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Overview of evolution of premature mortality from major cardiovascular diseases in the Republic of Moldova, 2003-2015

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Abstract

Background: Cardiovascular disease is the leading cause of mortality at the global and national level. Ischeamic heart diseases, cerebrovascular diseases and hypertensive heart disease together identify a highest proportional mortality that defines them as major contribution cardiovascular diseases worldwide. Premature mortality analyzing compared to traditional moves target from classical focus on the occurrence of deaths to focus on the losses caused by these deaths. The purpose of the study is to assess the premature mortality evolution from major cardiovascular diseases among adults in the Republic of Moldova for the period of 2003-2015.

Material and methods: the research is a descriptive population study over the time of 13 years. The premature mortality phenomenon was counted in the years of potential life lost (YPLL). Age-adjusted rates were calculated using the direct method of standardization applying WHO World Standard Population Distribution (%) based on world average population between 2000-2025.

Results: Overall period from 2003 to 2015, premature mortality rate from ischeamic heart diseases (+10.7%) and hypertensive heart disease (+41%) have registered increasing trends versus premature mortality rate from cerebrovascular diseases with decreasing trend (-23.9%). All together determined the decreasing trend (-2.4%) of major cardiovascular diseases premature mortality rate. When analyzing percentage changes of premature mortality increasing trends by age, the study findings identified the higher percentage changes in younger groups for ischeamic heart diseases premature deaths than hypertensive heart disease.

Conclusions: Despite the general decreasing trend of major cardiovascular diseases premature mortality rate, ischemic heart diseases compared to cerebrovascular and hypertensive heart disease identify the most pronounced trends of the deaths event rejuvenation in the Republic of Moldova for the period 2003-2015.

Key words: cardiovascular disease, premature mortality, years of potential life lost.

Introduction

Cardiovascular diseases are identified as the leading cause of mortality at the global level [1, 2, 3, 4] and national level, as well [5, 6]. Ischeamic heart disease, cerebrovascular diseases and hypertensive disease are referred by World Health Organization (WHO) as major cardiovascular diseases due to their high proportional mortality contribution [1, 2]. In the Republic of Moldova major contribution cardiovascular diseases are a part of 96.6 %, compared to 85% estimated on the global level in 2011 [1,2,7].

Unlike the traditional analyzing of mortality phenomenon, statistical indicator Years of Potential Life Lost (YPLL), proposed by the Global Burden of Disease 1990 study to estimate the burden of disease in a population [8], moves target from classical focus on the occurrence of deaths to focus on the losses caused by these deaths [7, 9]. The World Health Organization notes that the majority of premature deaths are avoidable, underlining the importance of a 25% reduction of premature mortality from noncommunicable diseases by 2025 in the world [2, 10]. In addition, the event of premature death is recognized as basic point of population health assessment [11, 12, 13], along with economic impact evaluation [14].

Aligning to the global efforts to prevent and control non-communicable diseases, including cardiovascular diseases, the Government of the Republic of Moldova has undertaken to reduce the avoidable burden of non-communicable diseases and risk factors for the years 2012-2020, adopted in the legislative and normative documents at the country level [15,16]. Relative reducing (10%) of premature mortality from cardiovascular diseases is one of the targets of the Republic of Moldova by 2020 in terms of control and prevention of noncomunicable diseases [17, 18].

The study purpose is to assess the premature mortality evolution from major cardiovascular diseases for the period of 2003-2015 in order to highlight their impact on the population health in the Republic of Moldova.

Material and methods

The research design was a descriptive population study in terms of premature mortality evolution for the period from 2003 to 2015 in the Republic of Moldova. The primary source of data collection was death certificate (form No 106/e) approved for application in the country since 2004. There were considered all deaths cases registered by the National Center of Health Management in collaboration with National Bureau of Statistics of the Republic of Moldova overall period 2003-2015 [5, 6].

The premature mortality phenomenon was counted in the years of potential life lost (YPLL) according the following formula (1):

$$YPLL = \sum_{i=1}^{n} d_i(70 - a_i) \quad (1)$$

Where:

n – Number of five years age groups;

d_i – Number of deaths in each five years age group;

70 – End point age;

a_i – Midpoint interval of each five years age group.

The rate of premature mortality (YPLL Rate) was calculated according the formula (2):

$$\text{YPLL Rate} = \frac{\text{Number of IPLL}}{\text{Number of population under 70 years age}} \times 100.000 \quad (2)$$

Age adjusted premature mortality rate was calculated using the steps of direct method of standardization, which allows comparisons between the sexes and geographical areas by considering a conventional population assuming that the age structure is the same in both sexes. There was applied as a standard for years of potential life lost adjustment rates of the WHO World Standard Population Distribution (%) based on world average population between 2000-2025 [19].

Results

Major cardiovascular diseases (I20-I25; I60-I69; I11)

In 2015, major cardiovascular diseases registered 22,018 deaths that resulted in 61,448 potential years of life lost (PYLL). Major cardiovascular diseases caused about 66.9% of all deaths from noncommunicable diseases in the Republic of Moldova. Major cardiovascular diseases premature deaths were identified in a proportion of 38.9% from total noncommunicable diseases and 21.8% from all causes of deaths in 2015.

Diseases of the circulatory system are the leading cause in the all causes of proportional mortality rate (58%), structured in 95.6% (in 2015) by three clinical forms, as following: ischeamic heart diseases (62%), cerebrovascular diseases (25,3 %), and hypertensive heart disease (8.3%), referred as major cardiovascular diseases. Major cardiovascular diseases identified deaths under the age of 65 year in 19.3% (95% CI 18.8% - 19.8%), indicating that about one in five deaths is produced in premature age. Proportional mortality rate from major cardiovascular disease by gender determined 44.6% (95% CI 44.0% - 45.3%) for males and 55.4% (95% IC 54.7% 56.0%) for females. Along with the fact that the distribution of deaths under 65 years of age from major cardiovascular diseases registered a higher proportion for males 67.2% (95% CI 65.8% - 68.6%) compared to women 32.8% (95% IC 31.4% - 34.2%). The distribution of deaths from major cardiovascular diseases for men aged less than 65 years was 29.0% (95% IC 28.1% - 29.9%): approximately every third male's death from major cardiovascular diseases was in premature age. The distribution of deaths from major cardiovascular diseases for women aged less than 65 years was 11.4% (95% IC 10.9% - 12.0%): about one in nine deaths by major cardiovascular diseases in women were premature.

Age-standardized rates of premature mortality from major cardiovascular diseases were permanent higher for age group 40-64 years for the overall period 2003-2015, ranging from 1034.8 (in 2013) to 1406.2 (in 2005) per 100,000 population. Standardized rates of premature mortality from major cardiovascular diseases in total were decreasing from 1,648.1 to 1,321.7 per 100,000 population for the period from 2003 to 2015. Standardized rates of premature death by age from major cardiovascular diseases have been decreased for ages 40-64 (from 1331.1 to 1048.5 per 100,000 population) and over 65 years (from 170.3 to 120,8 per 100,000 population), along with it an increase of standardized rates was registered for group 18-39 years (from 141.7 to 149.6 per 100,000 population).

Adjusted rates were higher for men (ranging from 1932.8 in 2013 to 2475.7 in 2005 per 100,000 population) compared to women (ranging from 733.7 in 2015 to 1181.6 in 2003 per 100,000 population), including all age groups in question: 18-39; 40-64; 65+ years, and productive years of age. Over the period 2003-2015 standardized rates of premature mortality from major cardiovascular diseases have decreased for both sexes: in males from 2,202.6 to 1,995.1 and in females from 1,181.6 to 733.7 per 100,000 population. Age-adjusted rate of premature mortality from major cardiovascular diseases in males compared to women is 2.7 times higher (in 2015). Standardized rates of premature mortality from major cardiovascular diseases by gender and age have shown a decrease for the majority of age groups analyzed in males and females, except in the 18-39 age groups in males, which showed a relative increase from 198.4 to 220.5 per 100,000 populations.

From 2003 to 2015 percentage change in major cardiovascular diseases premature mortality rate registered decreasing trend in total (-2.4%), along with rising trend in males (+ 9.8%) and decreasing trend in women (-22%). In addition, there were found the rising percentage changes in premature mortality rate from major cardiovascular diseases only in age group 18-39 years (+20.1%) versus decreasing percentage changes trends in age group 40-64 years (-11%), age group over 65 years (-29.1%) and productive years age group (-7.6%) (fig. 1).

With the general description of the major cardiovascular diseases, it is very important the descriptive analysis by clinical forms, which are the component parts of major cardiovascular diseases phenomenon, as follows:

Ischeamic Heart Diseases (I20-I25)

Ischeamic heart diseases are the leading cause of mortality of men and women in the Republic of Moldova with an average of 15,407 annual deaths overall period 2003-2015, which in 19% (95% CI 18.4% - 19.7%) cases are deaths under 65 years of age. Along with, every fifth death from ischeamic heart diseases was in premature age, ischeamic heart diseases produced more than a half (62%) of deaths from the diseases of circulatory system and more than 1/3 of total annual deaths. In 2015, ischeamic heart diseases have counted a number of 14,275 cases which produced 39,832 potential years of life lost (PYLL). Proportion of premature deaths from ischeamic heart diseases was determined in 64.8% from major cardiovascular diseases and in 14.1% from all causes of deaths in 2015.

For the period 2003-2015 age-standardized rates of premature mortality from ischeamic heart diseases were permanently higher for age group 40-64 years, ranging from

670.7 (in 2011) to 806.9 (in 2005) per 100,000 population. Adjusted rates of premature deaths from ischeamic heart diseases in men were higher (ranging from 1309.1 in 2011 to 1579.2 in 2005 than in women ranging from 426.6 in 2011 to 616.1 in 2012 per 100,000 population), inclusively all analyzed age groups, as follows: 18-39; 40-64; 65+ years, and productive years of age.

The percentage change in premature mortality caused by ischeamic heart diseases for the period 2003-2015 showed growth trends for all age groups except the age group over 65 years. Rising trends of premature mortality were determined as +38.1% for age group 18-39, +2.9% for age group 40-64 years, and +4.8% for group of productive years age (fig.1).

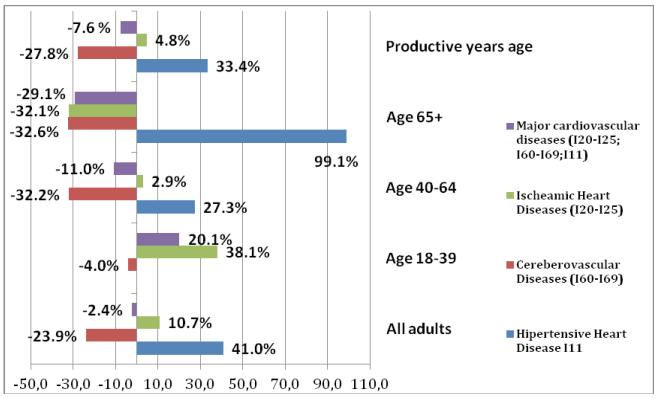

Fig. 1. Percentage change in major cardiovascular diseases premature mortality rates among adults, the Republic of Moldova, 2003-2015.

The increasing trends of percentage change in overall premature mortality from ischeamic heart diseases (+10.7%) was largely determined by the rising trends of premature mortality in men for all age groups. In addition, premature mortality rising trends for men were higher in younger age groups lying from + 38.2% for age group 18-39 years to + 13.0% for age group 40-64 years.

Cerebrovascular Diseases (I60-I69)

In 2015, cerebrovascular diseases recorded 5,835 deaths producing 19,302 potential years of life lost (PYLL). Cerebrovascular diseases were responsible for 31.4% of all PYLL from major cardiovascular diseases and a proportion of 7% from all causes of deaths in 2015.

Proportional mortality from cerebrovascular diseases by age was 22.8% (95% IC 21.8%-23.9%) in case of age groups under 65 years. In 2015, every fifth death from cerebrovascular diseases was in premature ages.

Age-standardized rates of premature mortality from cerebrovascular diseases were higher for age group 40-64 years overall period from 2003 to 2015, ranging from 320.9 (in 2013) to 563.3 (in 2005) per 100,000 population. Adjusted rates of premature mortality from cerebrovascular disease by gender were higher in case of men (ranging from 595.5 in 2012 to 837.6 in 2005) than in women (ranging from 258.3 in 2015 to 566.8 in 2005 per 100,000 population), inclusively all analyzed age groups, as follows: 18-39; 40-64; 65+; and productive years of age.

The percentage change of rates in premature mortality from cerebrovascular diseases for the period 2003-2015 registered decreasing trends for both men and women, with the exception of men aged 18-39 years with rising trend of +22.5%. The percentage change in premature mortality caused by cerebrovascular diseases for the period 2003-2015 showed decreasing trends for all age groups in question (fig.1). In addition, it was found that decreasing trend of percentage changes in premature mortality rates from cerebrovascular diseases for women was 3.6 times higher compared to men.

Hypertensive Heart Disease (I11)

In 2015, hypertensive heart disease recorded 1,908 deaths producing 2,312.5 potential years of life lost (PYLL), which determined 3.8% of total PYLL from major cardiovascular diseases.

Premature deaths from ischeamic heart disease were associated with hypertension in 21.2% of total premature deaths cases which were responsible for 9.4% of total potential years of life lost produced by this disease. Premature deaths from cerebrovascular disease were associated with hypertension in 40.7% of total premature deaths cases which were responsible for 30% of total potential years of life lost produced by this disease. Age-standardized premature mortality rates from cerebrovascular disease associated with hypertension identified higher frequencies compared to ischeamic heart disease associated with hypertension (1.9 times) and hypertensive heart disease (3.2 times).

Age-adjusted rates of premature mortality from hypertensive heart disease by gender registered higher level for men compared to women, respectively ranging from 38.0 (in 2012) to 61.8 (in 2014), and from 27.1 (in 2009) to 41.7 (in 2007) per 100,000 population. In addition, for both sexes the age group 40-64 years identified higher frequencies than age groups: 18-39; over 65, and productive years of age.

The percentage change of rates in premature mortality from hypertensive heart disease for the period from 2003 to 2015 recorded an increasing trend (+41%), along with a rising percentage for age group 40-64 years (+27.3%) and over 65 years (99.1%) (fig.1). Evolution of hypertensive heart disease by gender identified higher percentage change in women (+67.5%) than men (23.9%) overall period 2003-2015.

Discussion

Along with general decreasing trend of major cardiovascular diseases premature mortality rate (-2.4%) for the period 2003-2015, the study found when referring to every clinical form in question: ischeamic heart diseases, cerebrovascular diseases and hypertensive heart disease the trends of premature mortality rates were different. Overall period from 2003 to 2015, premature mortality rates from ischeamic heart diseases (+10.7%) and hypertensive heart disease (+41%) have registered increasing trends versus premature mortality rate from cerebrovascular diseases with decreasing trend (-23.9%).

When analyzing percentage changes of premature mortality increasing trends by age, the study findings determined the higher percentage changes in younger groups for ischeamic heart diseases premature deaths than hypertensive heart disease, respectively as following: age group 18-39 years (+38.1%), 40-64 years (+2.9%) , over 65 years (- 32.1%) and age group 18-39 years (a small number of cases was registered), 40-64 years (+27.3%), over 65 years (+99.1%). These differences over the time in mortality changes are of great epidemiologic interest because of resulting possibilities for comparative investigation [20, 21, 22]. Mostly similar trends were found by Global Burden Disease study (GBD-2010), which estimated for the period 1990-2010 along with a slightly decreasing from major cardiovascular diseases premature mortality rates, there was also an increase of 17-28% for the potential years life lost from ischeamic heart diseases and cerebrovascular diseases [8, 9].

Conclusions

1. Despite the general decreasing trend of major cardiovascular diseases premature mortality rate, ischeamic heart diseases compared to cerebrovascular and hypertensive heart diseases identify the most pronounced trends of the deaths event rejuvenation in the Republic of Moldova for the period 2003-2015.

2. The systematic evaluation of premature mortality changes contributes to improve the quality assessment of the population health and evidence-based decision-making regarding the cardiovascular diseases prevention and control in the Republic of Moldova.

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