess the relationship between COVID-19 and some NCDs. Predictors of complications among patients after COVID-19, which indicate unfavorable outcomes among people with one or more NCDs, have been analyzed [8-12].

In the present study, 3 groups were analyzed to assess the behavioral RFs and clinical status of patients. Taking into account the small number of groups, patients from 4 cities were united into one group called the Volga region. Ultimately, the patients were divided into 3 groups: Moscow, n=22 (10,7%), Volga region (Saransk, Penza, Nizhny Novgorod, Ulyanovsk), n=92 (44,9%), and Omsk, n=91 (44,4%). The groups of patients from the Volga region and Omsk were comparable in number, while

Table 2

Changes in behavioral RFs in a cohort of NCD patients

Parameters	Moscow, n=22 (10,7%)	Omsk, n=91 (44,4%)	Volga region, n=92 (44,9%)
Smoking before the pandemic	4 (18,2%)	12 (13,2%)	6 (6,5%)
Smoking increased during the quarantine period	1 (25%)	0	4 (66,7%)
Drinking alcohol before the pandemic	11 (50%)	64 (70,3%)	30 (32,6%)
Alcohol intake increased during the quarantine period	0	0	2 (6,7%)
Physical activity decreased during quarantine	6 (18,2%)	40 (44%)	36 (39,1%)
Nutrition did not change or decreased during quarantine	18 (81,8%)	74 (81,3%)	53 (57,6%)
Nutrition increased during quarantine	4 (18,2%)	17 (18,7%)	39 (42,4%)

the group from Moscow was 4 times smaller. The groups from Moscow and Omsk were comparable in mean age, while in the Volga region group, the mean age was significantly higher ($p<0,05$). At the same time, no significant differences were found between the groups in sex composition (Table 1). The men/women ratio in Moscow was 50/50%, in Omsk — 38,5/61,5%, and in the Volga region — 41,3/58,7%. An analysis of marital status showed that the majority of Muscovites are married (90,5%), while in Omsk and the Volga region, married people accounted for 66% and 62%, respectively. In the last two groups, the number of widowers/widows was 18,7% and 27,2%, while there were 2-3 times fewer people divorced.

In the analyzed groups, the level of higher education was comparable as follows: 33,3%, 44% and 37%, respectively. Before the pandemic, every second of the cohort worked as usual. Half of Muscovites switched to a remote regimen, in the Volga region one in five was transferred to a remote working regime, while in Omsk one person ended up working remotely. The status of temporary unemployment was indicated by 21% from Omsk and 29% from the Volga region. Only one person lost his job (Volga region) during quarantine.

One of the main objectives of this study was to analyze the changes of behavioral RFs during quarantine, which included the status of smoking, alcohol intake, physical activity and malnutrition. According to the multicenter European study, the closure of fitness centers, swimming pools and other wellness centers, as well as sedentary lifestyles and dietary disorders have negatively affected the condition of patients with NCDs, especially in older people. The authors emphasize that COVID-19 restrictions influenced the concentration of vitamin D, a low level of which is associated with some NCDs [7].

According to the survey, before quarantine, 18% (n=4), 6,5% (n=6) and 13% (n=12) of patients from the Moscow, Omsk, and Volga region groups, respectively, smoked. An increase in smoking frequency was reported by 1 patient from the first group and 4 patients from the Volga region. The changes were not significant (Table 2).

Before quarantine, every second patient from the first group reported drinking alcohol, while in the Omsk and Volga region groups, this parameter was 73,6% and 33%, respectively ($p<0,0001$). During quarantine, an increase in alcohol consumption was practically not detected; in all three groups, patients reported no changes or a decrease in alcohol intake. Alcohol abuse is considered as one of the negative factors affecting the outcome of COVID-19 complications [13].

Analysis of physical activity dynamics shows that during quarantine, its intensity decreased in every third Muscovite, and in groups of patients from Omsk and the Volga region, this changes was 45% and 43%, respectively. The difference between groups was not significant.

An increase in meal frequency and malnutrition during quarantine and self-isolation was noted in the groups of patients with NCDs from Moscow and Omsk (18,2% and 18,7% of cases, respectively), while in the group from the Volga region, these changes turned out to be 2 times more common (42,4%). The difference between the last two groups was significant ($p=0,001$).

In groups of patients, changes in body weight averaged up to 1 kg (-0,76 kg in Moscow, +0,97 kg in the Volga region). Sex analysis showed that during quarantine the body weight of Moscow females decreased by an average of 2 kg, and in the Volga region, increased by 1 kg. The differences between the groups were significant ($p=0,024$). Among men, there was an increase in body weight in all groups

Table 3

Assessment of the clinical condition of patients with NCDs during quarantine

Parameters	Moscow, n=22 (10,7%)	Omsk, n=91 (44,4%)	Volga region, n=92 (44,9%)
Hypertension	19 (86,4%)	61 (67%)	78 (84,8%)
Crises during self-isolation	1 (4,5%)	21 (23,1%)	31 (33,7%)
Dosage regimen increased during self-isolation	0	1 (1,6%)	29 (37,2%)
Angina	7 (31,8%)	20 (22,2%)	41 (44,6%)
Deterioration of angina clinical course	1 (14,3%)	1 (5,3%)	4 (14,8%)
Type 2 diabetes	4 (18,2%)	22 (24,2%)	24 (26,1%)
Treatment of diabetes, dosage regimen increased during self-isolation	0	0	7 (30,4%)
COPD	0	3 (3,3%)	13 (14,1%)
Dosage regimen increased		0	2 (16,7%)
Cancer	3 (13,6%)	5 (5,5%)	3 (3,3%)

Abbreviation: COPD — chronic obstructive pulmonary disease.

on average from 0,5 to 1 kg, therefore, significant differences were not revealed.

Experts note that during the pandemic in the context of limited care for NCD patients, the incidence of crises and emergency conditions increased, which was reflected in elective treatment increase [14, 15].

According to the data in Table 3, among the included patients with NCDs, hypertension took the main place as follows: Moscow — 86,4%, Volga region — 84,8%, Omsk — 67% (p<0,02 compared to Moscow). Hypertensive crises during a pandemic were noted in all three subgroups, but their greatest number was recorded in the Volga region — in every third patient (p<0,05 compared to Moscow), the Omsk group — in every fourth patient, while among Muscovites — no more than 5%. In addition, 37,2% (p<0,001 compared with other groups) of hypertensive patients from the Volga region increased antihypertensives' doses taken. In the remaining subgroups, no significant changes were observed in therapy regimen. Exertional angina ranked second among NCDs in the examined group of patients as follows: Volga region — 45% (p<0,007 compared to Omsk), Moscow — every third (31,8%), Omsk — every fifth (22,2%). Deterioration of the clinical course of angina was noted in 15% of cases, while the smallest number was recorded in Omsk patients (5,3%) — 3 times less than in other subgroups. Type 2 diabetes was registered in every fourth patient as follows: Moscow — 18,2%, Omsk — 24,2%, Volga region — 26,1%, respectively. Omsk patients noted a change in the amount and regimen of glucose-lowering therapy — 30% increased the dose of drugs (p<0,05 compared with the Volga region). The highest incidence of COPD was recorded in

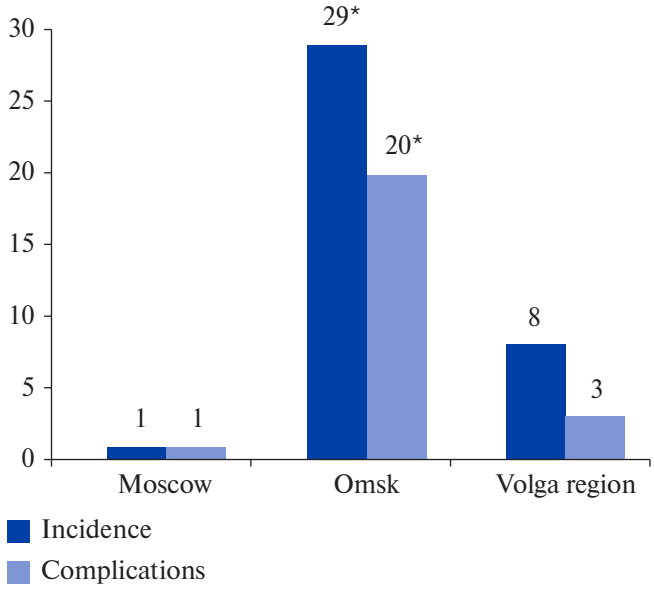

Figure 1. Incidence of COVID-19 and its complications in the Russian cohort with CVDs and other NCDs (absolute numbers).
Note: * — p<0,01 significance of differences between groups in incidence of COVID-19 and complications.

the Volga region group — 14,1% (p<0,05 compared to Omsk); 17% of patients in this group noted an increase in drug doses. Cancer was reported by 13,6% of Muscovites, while in the other two groups — by ~5% of patients. Only one patient with cancer reported a deterioration in health.

Assessment of health status dynamics in patients with CVDs and other NCDs in quarantine conditions showed that the largest number of patients from the Volga region noted condition worsening over the last year (30,8%), while a similar parameter was found

in every fifth patient from Omsk (19,6%) and 13,6% of Moscow residents.

Among patients with NCDs, 18,5% (n=38) reported COVID-19, of which 63% (n=24) had non-lethal complications (Figure 1). The largest number of patients after COVID-19 was registered in Omsk — 31,9% (p<0,01), while in the Volga region and Moscow, COVID-19 were less common — 8,7% and 4,5%, respectively. In absolute terms, the largest number of complications was noted in Omsk (n=20,69%), while in other groups, the number of complications was less than 3 cases. In this cohort, the incidence of COVID-19 was lower compared to other studies. It is obvious that quarantine measures had a positive effect on the incidence among people with NCDs. Nevertheless, according to Russian studies, the comorbidity of various CVDs and type 2 diabetes was an unfavorable RF, contributing to a lethal outcome [10, 11].

Conclusion

During quarantine and self-isolation, changes in dietary habits and physical activity decline were noted among patients with NCDs, while alcohol consumption and smoking remained practically unchanged. The clinical status of patients worsened, which required a therapy dose adjustment. Obviously, for the management of patients with NCDs, additions to the current clinical guidelines and health care provision should be developed.

Relationships and Activities: none.

References

1. Roth GA, Mensah GA, Johnson CO, et al.; GBD-NHLBI-JACC Global Burden of Cardiovascular Diseases Writing Group. Global Burden of Cardiovascular Diseases and Risk Factors, 1990-2019: Update From the GBD 2019 Study. J Am Coll Cardiol. 2020;76(25):2982-3021. doi:10.1016/j.jacc.2020.11.010.
2. Abraham DA, Vijayakumar TM, Rajanandh MG. Challenges of non-COVID-19 patients with chronic illness during the pandemic. J Res Pharm Pract. 2020;9(3):155-7. doi:10.4103/jrpp.JRPP_20_64.
3. Inciardi RM, Solomon SD, Ridker PM, Metra M. Coronavirus 2019 Disease (COVID19), Systemic Inflammation, and Cardiovascular Disease. J Am Heart Assoc. 2020;9(16):e017756. doi:10.1161/JAHA.120.017756.
4. Metkus TS, Sokoll LJ, Barth AS, et al. Myocardial Injury in Severe COVID-19 Compared to Non-COVID Acute Respiratory Distress Syndrome. Circulation. 2021;143(6):553-65. doi:10.1161/CIRCULATIONAHA.120.050543.
5. Chudasama YV, Gillies CL, Zaccardi F, et al. Impact of COVID-19 on routine care for chronic diseases: A global survey of views from healthcare professionals. Diabetes Metab Syndr. 2020;14(5):965-7. doi:10.1016/j.dsx.2020.06.042.
6. Azarpazhooh MR, Morovatdar N, Avan A, et al. COVID-19 Pandemic and Burden of Non-Communicable Diseases: An Ecological Study on Data of 185 Countries. J Stroke Cerebrovasc Dis. 2020;29(9):105089. doi:10.1016/j.jstrokecerebrovasdis.2020.105089.
7. Palmer K, Monaco A, Kivipelto M, et al. The potential long-term impact of the COVID-19 outbreak on patients with non-communicable diseases in Europe: consequences for healthy ageing. Aging Clin Exp Res. 2020;32(7):1189-94. doi:10.1007/s40520-020-01601-4.
8. Drapkina OM, Karpov OE, Lukyanov MM, et al. Prospective in-hospital registry of patients with suspected or documented COVID-19 infection and community-acquired pneumonia (TARGET-VIP): characteristics of patients and assessment of in-hospital outcomes. Cardiovascular Therapy and Prevention. 2020;19(6):2727. (In Russ.) doi:10.15829/1728-8800-2020-2727.
9. Konradi AO, Villevalde SV, Duplyakov DV, et al. An open-label multicenter observational study (registry) of patients recovered from coronavirus disease 2019 (COVID-19) with involvement of the cardiovascular system or with baseline severe cardiovascular diseases: rationale, design, and implications for clinical practice. Russian Journal of Cardiology. 2021;26(1):4287. (In Russ.) doi:10.15829/1560-4071-2021-4287.
10. Arutyunov GP, Tarlovskaya EI, Arutyunov AG, et al. International register "Dynamics analysis of comorbidities in SARS-CoV-2 survivors" (AKTIV SARS-CoV-2): analysis of predictors of short-term adverse outcomes in COVID-19. Russian Journal of Cardiology. 2021;26(4):4470. (In Russ.) doi:10.15829/1560-4071-2021-4470.
11. Boitsov SA, Pogosova NV, Paleev FN, et al. The clinical picture and factors associated with adverse outcomes in hospitalized patients with a new coronavirus infection COVID-19. Kardiologija. 2021;61(2):4-14. (In Russ.)
12. Venediktova AA, Saperkin NV, Deryabina OI. Clinical and epidemiological characteristics of patients who underwent COVID-19 in the Nizhny Novgorod region. Medial Journal. 2020;(2):6-9. (In Russ.)
13. Vasudeva A, Patel TK. Alcohol consumption: An important epidemiological factor in COVID-19? J Glob Health. 2020;10(2):020335. doi:10.7189/jogh.10.020335.
14. Grinevich VB, Gubonina IV, Doshchitsin VL, et al. Management of patients with comorbidity during novel coronavirus (COVID-19) pandemic. National Consensus Statement 2020. Cardiovascular Therapy and Prevention. 2020;19(4):2630. (In Russ.) doi:10.15829/1728-8800-2020-2630.
15. Guha S, Karak A, Choudhury B, et al. COVID 19 pandemic: Its impact on cardiovascular training and care. Indian Heart J. 2020;72(6):473-6. doi:10.1016/j.ihj.2020.12.001.