Iran J Public Health, Vol. 53, No.2, Feb 2024, pp.425-432

Original Article

Trend of Cardiovascular Diseases in the Northern Regions of the Republic of Kazakhstan at the Outpatient Level

Gulshara Berdeshova [1], *Aiman Musina [2], Lyazat Orakbay [3], Aidana Tolegenova [4], Saya Zhorabek [4], Assel Amanova [5], Shynar Kulbayeva [6]

1. *Department of General Hygiene, West Kazakhstan Medical University named after M. Ospanov, Aktobe, Kazakhstan*
2. *Department of Public Health and Epidemiology, Astana Medical University, Nur-Sultan, Kazakhstan*
3. *Department of Public Health, Kazakh-Russian Medical University, Almaty, Kazakhstan*
4. *Department of Health Policy and Management, Kazakh National Medical University named after S.D. Asfendiyarov, Almaty, Kazakhstan*
5. *Department of Public Health and Hygiene, Astana Medical University, Nur-Sultan, Kazakhstan*
6. *Department of Clinical Disciplines, Kokshetau University named after Sh. Ualikhanov, Kokshetau, Kazakhstan*

***Corresponding Author:** Email: kayupova.sh@gmail.com

(Received 10 Jan 2023; accepted 16 Mar 2023)

Abstract

Background: We aimed to study the rate and trends of the incidence of chronic cardiovascular diseases in urban and rural areas of the northern regions of the Republic of Kazakhstan (RK) from 2015 to 2020.

Methods: The retrospective data were analyzed using modern methods of biomedical statistics. We used the Electronic Register of Dispensary Patients (2015-2020), where we conducted a retrospective study and trend calculations. The study included patients with chronic cardiovascular diseases (CVD) (according to the International Classifier of Diseases-10, the following nosologies were identified: I25 chronic coronary heart disease and its nosological forms (I25.0-I25.9), and patients by age categories, consisting of dispensary registration in polyclinics of the northern region of the RK.

Results: For 2015 - 2020 in the northern region (urban and rural) of RK, 12,315 patients were registered, who were on dispensary records for the chronic CVD. This amounted to 87.3% of urban residents, and 12.7% of rural residents. The share of patients with chronic CVD in the northern region of the republic by age groups had a bimodal growth pattern with the first peak at the age of 60-74 (40.4%) and the second - at the age of 45-59 (37.7%).

Conclusion: This study notes an increase in chronic CVD, both in urban and rural areas of the northern region of the RK. This once again proves the need for the development, implementation and use of modern tools in the provision of medical services to cardiological patients at the outpatient level, taking into account the characteristics of the northern regions of our country.

Keywords: Cardiovascular diseases; Urban; Rural; Ambulatory care; Chronic diseases

Introduction

Today, the incidence and mortality from cardiovascular diseases, including chronic ones, remain high both in the world and in our country, despite the preventive measures taken.

Cardiovascular diseases (CVD), especially coronary heart disease, stroke, congestive heart failure, and peripheral arterial disease, became the leading cause of chronic disease morbidity and mortality in industrialized countries in the 20th century (1,2).

The following study revealed the enormous burden of CVD over the past decade and expanded on previous work on the epidemiological description of the incidence profile. Chronic cardiovascular disease has grown at an alarming rate and is expected to continue for the next 10 years (3-5). Therefore, there is an urgent need to focus on primary and secondary prevention strategies in order to contribute to successful public health policy and the achievement of the Millennium Development Goals (6).

As follows from studies in several regions of South Asia, the number of years of healthy life lost due to coronary heart disease increased by 73% between 1990 and 2010. According to epidemiological studies, culturally sensitive interventions to address the risk factors identified in these studies are necessary to realize true potential (7,8).

CVD is a serious and growing problem in Europe, accounting for almost 45% of all deaths and leading to significant morbidity. According to studies conducted in Greece over the past two decades, the prevalence of arterial hypertension, hypercholesterolemia has remained relatively stable or increased (9,10). During the financial crisis, mortality from cardiovascular diseases did not change, but there is evidence that the incidence of cardiovascular diseases is increasing in the developed countries of Europe (11).

In the United Kingdom (UK), CVD mortality has dropped markedly among both men and women, while hospitalizations have risen. This review highlights that the reduction in the burden of cardiovascular disease has not occurred equally between the four countries that make up the UK, or between men and women (12). The number of prescriptions and surgeries for cardiovascular diseases has increased over the last decade, which shows that in such developed countries, mortality from cardiovascular diseases is decreasing, while the incidence is on the contrary increasing (13,14).

In Australia, studying of the population aged 35 to 84 years, it was emphasized that the majority of cardiovascular diseases, regarded as coronary heart disease (CHD), cerebrovascular disease and peripheral arterial disease, occurred in older people. The prevalence trend is worse among young adults for most CVD subtypes (15,16).

To study the incidence in our country, a number of studies were conducted in which we analyzed the incidence of CVD in the regions of RK, where it also showed a high incidence in urban and rural areas in different years (17).

Today, in many countries, mobile applications are used for heart diseases, both at the inpatient and outpatient levels (18-21). This is the need of a new world where the population has basically become mobile and uses various advances in innovative technologies like gadgets and others.

According to some scientists in the world (11-13,21), the incidence of CVD is growing every year; CVD mortality is declining in some developed countries. In our region of RK, there is a trend towards an increase in morbidity and mortality from CVD, in connection with this; a new intervention in the provision of medical services is needed, as well as the improvement of preventive and rehabilitation measures at the outpatient level. Considering the above, it is necessary to use the achievement of innovative devices for the provision of medical services as a mobile application.

Therefore, we were interested to know the trends only in the northern regions of the RK, given that the population there is much smaller compared to other regions of the RK.

Materials and Methods

We used the outpatient electronic platform and population statistics. This is called the "Electronic Register of Dispensary Patients" (hereinafter - ERDP) and the Annual Statistical Compilation of the Population of the RK, we conducted a retrospective study for 2015-2020 and made trend calculations.

This study included: - adult population (over 18 years old) registered in dispensary care with a diagnosis of I25 -Chronic coronary heart disease and its nosological forms (according to the International Classifier of Diseases-10, the following nosologies were identified):
I 25.0 - Atherosclerotic cardiovascular disease as described;
I 25.1 - Atherosclerotic heart disease;
I 25.2 - Past myocardial infarction;
I 25.3 - Aneurysm of the heart;
I 25.4 - Aneurysm of the coronary artery;
I 25.5 - Ischemic cardiomyopathy;
I 25.6 - Asymptomatic myocardial ischemia;
I 25.8 - Other forms of chronic ischemic heart disease;
I 25.9 - Chronic ischemic heart disease, unspecified.
Also, there are patients with CVD living in the northern regions (urban, rural) of the RK. Exception: healthy patients, patients who do not have a diagnosis related to cardiovascular disease, patients with cognitive impairment.
In our country, ERDPs are used in clinics to record patients with chronic CVD. The ERDP portal allows employees of medical organizations to automate dispensary registration and observation of patients, storage and formation of a register of dispensary patients, processing and provision of statistical and analytical data.
Medical organizations were selected that provide outpatient care in northern regions of RK, both in urban and in rural areas.

Statistics statistical analysis

When studying the incidence of CVD, descriptive and analytical methods of epidemiology were used. Extensive, crude, age-specific and standardized incidence rates are calculated and determined generally accepted methodology used in biomedical statistics. Standardized indicators are calculated in a direct way, using the world demographic standard with recommendations for its calculation. Incidence rates are calculated per 100,000 of the respective population. The dynamics of indicators was studied for 18 years, while the trends were determined by the least square's method (22,23).

Using generally accepted methods of biomedical statistics, extensive, crude indicators (CI) and standardized (world standard (MS) indicators of CVD incidence were calculated. The dynamics of incidence markers was studied over 5 years, with incidence trends determined by the least square method. Average annual values (M) and average error (m), Student's t-test, 95% confidence interval (95% CI), average annual growth rate (Rg, %) were determined, both in urban and rural areas.

Procedure and ethical considerations

The study was reviewed, discussed and approved by the Local Ethics Committee at Astana Medical University (Kazakhstan, Astana City). Protocol No. 4 of 20.02.2020

Results

For 2015-2020 in the northern region of RK, 12,315 patients were registered, who were on dispensary records for CVD (I 25.0-I25.9). This amounted to 87.3% of urban residents, and 12.7% of rural residents. The share of patients with chronic CVD in the northern region of the republic by age groups had a bimodal growth pattern with the first peak at the age of 60-74 (40.4%) and the second at 45-59 years (37.7%). The average age of patients in urban areas was 57.3±1.0 years and in dynamics tended to increase from 56.9±0.7 years (2015) to 60.7±1.0 years (2020). When leveling these indicators, the above trend was noted (Rg=20.16%, x=-5, x^2=25). Consequently, CVD began to be detected more often in middle-aged people, i.e., there is a shift towards the age of 50-60 years. The average annual incidence CI is 14.6±0.40/0000, and WS is 16.3±0.40/0000. In the dynamics of CI and WS, as well as their equalized indicators, there was an upward trend. Thus, the incidence CI of CVD increased from 11.9±0.60/0000 (2015) to 20.4±0.70/0000 (2020), and WS - from 12.9±0.80/0000 up to 24.6±0.90/0000, respectively. The growth rates of CI and WS during equalization were almost the same (Rg = +10.4% and Rg = +10.5%, respectively) (Table 1).

Table 1: The incidence of VD in urban areas of the northern region of the Republic of Kazakhstan by years

Years	*Y (incidence)*	*X*	*X2*	*Trend (WS)*	*n*	*a*	*b*	*Trend (CM)*	*Rate of growth*
2015	16.016	-5	25	-84.14	6	293.19	29.247	14.955	20.158
2016	21.481	-3	9	-63.44		293.19	29.247	20.451	
2017	24.807	-1	1	-24.80		293.19	29.247	26.946	
2018	29.820	1	1	29.83		293.19	29.247	32.442	
2019	36.761	3	9	114.25		293.19	29.247	38.938	
2020	47.077	5	25	235.38		293.19	29.247	44.434	
Total	*763.166*	*0*	*70*	*552.35*					

CVD in urban areas tended to increase, but the slope of the angle (tg α) was below 15c. The maximum incidence of CVD was set at age of 60-74, and the incidence trends were (Rg = +20.5%). Similar trends in other age groups grew, people aged 30-44 years (Rg = +19.6%), 75 years and older (Rg = +15.4%) and 45-59 years (Rg = +12.6 %), up to 29 years (Rg =+2.5%) (Fig. 1), which led to a general increase in the incidence of chronic CVD in the urban population of the northern region of the republic.

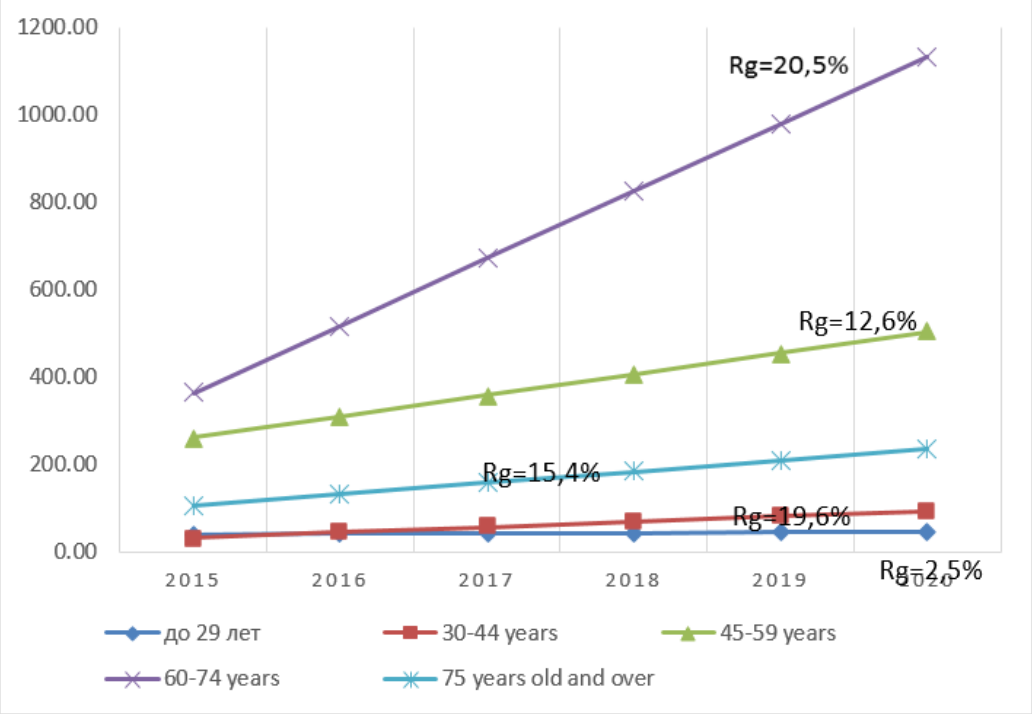

Fig. 1: CVD incidence trend in urban areas of the northern region of the Republic of Kazakhstan

The average age of patients in rural areas is 67.3±1.0 years and in dynamics it tended to increase from 66.9±0.7 years (2015) to 70.7±1.0 years (2020). When leveling these indicators, the above trend was noted (Rg=12.7%, x=-5, x^2=25) (Table 2). Consequently, chronic CVD began to be detected more often among older people, i.e. there is a shift towards "aging" in rural areas compared to urban areas.

Table 2: Calculations of CVD incidence trend in rural areas of the northern region of the Republic of Kazakhstan

Years	*Y (incidence)*	*X*	*X2*	*Trend (WS)*	*n*	*a*	*b*	*Trend (CM)*	*Rate of growth*
2015	17.844	-5	25	-89.22	6	213.53	13.58	145.6205	12.722
2016	17.991	-3	9	-53.97		213.53	13.58	172.7879	
2017	18.272	-1	1	-18.27		213.53	13.58	199.9553	
2018	19.501	1	1	19.501		213.53	13.58	227.1227	
2019	20.64	3	9	66.94		213.53	13.58	254.2901	
2020	34.977	5	25	174.88		213.59	13.58	281.4576	
Total	*125.23*	*0*	*70*	*450.85*					

The average annual incidence CI is 10.6±0.40/0000, and WS – 8.3±0.40/0000. In the dynamics of CI and WS, as well as their equalized indicators, there was an upward trend. Thus, CVD incidence CI increased from 6.9±0.60/0000 (2015) to 17.4±0.70/0000 (2020), and WS - from 24.9±0.80/0000 up to 44.6±0.90/0000, respectively. The growth rates of CI and WS during equalization were almost the same (Rg =+4.5% and Rg =+5.3%, respectively).

CVD among people from rural areas tended to increase, but the slope of the angle (tg α) was below 10°. The maximum incidence of chronic CVD was set at 75 years and older, and the incidence trends were (Rg = +17.9%). Similar trends in other age groups were growing, people at the age of 60-74 years (Rg = +11.8%), 45-59 years and older (Rg = +6.9%) and 30-44 years (Rg = +6 .5 %), only the trend has a decrease in the category up to 29 years (Rg = -1.5%) (Fig.2). This means that the overall increase in the incidence of chronic CVD in the rural population of the northern region of the republic in all age categories, except for those less than 29 years old. This indicator can be associated with the lowest number of people under 29 in rural areas compared to urban areas.

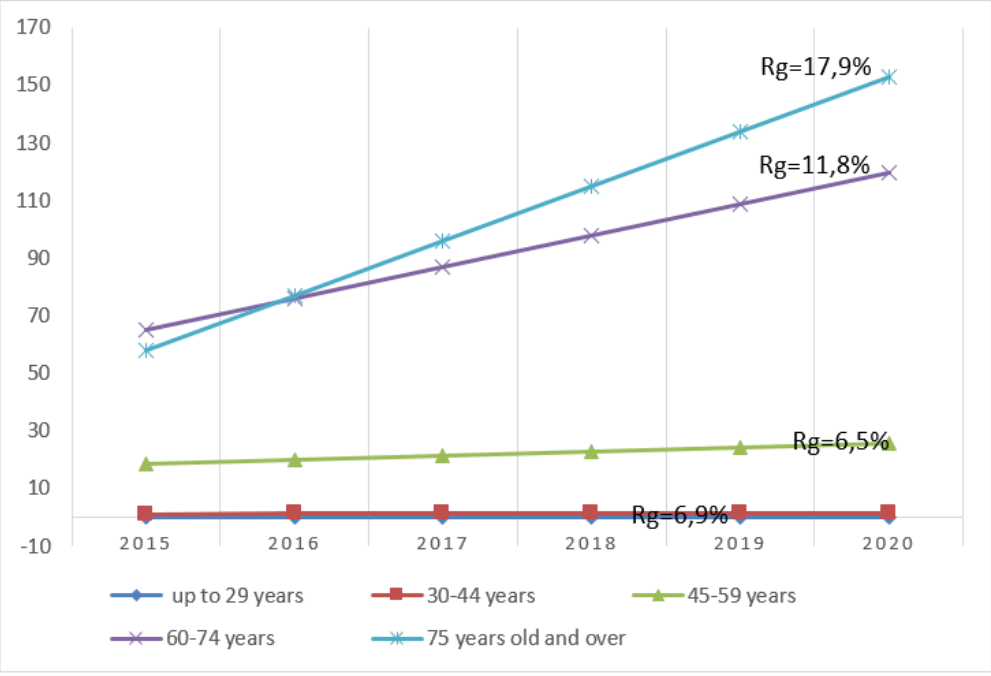

Fig. 2: CVD incidence trend in rural areas of the northern region of the Republic of Kazakhstan

Discussion

Research in this area shows the need to study the characteristics of chronic CVD in rural and urban areas, since the incidence is influenced by various factors, including cultural characteristics (24). Socio-economic parameters, such as the level of education, the level of material income and the type of location, play an important role in the morbidity and mortality from chronic CVD.

This latest update on the epidemiology of CVD in Europe provides new data on the disparity in the burden of CVD described in terms of mortality, morbidity and treatment across Europe (25). This supports calls for more research to improve outcomes in many countries to collect high quality data to compare mortality and morbidity so that interventions can be more targeted to combat chronic CVD.

The largest study currently, there also examining differences in the prevalence of risk factors for chronic CVD, is the PURE study (The Prospective Urban Rural Epidemiology). The global PURE study, conducted in 17 countries, showed that in rural areas in general, the profile of risk factors is more favorable, and the total risk on the INTERSTROKE scale (Study of the Importance of Conventional and Emerging risk factors of Stroke in Different Regions and Ethnic Groups of the World) is lower, but the incidence of cardiovascular events and mortality during their development was lower than among citizens (26). Analyzed as a whole, however, while considering countries separately, it turned out that in high-income countries, the total risk in rural areas was higher, and the frequency of adverse events was lower in the village compared to the city, and in low- and middle-income countries, the total risk among rural residents was lower than among urban residents, and the frequency of adverse events and mortality was higher than among citizens.

The causes of mortality gradients that exist among rural and urban residents are diverse. On the one hand, in cities, as a rule, the ecological situation is worse, but economic and social opportunities are higher. As we know, the factors that can also affect the incidence of chronic CVD, lifestyle features, and the availability of medical care. As a rule, the availability of medical care in rural areas is lower, and this applies to both emergency situations and planned care and the possibility of consulting qualified specialists. In this regard, it is necessary to develop and implement modern innovative technologies in healthcare practice. Given the quarantine measures for COVID-19, remote instruments in the provision of medical care could play an important role in the prevention and rehabilitation of chronic CVD.

Conclusion

Thus, as a result of the analysis of cardiovascular morbidity among the urban and rural population of the northern region of the Republic of Kazakhstan, it showed a trend of constant growth over this period. This once again proves that it is necessary to develop, implement and use modern tools in the provision of medical services to cardiological patients at the outpatient level for prevention CVD. And it requires further study of the issue, given the period of the pandemic.

Journalism Ethics considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

Acknowledgements

We thank all the specialists of district and city polyclinics who provided us with the database.

Conflict of interest

The authors declare that there is no conflict of interest.

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