

ACUTE MYOCARDIAL INFARCTION MORBIDITY AND MORTALITY IN POPULATION OF 30-64 YEARS OF AGE IN THE CITY OF NIS IN THE PERIOD 2001 - 2005

Zorana Deljanin, Natasa Rancic, Mirko Ilic, Branislav Petrovic and Branislav Todorovic

The aim of the paper was to determine the morbidity and mortality from acute myocardial infarction (AMI) in the population of 30-64 years of age in the city of Nis. Data about patients who were hospitalized in the Coronary Units at the territory of the city of Nis from 2001 to 2005 were analyzed retrospectively. Data about patients were obtained from the AMI Population-based Register of the Public Health Institute in Nis. The total of 1115 subjects of AMI in the population of 30-64 years of age was registered, 813 (72,9%) attacks of which in men and 302 (27,1%) in women, 128 (11,5%) fatal and 987 (88,5%) non-fatal cases of AMI. Among men, the highest number was in the age group of 55-59 – 239 (29,4%), and among women 60-64 years of age – 110 (36,4%). The male patients were 62,0 years old and the female ones were 65,6 years of age on the average. Average 28-days case-fatality among men was 50,6% and among women 56,8%. The difference was statistically significant ($X^2=3,38679$; $p<0,10$). Average 28-day case-fatality among hospitalized men was 24,3% and among women 33,2% ($X^2=14,929978$; $p<0,01$). Unadjusted attack rate has shown continual increase among men and slight increase among women. The age-adjusted attack rate /100 000 of AMI was the lowest in 2001 (among men 83,7 and women 36,8) and the highest in 2005 (among men 144,2 and women 45,6). Unadjusted mortality rate has shown continual increase both in men and in women. Age-adjusted mortality rate /100 000 among men ranged from 3,0 to 24,7 and it was 8,2 times higher in 2005 compared with the same rate in 2001. The age-adjusted mortality rate /100 000 among women ranged from 1,9 to 22,1 in 2005, and it increased by 11,6 times between 2001 and 2005. Both unadjusted and age-adjusted attack and mortality rates from AMI have shown continuous increase. Women were older than men at the time of first AMI. Average case-fatality was higher among women than among men. *Acta Medica Medianae 2007;46(2):21-24.*

Key words: acute myocardial infarction, attack rate, case-fatality, mortality rate

Center for Disease Control and Prevention Public Health Institute in Nis,

Correspondence to: Zorana Deljanin
Center for Disease Control and Prevention Public Health Institute
50 Dr Zoran Djindjic Blvd.
18000 Nis, Serbia
Phone: 018 226 448 local 152
E-mail: zoranam@bankerinter.net

Material and methods

Data about patients who were hospitalized in the Coronary Units at the territory of the city of Nis from 2001 to 2005 were analyzed retrospectively. All patients were 30-64 years of age. Data about patients were obtained from the Population-based Register for Acute Myocardial Infarctions of the City of Nis. Unadjusted and age-adjusted rates were calculated, while the population data were taken from the Census results of 2002. The direct standardization method was applied and standardization was carried out according the European standard population. The Population-register was formed on the legal grounds of the Rules of Register Form and Keeping, Entry Form and Procedure of Registering and Canceling Registration of Specific Diseases (Official Gazette of the SRS, No 2/80). The data originate from the following sources: the records of the Coronary units (CU), reports on the disease from Public health institutions at the territory of Nis, death certificates (DM-2 forms) from the Republic Bureau of Statistics-Branch Office in Nis. The diagnosis of acute myocardial infarction was based on at least two out of the following three criteria: 1) typical acute sym-

Introduction

Coronary heart disease, due to atherosclerosis, is the most prevalent chronic disease in the developed world (1,2,3,4). Acute myocardial infarction is the most complex clinical manifestation of coronary heart disease. It is also the leading cause of premature death in the developed countries of the world (1,2,3,4,5,6). As a cause of morbidity and mortality of the population, it is rapidly increasing in importance in the developing countries (6,7,8).

Aims

The aim of the paper was to determine the morbidity and mortality from acute infarction in the population of 30-64 years of age in the city of Nis in the period from 2001 to 2005.

ptoms-chest pain for more than 30 minutes; 2) increased enzyme concentrations-creatin kinase and creatin kinase-MB twice the upper normal value within 72 hours after the onset of acute symptoms, and 3) electro-cardiogram changes with or without ST-segment elevation. We used the diagnosis codes I21 and I22 from the 10th Revision of the International Classification of Diseases (ICD-10; ref.10). An acute myocardial infarction reoccurring within 28 days was not registered as a new attack. The attacks rates were defined as a sum of definite, recurrent, and possible attacks. Possible heart attacks mostly included fatal cases where autopsy was not performed and not all the above listed criteria were met.

The mortality rate indicated the number of deaths in the population over the period of time. Case fatality indicated the proportion of deaths among patients. Attack rate was presented by year and sex. Mortality rate was presented by year and sex and by prehospital and hospital mortality.

Comparison between men and women was done by using X² test. Statistical analysis was performed by Microsoft's Exel for Windows.

Results

The total of 1115 cases of acute myocardial infarction in the population of 30-64 years of age in the city of Nis in the period 2001-2005 was recorded. There were 813 (72,9%) attacks in men and 302 (27,1%) in women. There were 128 (11,5%) fatal and 987 (88,5%) non-fatal cases of acute myocardial infarctions registered. Among men, the highest number of attacks was in the age group of 55-59 years - 239 (29,4%). The highest number of attacks among women was recorded in the age group of 60-64 years - 110 (36,4%).

The male patients were 62,0 years old and the female ones had 65,6 years on the average. The difference is not statistically significant.

Table 1. Cumulative number of fatal and non-fatal acute myocardial infarctions by age, sex and case-fatality in the population 30-64 years of age in the City of Nis in the period 2001 - 2005

Age group	Men/women		
	fatal	non-fatal	case-fatality (%)
30-34	1/1	5/4	1,1/2,8
35-39	1/0	20/0	1,1/0,0
40-44	1/4	42/20	1,1/11,4
45-49	9/3	95/35	9,6/8,6
50-54	18/3	177/50	19,4/8,6
55-59	35/7	204/65	37,6/20,0
60-64	28/17	177/93	30,1/48,6
scor	93/35	720/267	100/100

The acute myocardial infarction was registered in both sexes after the age of 30, it

abruptly increased after the age of 44, reached its maximum in men from 55 to 59 years of age and in women over 60 years of age (Table 1).

Average twenty-eight-day case-fatality among men was 50,6% and among women 56,8%. The difference was statistically significant (X²=3,38679 and p<0,10).

Case-fatality showed more pronounced variations among men. Average twenty-eight-day case-fatality among hospitalized men was 24,3% and among women 33,2%. The difference was statistically significant (X²=14,929978 and p<0,01).

Table 2. Unadjusted and age-adjusted attack rate of acute myocardial infarction in the population of 30-64 years of age in the City of Nis in the period 2001 - 2005

Years	men		women	
	unadjusted rate	age-adjusted rate	unadjusted rate	age-adjusted rate
2001	91,5	83,7	39,8	36,8
2002	128,3	118,4	39,8	38,4
2003	151,2	133,4	51,5	68,1
2004	139,0	130,4	51,5	46,7
2005	153,7	144,2	54,6	45,6

Unadjusted attack rate showed continual increase among men. Among women, the same rate showed slight increase and it was lower than among men in the same observed period. The values of unadjusted attack rate among women in 2001 and 2002 were higher than age-adjusted attack rates in the same observed period. That could be explained by high annual case-fatality among women in this period (Table 2).

The age-adjusted attack rate of acute myocardial infarction among men was the lowest in 2001 (83,7 per 100 000) and the highest in 2005 (144,2 per 100 000). The age-adjusted rate among women was 36,8 per 100 000 in 2001 and the highest in 2005 (45,6 per 100 000). The age-adjusted attack rate among men in 2005 increased by 1,7 times. Among women, the age-adjusted attack rate increased by 1,2 times in the same observed period.

Table 3. Age-adjusted mortality rate from acute myocardial infarction in the population of 30-64 years of age in the City of Nis from 2001 to 2005.

Years	men		women	
	unadjusted rate	age-adjusted rate	unadjusted rate	age-adjusted rate
2001	6,5	3,0	4,7	1,9
2002	13,9	6,7	7,8	2,1
2003	29,4	15,5	21,8	3,6
2004	34,3	20,0	20,3	4,8
2005	45,0	24,7	32,0	22,1

Unadjusted mortality rate showed continual increase both in men and women. Age-adjusted

mortality rate among men ranged from 3,0 per 100 000 men to 24,7 per 100 000. The age-adjusted mortality rate was higher among men than in women in the observed period (Table 3). The age-adjusted mortality rate in men was 8,2 times higher in 2005 compared with the same rate in 2001.

The age-adjusted mortality rate among women ranged from 1,9 per 100 000 to 22,1 per 100 000 in 2005. The age-adjusted mortality rate among women increased by 11,6 times between 2001 and 2005.

Discussion

According to the results of our study, the increase in unadjusted and age-adjusted attack and mortality rates from acute myocardial infarction, was recorded in the population of the city of Nis. Both attack and mortality rates of acute myocardial infarction were strongly related to sex and age. Women were older than men at the time of first acute myocardial infarction. The difference in mean age between men and women was not statistically significant. The same data regarded are presented in the literature (3,4,5,9).

There was a continuous increase in unadjusted and age-adjusted attack rates in both men and women in the population of the city of Nis. The difference between men and women in the increase of attack rates was statistically significant ($p < 0,01$). This increase can be explained by stressful living during and after the bombardment in 1999, a continuous decline in socioeconomic status of the population, and many refugees and displaced people from Croatia, Bosnia and Kosovo and Metohia. There were not preventive programmes for reduction and elimination of well-known risk factors for coronary heart disease. Data about negative association between low socioeconomic status and coronary heart disease can be found in the medical literature (10,11,12).

Twenty-eight-day case-fatality from acute myocardial infarction was especially high among women of 30 to 40 years of age. Twenty-eight-day case-fatality among men was high in the group of patients from 45 to 60 years of age and it was especially high compared to women of the same age.

Average twenty-eight-day case-fatality among men was 50,6% and 56,8% among women. The difference was statistically significant ($X^2 = 3,38679$ and $p < 0,10$). According to the data from the MONICA study (13), which was conducted in Glasgow and Belfast, an average twenty-eight-day population case-fatality was 49% in men and 51% in women, which was lower than in Nis. The twenty-eight-day case-fatality in the city of Za-

greb after acute myocardial infarction was 46% in men and 45% in women (8). According to data of the Swedish National Myocardial Infarction Register from the population-based register in Sweden, case-fatality was 42% in men and 45% in women (3), and from MONICA-KORA study, case-fatality in Ausburg in Germany was 42% in men and 44% in women (5).

Case-fatality showed more pronounced variations among men. Average twenty-eight-day case-fatality among hospitalized men was 24,3% and among women 33,2%. The difference is statistically significant ($X^2 = 14,929978$ and $p < 0,01$). The higher average twenty-eight-day case-fatality among hospitalized women was probably due to the high number of fatal acute myocardial infarction cases in younger women. The average twenty-eight-day case-fatality of hospitalized patients in Zagreb was 24% for men and 31% for women (8). Median twenty-eight-day case-fatality for hospitalized events was 22% for men and 27% for women in 38 populations from 21 countries on 4 continents (6). Similar data can be found in medical literature (2,5,14).

The annual case-fatality one year after acute myocardial infarction was especially high in women in the city of Nis. A slight and continuous decline in annual case-fatality has been recorded since 2003. There are the same data in the medical literature (5,8,13,14,15).

Limitations of the study

Despite the computerized information system of data collection and keeping the mistakes in registrations of patients are possible. In most cases the exact diagnosis of each sick person and demographic data (age, address) were missing. There were more problems with mortality data, because the reliability and accuracy of the definition of underlying cause of death depends on the certifier of each death and national nosologists who determine the codes and the underlying causes. The autopsy in most cases was not always adequate.

Conclusion

Annual unadjusted and age-adjusted attack rates and mortality rates indicate a slight but steady increase in both men and women. The disease is registered in both sexes after 30 years of age; its incidence is highly increased after the age of 44 and it reaches its maximum in patients older than 70. The acute myocardial infarction affected women who were older than the disease-struck men. The mean twenty-eight-day case-fatality after acute myocardial infarction was higher in women than in men. A decrease of case-fatality has been registered in women since 2003.

References

1. Botkin FN, Spencer AF, Goldberg JR, Lessard D, Yarzebski J, Joel M. Changing trends in the long-term prognosis of patients with acute myocardial infarction: A population-based perspective. *Amer Heart J* 2006;Vol. 151:1;199-205.
2. Rothwell PM, Coull AJ, Silver LE, Fairhead JF, Gilles MF, Lovelock CE, et al. Population-based study of event-rate, incidence, case fatality, and mortality for all acute vascular events in all arterial territories (Oxford Vascular Study). *Lancet* 2005; Vol. 366:19:1773-83.
3. Hammar N, Alfredsson L, Rosen M, Spet CL, Kahn T, and Ysbers AS. A national record linkage to study acute myocardial infarction incidence and case fatality in Sweden. *Int J Epidemiol* 2001; 30:S30-S34.
4. Jenum AK, Stensvold I, Thelle DS. Differences in cardiovascular disease mortality and major risk factors between districts in Oslo. An ecological analysis. *Int J Epidemiol* 2001;30:S59-S65.
5. Lomel H, Meisinger C, Heil M, Hormonnt. The Population-Based Acute Myocardial Infarction (AM) Registry of the MONIKA/KORA Study Region of Augsburg. *Gesundheitswesen* 2005;67 Sonderheft 1:S31-S37.
6. Tunstall-Pedoe H, Kuulasma K, Amoyel P, Arveiler D, Raja Kangs A-M, Paja KA, for MONIKA Project. Myocardial Infarction and coronary daths in World Organization MONICA Project Registratiomm procedures event rates and case fatality in 38 populations from 21 countries in 4 continents. *Circulation* 1994;90:583-612.
7. Prevencija ishemijske bolesti srca. Nacionalni vodič kliničke prakse. Radna grupa za kardiovaskularne bolesti. Beograd, 2002.
8. Haim I, Jembrek-Gostović M, Kern J, Janke V, Svetina M. Trends in Acute Myocardial Infarction Mortality and Morbidity from 1979 to 2001 in the City of Zagreb, Croatia. *Croat Med J* 2005;46 (6): 970-6.
9. Goldberg JR, Spencer AF, Yarzebski, Lessard, Gore MJ, Alpert SJ, Dalen EJ. A 25-Year Perspective Into the Changing Landscape of Patients Hospitalized With Acute Myocardial Infarction (the Worcester Heart Attack Study). *Am J Cardiol* 2004;94:1373-78
10. Cesana G, Ferrario M, Gigante S, Segà R, Toso C, Achilli F. Socio-occupational differences in acute myocardial infarction case-fatality and coronary care in a northern Italian population. *Int J Epidemiol* 2001;30: S53-S58
11. Cooper SR. Social inequality, ethnicity and cardiovascular disease. *Int J Epidemiol* 2001;30:S48-S52
12. Huff N, Gray DM, Hampton J. Acute myocardial infarction admissions to hospital and the socioeconomic environment in Nottingham Health District. *UK. Coronary health Care* 1998; 3:145-149
13. Moore W, Kee F, Evans AE, Mc Crum GE, Morrison C, Tunstall-Pedoe H. Pre-hospital coronary care and coronary fatality in the Belfast and Glasgow MONIKA populations. *Int J Epidemiol* 2005;34:422-30
14. Perers E, Caidahl K, Herlitz J, Karson WB, Karlsson T, Hartford M. Treatment and short-term outcome in women and men with acute coronary syndromes. *Inter J Cardiol* 2005; 103:120-7
15. Ruiz-Bailén M, Aguayo de Hoyos E, Ramos-Cuadra AJ, Díaz-Castellanos AM, Issa-Khozouz Z, Reina-Toral A, et al. Influence of age on clinical course, management and mortality of acute myocardial infarction in the Spanish population. *Intern J Cardiol* 2002; 85:2-3: 285-96

OBOLJENJE I UMIRANJE OD AKUTNOG INFARKTA MIOKARDA U POPULACIJI GRADA NIŠA STAROSNE GRUPE 30-64 GODINE U PERIODU OD 2001. DO 2005. GODINE

Zorana Deljanin, Nataša Rančić, Mirko Ilić, Branislav Petrović i Branislav Todorović

Cilj rada bio je sagledavanje oboljevanja i umiranja od akutnog infarkta miokarda (AIM) u populaciji grada Niša, starosne grupe 30-64 godine. Retrospektivno su analizirani podaci o bolesnicima koji su od 2001. do 2005. godine bili hospitalizovani u koronarnim jedinicama grada Niša zbog AIM. Podaci o bolesnicima dobijeni su iz Populacionog registra za AIM Instituta za javno zdravlje u Nišu. Ukupno je registrovano 1115 morbiditeta, kod muškaraca 813 (72,9%) a kod žena 302 (27,1%), 128 (11,5%) fatalnih i 987 (88,5%) nefatalnih AIM. Najveći broj, 239 (29,4%) kod muškaraca, registrovan je u starosnoj grupi 55-59 godina a kod žena, u starosnoj grupi 60-64 godine, 110 (36,4%). Prosečan broj godina obolelih muškaraca bio je 62,0, žena 65,6. U proseku, letalitet kod muškaraca iznosio je 50,6% a kod žena 56,8%. Razlika je statistički značajna ($\chi^2=3,38679$ i $p<0,10$), kod hospitalizovanih muškaraca je 24,3% a kod žena 33,2%, sa statističkom značajnošću ($\chi^2=14,929978$ i $p<0,10$). Nestandardizovana stopa udara pokazuje kontinuirani porast kod muškaraca a kod žena je zabeležena izvesna stagnacija i blagi porast. Standardizovana stopa morbiditeta/100 000 bila je najniža 2001. (kod muškaraca-83,7, kod žena-36,8) a najviša 2005. godine (kod muškaraca-144,2, kod žena-45,6). Nestandardizovana stopa mortaliteta kontinuirano se povećavala kod oba pola. Standardizovana stopa mortaliteta /100 000 kod muškaraca kretala se od 3,0 do 24,7, povećala se 8,2 puta u 2005. u odnosu na 2001. godinu, a kod žena se kretala od 1,9 do 22,1 2005. godine i povećala 11,6 puta 2005. godine. Registrovan je porast nestandardizovanih i standardizovanih stopa morbiditeta i mortaliteta kod oba pola. Žene su bile starije od muškaraca u vreme prvog AIM. Prosečna vrednost letaliteta bila je viša kod žena nego kod muškaraca. *Acta Medica Medianae* 2007;46(2):21-24.

Ključne reči: akutni infarkt miokarda, stopa morbiditeta, letalitet, stopa mortaliteta