ORIGINAL ARTICLE

CONTENTS

Analysis of the burden of cardiovascular diseases morbidity and mortality for the period 2018-2023

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ABSTRACT

Aim: To analyze the morbidity from cardiovascular diseases, in particular coronary heart disease, angina pectoris and acute myocardial infarction in Ukraine in 2018-2023.

Materials and Methods: The study uses data from the Center for Medical Statistics of the Ministry of Health of Ukraine on hospitalizations and average duration of care for CHD, angina pectoris, and AMI patients in Ukraine during 2018-2023. The epidemiological method and the method of estimating dynamic series were used.

Results: For 2018-2023, a decrease in hospitalization rate of CHD (growth rate 65.3%), angina pectoris (GR 69.7%) and a slight decrease in patients with AMI (GR 98.5%) patients was found. 2020-2022 saw a decrease in hospitalization rates for CHD and angina patients, which arose as a result of reduced access to care. In AMI, hospitalization rate decreased slightly, but the proportion of all its forms among all hospitalized patients increased in 2020-2022, while hospitalization for CHD and angina decreased. The decrease in the hospitalization rate in 2020-2022 indicates a reduced level of diagnosis of AMI and a possible lack of seeking specialized medical care and lack of adequate treatment for its atypical forms, which confirms the increase in the hospitalization rate of patients with AMI in 2023, when pandemic-related restrictions were lifted.

Conclusions: During 2018-2023, the hospitalization rate for CHD, angina pectoris, and AMI patients decreased in Ukraine. It changed the most during 2020-2022 as a result of reduced access to medical care during the COVID-19 pandemic.

KEY WORDS: coronary heart disease, angina, acute myocardial infarction, COVID-19 pandemic, hospitalization rate

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INTRODUCTION

The Sustainable Development Goals aim to eliminate inequality, reduce poverty, and ensure peace and prosperity for all by 2030. One of the Goals, Goal 3, aims to ensure good health and well-being [1]. One of the tasks to ensure the well-being of the population is to reduce the burden of cardiovascular disease. This pathology causes a significant burden of morbidity, contributes to a decrease in average life expectancy and has been a leading cause of death and disability among persons of working age in recent decades both globally [2, 3] and in Ukraine [4, 5].

Atherosclerotic diseases, especially coronary heart disease (CHD), including acute myocardial infarction (AMI), and cerebrovascular diseases, including cerebral stroke, account for approximately 80% of all CVD deaths. At the same time, there is a tendency for deaths to increase in low-income countries and decrease in high-income countries. Globally, deaths from CVD account for about 1/3 of all deaths [6, 7].

The development of CVD is influenced by many different factors, including behavioral, socioeconomic, and biological ones. According to a number of researchers, the COVID-19 pandemic had a significant impact on the growth of CVD, including AMI [8, 9]. Myocardial lesions occurred more frequently in patients, mostly older and with comorbidities (19-40 %). There were manifestations of myocarditis, AMI, venous thromboembolism, and arrhythmias.

The growing burden of CVD is especially relevant in the context of an aging population, the COVID-19 pandemic, the significant impact of psychological and environmental factors associated with Russia's full-scale attack on Ukraine, and requires constant monitoring.

AIM

To analyze the incidence of cardiovascular diseases, in particular coronary heart disease, angina and acute myocardial infarction (AMI) for the period 2018-2023.

Table 1. Hospitalized coronary heart disease (I20-I25) patients among the adult population in 2018-2023 in Ukraine

Year	Number of patients, discharged and died (absolute)	% of all diseases	Hospitalization rate per 100,000 people
2018	716,765.00	10.82	2,071.13
2019	706,002.00	10.93	2,052.10
2020	409,300	8.86	1,196.82
2021	371813	7.45	1,094.89
2022	390,268	7.99	1,159.81
2023	455,229.00	7.57	1,352.87

MATERIALS AND METHODS

The study used data from the Global Burden of Disease Database, Center for Medical Statistics of the Ministry of Health of Ukraine on the level of hospitalization and average treatment duration for patients with CHD, angina, and AMI in Ukraine and its oblasts in 2018-2023. The indicators are calculated for the population excluding the temporarily occupied territories. The epidemiological method was used to analyze the proportion of mortality and the total burden of disease (DALYs) with an indication of the confidence interval and the method of estimating dynamic series with the determination of the growth rate (GR). The study was conducted in compliance with the principles of the World Medical Association's Declaration of Helsinki "Ethical Principles for Medical Research Involving Human Subjects" (2000).

RESULTS

Cardiovascular diseases continue to be the leading pathology in terms of prevalence, morbidity and mortality in Ukraine.

According to the Global Burden of Disease (GBD Compare) database [10], the proportion of patients who died of CHD in 2018 was 15.16% (95% CI 14.09-15.85%) worldwide. Looking at a number of developed economies, it was 13.12% (95% CI 11.75-13.77%) in the UK, 9.73% (95% CI 8.31-10.51%) in France, 8.73% (95% CI 7.11-9.62%) in Japan, 16.89% (95% CI 14.72-18.01%) in the USA, and 16.54% (95% CI 14.43-17.82%) in Germany. In Ukraine, the proportion of deaths from CHD was 3.2 times higher than the global rate—48.86% (95% CI 46.16-50.65%).

In 2021, there was a tendency to decrease the proportion of deaths from CHD in the total number of deaths. It amounted to 11.13% (95% CI 9.84-11.73%) in the UK, 8.71% (95% CI 7.36-9.49%) in France, 8.57% (95% CI 6.9-9.47%) in Japan, 14.21% (95% CI 12.42-15.16%) in the USA, 14.94% (95% CI 12.79-16.16%) in Germany, and 13.25% (95% CI 12.27-13.87%) in the world. In Ukraine, this indicator was 3.0 times higher than the global level—39.89% (95% CI 36.5-43.09%).

In 2018, the total disease burden (DALYs) of CHD was 6.93% globally (95% CI 6.23-7.56%). In the leading countries of the world, these data fluctuated. For example, in the United Kingdom, CHD DALYs were 6.77% (95% CI 5.9-7.61%), France 4.60% (95% CI 3.97-5.2%), Japan 4.71% (95% CI 3.97-5.46%), the United States 7.76% (95% CI 6.75-8.77%), and Germany 8.42% (95% CI 7.19-9.54%). In Ukraine, this number was 3.8 times higher than the global level—26.5% (95% CI 23.72-29.08%).

In 2021, there was a tendency to reduce the burden of CHD. The DALYs rate in the UK was 5.91% (95% CI 5.18-6.64%), in France 4.22% (95% CI 3.63-4.77%), in Japan 4, 63% (95% CI 3.88-5.39%), in the USA 6.93% (95% CI 6.09-7.79%), in Germany 7.65% (95% CI 6.58-8.71%), and in the world 6.55% (95% CI 5.9-7.17%). In Ukraine, this figure was 3.4 times higher than the global level—22.57% (95% CI 19.28-25.42%).

Over the period 2018-2023, a decrease in the hospitalization rate of CHD patients from 2,071.13 to 1,352.87 per 100,000 people (GR 65.3%) was found in Ukraine. Their proportion among all diseases also decreased from 10.82% to 7.57%. Since 2020, there has been a decrease in the hospitalization rate with the lowest rate in 2022—1,159.81 per 100,000 people (Table 1).

A similar trend was found in the hospitalization of angina patients. Thus, during the period 2018-2023, the hospitalization rate for angina patients decreased from 757.60 to 528.40 per 100,000 people (GR 69.7%). Their proportion among all diseases also decreased from 3.96% to 2.96%. A significant decrease in the hospitalization rate of angina pectoris patients was observed in 2020-2022, with the lowest rate in 2021—424.53 per 100,000 people (Table 2).

When hospitalizing patients with acute myocardial infarction (AMI), there was a slight decrease in the hospitalization rate for the period 2018-2023 from 133.42 to 131.40 per 100,000 people (GR 98.5%) and a significant decrease in this indicator in 2020-2022. Also, in the period 2020-2022increased, the proportion of patients with AMI among all diseases, as well as in general for the study period (Table 3).

The rate of hospitalization of AMI patients with ST segment elevation in 2019-2023 slightly decreased from 92.60 to 91.08 per 100,000 people (GR 98.4%), with the largest decrease in 2020. At the same time, the

Table 2. Hospitalized angina pectoris (I20) patients among the adult population in 2018-2023 in Ukraine

Year	Number of patients, discharged and died (absolute)	% of all diseases	Hospitalization rate per 100,000 people
2018	262,186	3.96	757.60
2019	259,750	4.02	755.00
2020	150,442	3.26	439.90
2021	144,165	2.89	424.53
2022	150,184	3.07	446.32
2023	177,803	2.96	528.40

Table 3. Hospitalized acute myocardial infarction (I21-I22) patients among the adult population in 2018-2023 in Ukraine

Year	Number of patients, discharged and died (absolute)	% of all diseases	Hospitalization rate per 100,000 people
2018	46,172.00	0.70	133.42
2019	47,337.00	0.73	137.59
2020	42,522	0.92	124.34
2021	42279	0.85	124.50
2022	41,190	0.84	122.41
2023	44,215.00	0.74	131.40

Table 4. Hospitalized acute myocardial infarction with ST segment elevation (I21.0-3, I22) patients among the adult population in 2019-2023 in Ukraine

Year	Number of patients, discharged and died (absolute)	% of all diseases	Hospitalization rate per 100,000 people
2019	31,858.00	0.49	92.60
2020	28,825	0.62	84.29
2021	29357	0.59	86.45
2022	29,088	0.60	86.44
2023	30,648.00	0.51	91.08

Notes: Data for 2018 not available

proportion of AMI with ST segment elevation among all diseases increased in 2020-2022 (most of all in 2020) (Table 4).

During the study period the proportion of AMI patients with ST segment elevation among AMI patients was within 2/3 and increased from 67.3% in 2019 to 69.3% in 2023, and it was 70.6% in 2022.

DISCUSSION

Over the period 2018-2021, there was a tendency of reduction of CHD burden, both globally as well as in leading countries and Ukraine. There was also a tendency of reduction of the proportion of patients who died from CHD in the context of the studied countries. However, this dynamics needs to be studied further, as the decrease in this proportion may be due to the COVID-19 pandemic (redistribution of deaths due to patients with coronavirus disease and post-COVID-19 impact on the cardiovascular system in the future [11, 12].

A number of studies have identified the COVID-19 virus as an independent risk factor for various forms of cardiovascular disease: stroke, transient ischemic attack, heart rhythm disturbances, pericardial and myocardial inflammation, myocardial infarction, and pulmonary embolism [12-14].

The WHO announced the beginning of the COVID-19 pandemic March 11, 2020, and on May 5, 2023, it announced that the disease was no longer a global public health emergency of international concern, but continued to believe that the pandemic was not over yet. The period of 2020-2022 saw a decrease in hospitalization rates for patients with CHD and angina, which arose as a result of reduced access to healthcare: overloading of family doctors with COVID-19 patients, patients' fear of coronavirus infection when visiting medical facilities, and a decrease in the number of cardiology beds due to the re-profiling of departments. This trend has been observed in many countries around the world [12]. A somewhat different situation was observed in the hospitalization of patients with AMI. Given the severity of the condition in some patients and the possibility of fatalities, such patients sought medical care and were hospitalized in specialized departments, as evidenced by the increase in the proportion of all forms of AMI among all hospitalized patients in 2020-2022,

while reducing hospitalization for CHD and angina. However, the decrease in the hospitalization rate in 2020-2022 indicates a reduced level of AMI diagnosis and a possible lack of seeking specialized medical care and lack of adequate treatment for atypical forms of AMI. This hypothesis is confirmed by the increase in the hospitalization rate for patients with AMI in 2023, when pandemic-related restrictions were lifted.

CONCLUSIONS

In 2018-2021, there was a decrease in the burden of CHD and its share of deaths in the total number of deaths both globally and in economically developed countries. The CHD DALYs were 3.4-3.8 times higher in Ukraine than the global level. The proportion of deaths from CHD in Ukraine exceeded the global level by 3.0-3.2 times.

Over the period 2018-2023, the hospitalization rate for CHD, angina, and AMI patients decreased in Ukraine. It changed the most in 2020-2022 as a result of reduced access to medical care during the COVID-19 pandemic.

During the study period, the proportion of AMI patients with ST segment elevation among AMI patients increased, indicating a more severe course of the disease and requiring further study of AMI risk factors.

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CONFLICT OF INTEREST
The Authors declare no conflict of interests

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