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Acute Coronary Syndrome Frequency in Western Herzegovina over the Fifteen Year Period (1987–2001)

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ABSTRACT

All patients who suffered from the acute coronary syndrome in western Herzegovina over the fifteen year period (1987–2001) are included in this retrospective epidemiological study. The population that was undertaken by the study is relative stable and did not emigrate during the war period. The study compared the time before the war (1987–1991), during the war (1992–1996) and after the war (1997–2001). The data were acquired from the archives of the patients of the Mostar hospital and Clinical hospital Split during the war period. A total of 2022 acute coronary syndrome patients were found, 1305 men and 717 women. More patients were treated during the war compared to the time before the war for both male and female patients ($p < 0.0005$). During the after-war period the number of treated patients was greater ($p < 0.0005$) compared to the war-time for both sexes. The comparison of the after-war period and the pre-war period reveals a statistically significant difference as the number of treated patients (male and female) is larger in the after-war period. The number of patient who are 65 years old and older than that is greater, and that is statistically significant ($p = 0.0005$). We can conclude that the stress caused by the war and other factors have influenced a larger number of treated patients of acute coronary syndrome. Therefore, further epidemiological researches of acute coronary syndrome with the accent on prevention and treatment are needed.

Key words: war, acute coronary syndrome, western Herzegovina

Introduction

During the war and after-war period the population of Bosnia and Herzegovina was exposed to different risk factors that could affect the health condition of the population especially with respect to non-infective (coronary) diseases. It is well known that the stress is the risk factor for the development of the coronary disease. Since the influence of stress on the frequency of patients being treated for acute coronary syndrome was not previously investigated, we decided to conduct this research in the

population of western Herzegovina. Our goal is to present the frequency of patients being treated for acute coronary syndrome during pre-war, war and post war period (1987–2001).

Methods

In this retrospective study the period of fifteen years (from 1987 to 2001) was taken as the referent period. We

have compared frequency of patients treated for acute coronary syndrome in pre-war period (1987–1991), war (1992–1996) and post war period (1997–2001). The relatively stabile population of Mostar and neighboring municipalities – Čapljina, Stolac, Čitluk, Neum, Prozor, Široki Brijeg, Posušje, Grude and Ljubuški was included in the study. The number of inhabitants according to the Census from 1991 was 182.000 inhabitants.

We collected the information about the patients hospitalized due to acute coronary syndrome (category I 20, 21, 22 – X revision ICD) or treated in hospital during the pre-war period in Mostar, during the war period in Mostar and in the Republic of Croatia, as well as in post-war period in the Clinical Hospital in Mostar, where that population belongs according to their health insurance. The data about the treated patients due to the acute coronary syndrome were taken from the hospital archive.

The acute coronary syndrome encompassed acute myocardial infarction, with or without ST segment elevation, and unstable angina pectoris.

Myocardial infarction (first sad recurrent) was based on at least two criteria of the following three: (1) typical acute symptoms (chest pain for >30 minutes), (2) enzyme level elevations (creatine kinase or creatine kinase isoenzyme MB levels twice the normal upper limit within 72 hours after the onset of acute symptoms), and (3) electrocardiographic (ECG) changes, with or without ST segment elevation. Myocardial infarction with ST segment elevation was defined if ST segment elevation of ≥ 1 mm was present for two or more consecutive ECG leads for the inferior region (ECG leads II, III, and/or a VF: inferior myocardial infarction) or ST segment elevation of > 2 mm was present for ECG leads for the anteroseptal or lateral region (ECG leads V1–V6, a VL and/or I: myocardial infarction with anteroseptal or lateral localization). Dorsal localization of myocardial infarction was defined with new R wave development for ECG leads V1 and V2. Myocardial infarction without ST segment elevation was defined when > 1 mm depression of the ST segment at two consecutive ECG leads or T wave inversion at two or more consecutive leads was present.

We have collected the following data for every patient: age, gender, residency, as well as their medical record for acute coronary syndrome in the period from 1987 to 2001. Although there were changes in the number of population that came to live in Herzegovina, this research applies to the population that lived in that area during the period under research and did not emigrate. Their number is relatively stabile. The frequency of acute coronary syndrome is shown with the absolute numbers and percentages. The differences were tested with t-test, and $p < 0.05$ was considered as statistically significant.

Results

Total number of patients that were treated from acute coronary syndrome is 2022 (1343 treated from acute myocardial infarction, 105 from repeated myocar-

dial infarction, and 574 from instable angina pectoris), out of that 1305 men (865 acute myocardial infarction, 64 repeated myocardial infarction and 376 from instable angina pectoris) and 717 women (478 treated from acute myocardial infarction, 41 repeated myocardial infarction and 198 from instable angina pectoris). In the pre-war period 514 patients were treated from acute coronary syndrome (365 from acute myocardial infarction, 24 from repeated myocardial infarction and 125 from instable angina pectoris), out of that 344 men (246 from acute myocardial infarction, 14 repeated myocardial infarction and 84 from instable angina pectoris), and 170 women (119 from acute myocardial infarction, 10 from repeated myocardial infarction and 41 from instable angina pectoris). In the war period 665 patients were treated from acute coronary syndrome (428 from acute myocardial infarction, 52 from repeated myocardial infarction and 185 from instable angina pectoris), out of that 409 men (267 from acute myocardial infarction, 33 repeated myocardial infarction and 109 from instable angina pectoris), and 256 women (161 from acute myocardial infarction, 19 from repeated myocardial infarction and 76 from instable angina pectoris). In the post war period 843 patients were treated from acute coronary syndrome (550 from acute myocardial infarction, 29 from repeated myocardial infarction and 264 from instable angina pectoris), out of that 552 men (352 from acute myocardial infarction, 17 repeated myocardial infarction and 183 from instable angina pectoris), and 291 women (198 from acute myocardial infarction, 12 from repeated myocardial infarction and 81 from instable angina pectoris). The largest percentage of treated from acute coronary syndrome with both gender (48.4%), out of that women (62.9%) is in the oldest age groups in post war period and men (51.7%) in the pre-war period, and the least (12.8%) with both genders together and women (3.5%) in the pre-war period, and with men (17.4%) in the post war period. When the number of the treated patients is compared, it is obvious that largest number of treated patients is in 1998 – 187 patients, and the least number of patients was in 1992 – 81 patients hospitalized from acute coronary syndrome. The number of patients treated from acute coronary syndrome in the war period is much bigger comparing to the pre-war period with both genders together ($p < 0.001$), with men ($p < 0.018$) and with women ($p < 0.001$). Statistically, significantly larger number of treated patients in the post-war period comparing to the war period with both genders together ($p = 0.0000$), with men ($p = 0.0000$). Comparing the post war and pre-war period, we get the larger number of treated men and women in post war period ($p = 0.0000$), and larger number of treated from acute coronary syndrome ($p < 0.05$) in the age of 65 and more in the post war period, which is statistically significant. There are no statistical significances according to age and gender in three research period (Table 1). Statistically, number of treated patients from instable angina pectoris with men in post war period comparing to war period is more important ($p < 0.05$), and pre-war period ($p < 0.05$), as well as larger

number of treated from instable angina pectoris in the war period comparing to pre-war period ($p=0.019$).

The number of treated from acute myocardial infarction with men in post war period comparing to war period ($p=0.0006$), and pre-war ($p<0.0001$), period was bigger, and with women, number of treated was bigger in the war period comparing to per-war period ($p=0.01$), and in post war comparing to war period, which has proven as the statistically significant difference. The incidence of the repeated myocardial infarction is more significant in the war period comparing to pre-war period ($p=0.0005$), and post war period ($p=0.02$) with men.

Discussion

Many researches that were conducted during the previous years correlate war stress and its influence on the development of specific diseases, as well as on the coronary diseases¹⁻⁴. The psycho-social factors, psycho and physical stress, eating disorders are listed as examples of war stress factors^{5,6}. The significance of the war stress for getting sick and increased mortality from coronary disease⁷⁻¹⁰ was the subject of many researches in Lebanon, Israel, Korea and Croatia¹¹⁻¹⁵. While certain authors found connection between the influence of the war stress on increased number of sick patients from acute coronary syndrome^{7,15} others were not able to find that connection¹³. Besides the war stress, earthquakes can also cause increased number of sick patients from acute coronary syndrome¹⁶ and that was obvious after the earthquake in Athens in 1981 and in Los Angeles in 1994^{17,18}.

During the war in Bosnia and Herzegovina, citizens of Bosnia and Herzegovina were subject to many difficulties due to various factors, and many of those could influence their health condition. Citizens were spending lots of time in shelters, due to general danger from bombing. Everyday life was completely changed and was filled with stressful situations. Besides physical and mental stress, the eating habits were changed, physical activity was reduced, and communication among people, smoking and alcohol habits, and etc, and all that could influence general health of population. This study showed that significantly larger number of patients treated from acute coronary syndrome was in the war and post war period comparing to the number of patients before the war. Twenty years after the war in Vietnam, the veterans still suffer and die from acute coronary syndrome, which is the same in our country after the war¹⁹. The number of patient who is suffering of acute coronary syndrome is bigger in countries in transit, as ex countries of SSSR and Yugoslavia because of unemployment, stress, unhealthy way of living, health prevention which is late for few years, and reconstruction of health care is still on^{20,21}.

The least number of patients treated from acute coronary syndrome was in 1992 (unexpectedly), and the biggest was in 1998 (Table 2).

The largest number of treated patients 66.4% is for the patients from acute myocardial infarction, while 28% are for the instable angina, although in the medical literature angina pectoris is the most frequent diagnosis of acute coronary syndrome, and here it is about the patients treated in hospital, and it is most possible that some of the patients were treated in primary care. In this study it is obvious that significantly number of patients treated from acute coronary syndrome in the oldest age groups, and that can be explained by long-term chronic stress as the risk factor for atherosclerosis. Also, the number of treated women in the war and post war period in comparison to the pre war period is bigger. This refers to the women older than 50, since in the age group under 50, number of the women with acute coronary syndrome was little and this can be explained by the protective influence of estrogens in generative age of women. Significantly larger number ($p<0.05$) of treated women from acute myocardial infarction in the age from 60–69 in the war period is already described (1.3%). The number of women that died in the hospital from acute myocardial infarction was the least during the war (18.6%) in comparison to the per-war period (32.8%), most probably due to the fact that women had difficulties in coming to the hospital, and probably more have died prior to coming to the hospital, while in the pre-war period accessibility to the hospital was much better¹.

It was determined that those differences were not noticed with men, that in the huge number were obliged to work and military service, and access to the hospital was much easier to them comparing to women¹.

Greater mortality of women in hospitals was described in other studies^{19,20,22,23}. That can be explained by the fact that women were older in the time of myocardial infarction, have more often hypertension, diabetes mellitus, chronic heart failing, and other chronic diseases.

Greater morbidity and mortality from coronary disease is visible during the war in Israel and war in Croatia. That is how in Zagreb, during the war number of patients from acute myocardial infarction and sudden death¹⁵ was increased, while authors in Split during the time of general danger periods did not determine bigger number of sick or dead from acute myocardial infarction¹³. Regional differences in mortality of AIM during the war can be explained by bigger accessibility of urgent medical service and hospital care in bigger cities (Zagreb), while that was the case in geographically indented region (Split). Some authors have found larger number of treated from acute myocardial infarction in the age of 45 in Split¹⁴ and age 49 in Bosnia and Herzegovina.

In the conclusion we can say that our research has showed statistically significant larger hospital frequency of acute coronary syndrome in the war and post war period with the stress as one of the risk factors, although in other transition countries mortality and morbidity from coronary diseases is larger, due to the fact that primary prevention is late for couple of decades after western countries. Definitely, we need to conclude that war trau-

mas have short-term and long-term negative impact on mental and physical health of population whose consequences could also be in the development of the coronary diseases. The reason for this are most probably the con-

sequences caused by PTSP that was caused by the war, as well as some negative living habits acquired during the war, and difficult economical situation that continued after the war.

TABLE 1
THE FREQUENCY OF ACUTE CORONARY SYNDROME ACCORDING TO THE AGE IN THE TIME PERIOD OF 1987 TO 2001 IN WESTERN HERZEGOVINA

Male	≤49		50–64		≥65		Total
	N	%	N	%	N	%	
Before war	60	17.4	178	51.7	106	30.9	344
War time	72	17.6	205	50.1	132	32.3	409
After war	107	19.4	220	39.9	225	40.7	552
Total	239	18.3	603	46.3	463	35.4	1305

Female	≤49		50–64		≥65		Total
	N	%	N	%	N	%	
Before war	6	3.5	70	41.2	94	55.3	170
War time	13	5.1	104	40.6	139	54.3	256
After war	21	7.2	87	29.9	183	62.9	291
Total	40	5.6	261	36.4	416	58.0	717

Male and Females	≤49		50–64		≥65		Total
	N	%	N	%	N	%	
Before war	66	12.8	248	48.2	200	39.0	514
War time	85	12.9	309	46.5	271	40.7	665
After war	128	15.2	307	36.4	408	48.4	843
Total	279	13.8	864	42.7	879	43.5	2022

TABLE 2
THE INCIDENCY OF ACUTE CORONARY SYNDROME ACCORDING TO THE AGE IN THE TIME PERIOD OF 1987 TO 2001 IN WESTERN HERZEGOVINA

Year	Acute infarct of myocardium			Repeated infarct of myocardium			Angina pectoris		
	Number of treated patients from acute coronary syndrome	Database 1987	Chain index	Number of treated patients from acute coronary syndrome	Database 1987	Chain index	Number of treated patients from acute coronary syndrome	Database 1987	Chain index
1987	77	100.00	100.00	2	100.00	100.00	11	100.00	100.00
1988	75	97.40	97.40	7	350.00	350.00	25	227.27	227.27
1989	65	84.42	86.67	5	250.00	71.43	29	263.64	116.00
1990	78	101.30	120.00	6	300.00	120.00	38	345.45	131.03
1991	70	90.91	89.74	4	200.00	66.67	22	200.00	57.89
1992	58	75.32	82.86	3	150.00	75.00	20	181.82	90.91
1993	87	112.99	150.00	14	700.00	466.67	35	318.18	175.00
1994	103	133.77	118.39	12	600.00	85.71	40	363.64	114.29
1995	93	120.78	90.29	15	750.00	125.00	51	463.64	127.50
1996	87	112.99	93.55	8	400.00	53.33	39	354.55	76.47
1997	97	125.974	111.4943	10	500	125	40	363.6364	102.5641
1998	114	148.05	117.53	6	300.00	60.00	67	609.09	167.50
1999	119	154.55	104.39	5	250.00	83.33	48	436.36	71.64
2000	111	144.16	93.28	3	150.00	60.00	46	418.18	95.83
2001	109	141.56	98.20	5	250.00	166.67	62	563.64	134.78

In retrospective epidemiological research of patients treated in hospital from acute coronary syndrome in fifteen years period (1987–2001), pre-war period (1987–1991) war period (1992–1996), and post war period (1997–2001) were included. Statistically, number of treated from acute coronary syndrome in the war period comparing to the pre-war period with both genders together, men and

women is more important, post war period comparing to the pre-war period with both genders. Number of treated men and women is larger in post war period comparing to the pre war period and that is statistically significant. The number of treated in the age of 65 and more in post war period is statistically significant.

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UČESTALOST AKUTNOG KORONARNOG SINDROMA U PETNAESTOGODIŠNJEM RAZDOBLJU (1987–2001) U ZAPADNOJ HERCEGOVINI

S A Ž E T A K

Radi se o retrospektivnoj epidemiološkoj studiji liječenih od akutnog koronarnog sindroma u petnaestogodišnjem razdoblju (1987–2001) u zapadnoj Hercegovini. Obradena je relativno stabilna populacija koja se za vrijeme rata nije iseljavala. Uspoređeno je referentno prijeratno (1987–1991), ratno (1992–1996) i poslijeratno (1997–2001) razdoblje. Podaci su dobiveni iz arhive o liječenim bolesnicima u bolnici Mostar u petnaestogodišnjem razdoblju i KB Split u ratnom razdoblju. Obradena su 2022 bolnička slučaja akutnih koronarnih sindroma, a od toga 1305 muškaraca i 717 žena. Značajnije je, da je veći broj liječenih od akutnog koronarnog sindroma u ratnom u odnosu na prijeratno razdoblje kod oba spola zajedno ($p < 0.0005$). Veći je broj liječenih u poslijeratnom razdoblju kod oba spola zajedno ($p < 0.0005$) u odnosu na ratno, a kada usporedimo poslijeratno i prijeratno razdoblje vidimo statistički značajno veći broj liječenih i muškaraca i žena u poslijeratnom razdoblju ($p < 0.0005$). Statistički je značajnije veći broj oboljelih u dobi 65 i više ($p = 0.0005$). Zaključno se može reći da je ratni stres uz ostale čimbenike rizika imao utjecaja na veći broj liječenih od akutnog koronarnog sindroma, što otvara mogućnost epidemioloških istraživanja akutnog koronarnog sindroma te mogućnosti prevencije i liječenja.