

CASE-FATALITY AND MORTALITY FROM ACUTE MYOCARDIAL INFARCTION IN THE ELDERLY POPULATION IN THE CITY OF NIS

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Acute myocardial infarction (AMI) is an important cause of mortality in the elderly. The aim of the paper was to determine the frequency of mortality due to AMI in the elderly population (≥ 65 years of age). The data about all hospitalized patients with AMI were analyzed. Data were taken from the Population-based Register for AMI of the City of Nis. The total number of registered cases was 1917, 1065 (55,6%) of which in men and 852 (45,4%) in women. Among the elderly men, there were 214 (20,1%) cases of fatal AMI and 237 (27,8%) cases of fatal AMI among the elderly women. The difference found was statistically significant ($X^2=36,5140$ and $p<0,001$). The average 30-day case-fatality for AMI was 34,4% in men and 45,5% in women. The difference determined was statistically significant ($X^2=5,62580$ and $p<0,05$). In regard to age, the highest 30-day case-fatality both in men and women was in the age group 75-79 years (37,8%:38%) and the lowest 30-day case-fatality was in the group of patients older than 90 years (1,4%:3%). The standardized prehospital and hospital mortality rates for men were much higher than for women. The standardized mortality rate in men ranged from 3,7 to 102/100 000. The same mortality rate in women ranged from 8,6 to 60,7/100 000. There were more elderly women with fatal AMI than men. Both non-standardized and standardized mortality rates from AMI have shown continuous increase in the elderly, especially in men. The average of 30-day case-fatality has been consistently reported as being higher among women. There has been a decrease of 30-day case-fatality among men from 2004. The 30-day case-fatality among women showed an increase in 2006. Both non-standardized and standardized prehospital and hospital mortality rates both in men and women have increased. *Acta Medica Medianae 2007;46(3):21-26.*

Key words: acute myocardial infarction, mortality, case-fatality, the elderly population

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Introduction

Acute myocardial infarction (AMI) is an important cause of mortality in patients older than 65 years (1). Incidence and prevalence of AMI increase progressively with age (1,2,3,4). Age is a significant predictive variable for case-fatality and long-term survival after AMI (2,5,6,7,8,9). The incidence of both AMI and their associated morbidity and mortality increase with ageing (9). The elderly population compared with younger individuals are a unique population presenting with different clinical characteristics of acute myocardial infarction and a worse prognosis (10,11).

Aim

To evaluate mortality from acute myocardial infarction in the elderly population (≥ 65 years of age) in the City of Nis.

Material and methods

Data about all the hospitalized elderly patients who had AIM between 2002 and 2006 were analyzed. Data were taken from the Population-based Register for Acute Myocardial Infarction 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 to the European standard population.

Comparison between men and women were made by using Mantel-Haenszel Chi-square test. Statistical analysis was performed with Microsoft's Excel for Windows.

Table 1. Cumulative number of acute myocardial infarctions in the elderly by age and sex and case-fatality in the City of Nis from 2002 to 2006

Age group	Men			Women		
	fatal	non-fatal	case-fatality(%)	fatal	non-fatal	case-fatality(%)
65-69	30	187	217 (14%)	35	138	173 (14,7%)
70-74	34	203	237 (15,9%)	38	164	202 (16%)
75-79	81	343	424 (37,8%)	90	196	286 (38,0%)
80-84	50	85	135 (23,4%)	54	95	149 (22,8%)
85-89	16	27	43 (7,5%)	13	20	33 (5,5%)
90+	3	6	9 (1,4%)	7	2	9 (3,0%)
svega	214	851	1065 (100%)	237	615	852(100%)

Results

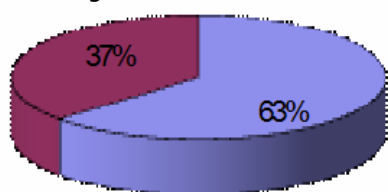
The total number of 1917 cases in the elderly population was registered. There were 1065 (55,6%) AMIs in men and 852 (45,4%) in women.

The Table 1 presents the total number of AMIs in the elderly by age and case-fatality for the observed five-year period in the City of Nis.

The highest number of cases - 828 (82,5%) was recorded in the elderly men under 80 years of age. Among women of the same age, there were 661 (77,6%) cases of AMI.

Among 1065 elderly men with AMI, there were 214 (20,1%) cases of fatal AMIs. In the female population over 65 years of age, there were 237 (27,8%) cases of fatal AMIs. The difference was statistically significant ($\chi^2=36,5140$ and $p<0,001$). Fatal AMIs were registered more in the elderly women compared to elderly men.

<65 years of age



<65 years of age

Chart 1. Percentage of patients older than 65 years of age compared to a total number of hospitalized patients suffering from acute myocardial infarction in the city of Nis from 2002 to 2006

Patients older than 65 years of age account for 63% of all the patients with AMI who were admitted to hospital (Chart 1) and 78% of deaths due to AMI occur in those over 65 years of age (Chart 2)

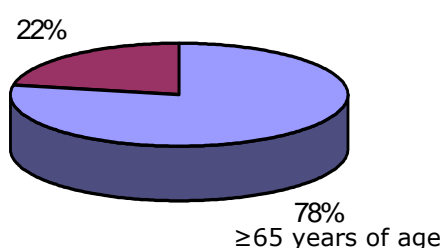


Chart 2. Percentage of deceased patients older than 65 years of age compared to a total number of all deceased patients suffering from acute myocardial infarction in the City of Nis from 2002 to 2006

Case-fatality

In the observed period, mean twenty-eight-day case-fatality was 34,4%, and 45,5% in men and women, respectively. The difference was statistically significant ($X^2= 5,62580$ and $p<0,05$). Women older than 65 years of age had a higher mean twenty-eight-day case-fatality than men of the same age.

The continuous decrease of twenty-eight-day case-fatality in men was recorded from 2004. The same case-fatality among women showed more pronounced variations, decrease in 2004 and in 2005 and increase in 2006 by 14%.

According to age, the highest case-fatality was recorded in men and women aged 75-79 years (37,8%:38%) and the lowest was in patients over 90 years of age (1,4%:3%), (Table 1). The lowest case-fatality in patients over 90 years of age was probably because of low absolute number of patients of this age.

Mortality rate

Table 2 presents annual unadjusted and age-adjusted mortality rates in elderly men and in elderly women in the five-year period in the City of Nis.

Annual unadjusted and age-adjusted mortality rates showed continuous increase in both men and women. Annual unadjusted mortality rate was higher among men than among women in all observed periods (Table 2).

Table 2. Annual unadjusted and age-adjusted mortality rates from acute myocardial infarction in the elderly population in the City of Nis from 2002 to 2006

year	men		women	
	unadjusted	age-adjusted	unadjusted	age-adjusted
2002	58,0	3,7	33,9	8,6
2003	135,4	8,9	77,4	12,9
2004	444,9	41,3	333,9	46,6
2005	522,3	54,6	280,7	42,9
2006	909,2	102,0	421,0	60,7

Age-adjusted mortality rate ranged from 3,7 per 100 000 inhabitants to 102 per 100 000 inhabitants. The age-adjusted mortality rate showed more pronounced variations among men than in women. The rate was increased in men 86,8% in 2006 compared with one registered in 2002. The same rate was increased in women by 41,4% in the same observed period. The difference was statistically significant ($\chi^2=16,8231$ $p<0,001$).

Between 2002 and 2004, the rate was higher in women than in men by 1,5 times. In 2005 and 2006, age-adjusted mortality rate was higher in men than in women in the same year (Table 2).

Table 3 presents age-adjusted annual prehospital and hospital mortality rates in the elderly men in the City of Nis from 2002 to 2006.

Table 3. Age-adjusted prehospital and hospital mortality rates from acute myocardial infarction in the elderly men in the City of Nis between 2002 to 2006

Year	Age-adjusted prehospital mortality rate	Age-adjusted hospital mortality rate
2002	1,6	4,8
2003	1,3	9,0
2004	17,2	8,1
2005	17,8	10,9
2006	19,7	17,5

Between 2002 and 2006 the age-adjusted prehospital rate was higher in elderly men than in elderly women (table 3 and table 4).

The increase of both prehospital and hospital mortality rate was recorded among men. The prehospital rate showed the continuous increase from 2004. The age-adjusted rate increased by 22 times in 2006 compared with the rate in 2002. The increase of age-adjusted hospital rate was much lower than prehospital rate. The hospital rate was increased only by 3,6 times in the same observed period.

Table 4 presents age-adjusted mortality rates in elderly women in the City of Nis from 2002 to 2006.

Table 4. Age-adjusted prehospital and hospital mortality rates from acute myocardial infarction in the elderly women in the City of Nis between 2002 to 2006

Year	Age-adjusted prehospital mortality rate	Age-adjusted hospital mortality rate
2002	0,6	4,1
2003	0,5	4,4
2004	7,5	8,8
2005	6,0	7,9
2006	13,2	14,3

The increase of both prehospital and hospital mortality rates was recorded in the elderly women, too. The age-adjusted prehospital rate was increased by 22 times in 2006 compared with the same rate in 2002. The increase of age-adjusted hospital rate was much lower. The age-adjusted hospital rate was increased by 3,5 times in 2006 compared with the same rate in 2002.

The age-adjusted prehospital mortality rate, in both men and women showed higher and faster increase than the age-adjusted hospital mortality rate. The increase of the prehospital and hospital mortality rates was almost the same in the elderly men and elderly women in the observed period.

Discussion

According to data from the Population-based Register for Acute Myocardial Infarctions of the City of Nis, patients older than 65 account for 63% of all the patients with acute myocardial infarctions who were admitted to hospital and 78% of deaths due to acute myocardial infarction occur in those over 65 years old.

Data from other studies have shown that 80% of deaths due to acute myocardial infarction occur in patients aged over 65 years (9,14,15,16).

In the United States, over 60% of acute myocardial infarctions occur in patients 65 years of age or older, and approximately one third occur in persons over 75 years of age (3,11).

Our results showed that annual age-adjusted attack rate between 2002 and 2006 had a slight but a steady increase both in the elderly men and in the elderly women. The increase is higher in men than in women ($\chi^2=62,7$ and $p<0,001$).

According to data from the Population-base register for acute myocardial infarctions of the City of Nis, the people older than the age of 75-79 had by 4,1 times greater number of fatal AMIs than patients at the age of 55-59. The number of recorded cases is especially higher in the elderly women and it was by 12,9 times higher than in younger women.

According to the age, the highest case-fatality in the elderly in Nis were recorded in both men and women in the age group 75-79 years (37,8%:38%). The rate was the lowest in the patients older than 90 years probably due to the small absolute numbers of inhabitants of this age in the City of Nis.

In-hospital case fatality increased with increasing age. There were the same data in the literature; 65-74 16,1% and in patients 75 years of age and older 32,1% (5,13).

In the observed period, mean twenty-eight-day case-fatality in men was 34,4% and in women was 45,5%. The difference is statistically significant ($X^2 = 5,62580$ i $p < 0,05$). Women older than 65 years of age had a greater mean twenty-eight-day case-fatality than men of the same age.

Mortality among patients within twenty-eight-day of the hospitalized with an acute myocardial infarction has been consistently reported as being higher among women (12,16). Short-term mortality increased with age, but without any significant gender interaction (1,3,17).

According to our results, patients aged 75-79 years had an approximate 2,7- fold increased risk, respectively, of dying during the acute

hospitalization as compared to individuals 65 to 69 years of age.

According to our results, the greatest number of deaths was outside health organizations. A decrease of deaths which happened in the hospital is evident, what is probably the result of up-to-date procedures usage and more efficient therapy even in elder patients with acute myocardial infarctions (10,18).

Conclusion

The more fatal AMIs was registered in the elderly women than in the elderly men. Annual unadjusted and age-adjusted mortality rates have shown continuous increase in both men and women, especially in men. The increase of both age-adjusted prehospital and age-adjusted hospital mortality rates was determined both in men and in women. Women older than 65 years of age had a higher twenty-eight-day case-fatality than men of the same age. The continuous decrease of twenty-eight-day case-fatality was recorded in men from 2004. The increase of twenty-eight-days case-fatality rate was recorded in women in 2006.

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LETALITET I MORTALITET OD AKUTNOG INFARKTA MIOKARDA U POPULACIJI STARIH

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Akutni infarkt miokarda (AIM) je značajan uzrok umiranja stanovništva starijeg od 65 godina. Cilj rada bio je da utvrdi učestalost umiranja od AIM u populaciji starih. Analizirani su podaci o svim obolelim starijim od 65 godina koji su bili hospitalizovani zbog AIM u periodu od 2002. do 2006. godine. Podaci o obolelima dobijeni su iz Populacionog registra za AIM grada Niša. U posmatranom periodu, u populaciji starijoj od 65 godina, ukupno je registrovano 1917 AIM i to 1065 (55,6%) kod muškaraca i 852 (45,4%) kod žena. Kod muškaraca je registrovano 214 (20,1%) fatalnih AIM, a kod žena 237 (27,8%) fatalnih AIM. Utvrđena razlika je statistički značajna ($X^2=36,5140$ i $p<0,001$). Prosečan letalitet u 30 dana od AIM kod muškaraca iznosio je 34,4% a kod žena 45,5%. Utvrđena razlika je statistički značajna ($X^2=5,62580$ i $p<0,05$). Letalitet u 30 dana i kod muškaraca i kod žena u odnosu na starost, bio je najveći u starosnoj grupi 75-79 godina (37,8%:38%) a najniži kod starijih od 90 godina (1,4%:3%). Standardizovana stopa mortaliteta kod muškaraca kretala se od 3,7 do 102/100 000. Stopa mortaliteta kod žena kretala se od 8,6 do 60,7/100 000. Trend mortaliteta od AIM kod muškaraca iznosio je $y=24,23x-30,59$ i $R^2=0,9287$, a kod žena, $y=13,42x-5,92$ i $R^2=0,8825$. Registrovano je više fatalnih AIM kod žena starijih od 65 godina, nego kod muškaraca. Godišnje nestandardizovane i standardizovane stope mortaliteta od AIM, pokazuju kontinuirani porast kod oba pola, posebno kod muškaraca. Trend mortaliteta od AIM bio je u porastu kod oba pola. Kod žena starijih od 65 godina, letalitet u 30 dana od AIM bio je veći nego kod muškaraca. Od 2004. godine registruje se kontinuirani pad letaliteta u 30 dana od AIM kod muškaraca. Kod žena je registrovan porast letaliteta u 2006. godini. Utvrđen je porast standardizovanih stopa vanbolničkog i bolničkog od AIM mortaliteta kod oba pola. *Acta Medica Medianae* 2007; 46(3):21-26.

Ključne reči: akutni infarkt miokarda, letalitet, mortalitet, populacija starih