

## Sex differences in discharge therapy in young patients with acute coronary syndrome

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**KEYWORDS:** acute coronary syndrome, myocardial infarction, young, therapy.

**CITATION:** *Cardiol Croat.* 2021;16(1-2):80-2. | <https://doi.org/10.15836/ccar2021.80>

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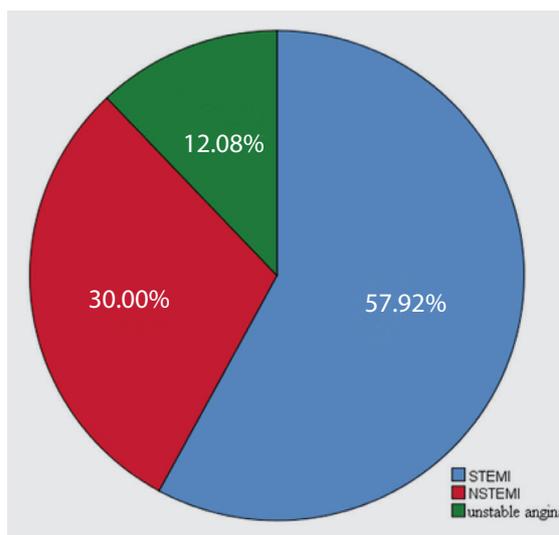
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**Introduction:** Acute coronary syndrome (ACS), including ST-segment elevation myocardial infarction (STEMI), non-ST-elevation myocardial infarction (NSTEMI) and unstable angina pectoris (UA), has been less researched in the subpopulation of young patients. Sex differences in discharge therapy after ACS have been described in older patients as favouring the male sex<sup>1</sup>, and we decided to test this hypothesis in young patients. The term “young” (with regard to ACS) is not uniquely defined, but according to multiple sources, the proposed cut-off age is 45 years<sup>2</sup>.

**Patients and Methods:** A total of 361 young patients (with an age cut-off of 45 years for men and 55 years for women) with ACS and percutaneous coronary intervention (PCI) performed at the University Hospital Centre Zagreb (UHCZG) between Jan 1<sup>st</sup> 2012 and Jan 1<sup>st</sup> 2020 were enrolled. The patients were divided into the UHCZG group (241 patients discharged home after ACS) and the PCI network group (120 patients transferred to another medical facility after ACS). We explored statistically relevant associations between sex and discharge therapy using the Pearson chi-square test in the UHCZG group, due to the completeness of this dataset.

**Results:** The mean patient age in the UHCZG group was 44±7 years, and 148 (61.4%) were men. 139 (57.9%) patients had STEMI, 72 (30.0%) NSTEMI, and 29 (12.1%) had UA (**Table 1, Figure 1**). Female patients had a higher prevalence of hypothyroidism, lower diastolic blood pressure at admission and higher LDL values (**Table 1**). A significantly higher proportion of male patients were prescribed with angiotensin-converting enzyme inhibitors (ACEi) (82.4% versus 65.6%,  $p=0.003$ ). There were no sex differences in the prescription of other cardiovascular drugs (**Table 2**).

**Conclusion:** In a group of young patients with ACS, we found a statistically significant difference between male and female patients regarding the prescription of ACEi, despite a lack of significant difference in systolic blood pressure. Results similar to ours, regarding sex differences in optimal medical therapy, have been described in the literature, including young ACS patients<sup>3</sup>. These results raise concerns regarding potentially negative consequences on the health of young women treated for ACS.



**FIGURE 1.** Pie chart showing the distribution of types of acute coronary syndrome in the University Hospital Centre Zagreb group.

STEMI – ST-segment elevation myocardial infarction;  
NSTEMI – non-ST-elevation myocardial infarction.

**RECEIVED:**  
December 14, 2020

**ACCEPTED:**  
December 18, 2020



TABLE 1. Baseline patient characteristics by sex in the University Hospital Centre Zagreb group.

Characteristic	UHCZG group - women (n = 93)	UHCZG group - men (n = 148)	p-value
Age, years	50 ± 5	41 ± 4	< 0.001
BMI, kg/m <sup>2</sup>	27.9 ± 6.6	29.9 ± 5.4	0.018
ACS type			
STEMI	50 (53.8)	89 (60.5)	0.298*
NSTEMI	29 (31.2)	43 (29.3)	0.749*
Unstable angina	14 (15.1)	15 (10.2)	0.263*
Arterial hypertension	53 (57.0)	78 (52.7)	0.516
Diabetes mellitus	16 (17.2)	14 (9.5)	0.077
Hypothyroidism	7 (7.6)	2 (1.4)	0.013
Dyslipidemia	47 (50.5)	77 (52.0)	0.818
Family history of CVD			
CVD at younger age	10 (18.2)	15 (15.6)	0.682**
CVD at older age	8 (14.5)	10 (10.4)	0.453**
CVD at unknown age	11 (20.0)	11 (11.5)	0.153**
Previous myocardial infarction	12 (12.9)	16 (10.9)	0.638
Previous TIA or CVA	1 (1.1)	2 (1.4)	0.849
Previous angina pectoris	32 (34.8)	38 (25.7)	0.131
Smoking status			
Non-smoker	20 (22.2)	20 (14.3)	0.121*
Former smoker	6 (6.7)	11 (7.9)	0.734*
Current smoker	64 (71.1)	109 (77.9)	0.246*
Number of significant coronary stenoses			
0	0 (0.0)	5 (3.4)	0.073**
1	58 (63.0)	95 (65.1)	0.749**
2	17 (18.5)	36 (24.7)	0.263**
3	17 (18.5)	10 (6.8)	0.006**
Culprit vessel			
LAD	36 (39.1)	64 (44.1)	0.447*
LCX	17 (18.5)	28 (19.3)	0.873*
RCA	39 (42.4)	48 (33.1)	0.147*
Dominant coronary artery			
Right	65 (83.3)	102 (78.5)	0.390*
Left	7 (9.0)	20 (15.4)	0.184*
Co-dominance	6 (7.7)	8 (6.2)	0.667*
Systolic BP at admission, mmHg	138 ± 29	142 ± 25	0.265
Diastolic BP at admission, mmHg	85 ± 16	90 ± 17	0.011
Heart rate at admission, beats/min	77 ± 18	80 ± 17	0.369
Total cholesterol, mmol/L	5.15 ± 1.34	5.07 ± 1.35	0.706
Triglycerides, mmol/L	1.77 ± 0.88	2.04 ± 1.33	0.094
HDL, mmol/L	1.17 ± 0.39	0.96 ± 0.27	< 0.001
LDL, mmol/L	3.19 ± 1.26	3.23 ± 1.19	0.809

If not otherwise marked, significance determined at p-value of 0.05. \*significance of p-value = 0.008 (due to Bonferroni correction) \*\* significance of p-value = 0.006 (due to Bonferroni correction).

UHCZG – University Hospital Centre Zagreb; BMI – body mass index; ACS – acute coronary syndrome; STEMI – ST-segment elevation myocardial infarction; NSTEMI – non-ST-elevation myocardial infarction; CVD – cardiovascular disease; TIA – transient ischemic attack; CVA – cerebral vascular accident; LAD – left anterior descending artery; LCX – left circumflex artery; RCA – right coronary artery; BP – blood pressure; HDL – high-density lipoprotein; LDL – low-density lipoprotein.

TABLE 2. Sex differences in discharge therapy in the University Hospital Centre Zagreb group.

Drug class	UHCZG group - women (n = 93)	UHCZG group - men (n = 148)	p-value
Acetylsalicylic acid	88 (94.6)	144 (97.3)	0.287
Anti-platelet therapy			
Ticagrelor	40 (43.0)	63 (42.6)	0.944*
Clopidogrel	51 (54.8)	79 (53.4)	0.826*
Beta-blocker	81 (87.1)	129 (87.2)	0.988
RAAS inhibitor			
ACE inhibitor	61 (65.6)	122 (82.4)	<b>0.003*</b>
ARB	8 (8.6)	6 (4.1)	0.142*
MRA	10 (10.8)	24 (16.2)	0.236
Nitrate	29 (31.2)	37 (25.0)	0.295
Statin			
Atorvastatin	81 (87.1)	135 (91.2)	0.308**
Rosuvastatin	7 (7.5)	11 (7.4)	0.976**
Simvastatin	0 (0)	1 (0.7)	0.430**
Antiischemic drug	15 (16.1)	22 (14.9)	0.791
Calcium channel blocker	24 (25.8)	24 (16.2)	0.070
Antiarrhythmic drug	4 (4.3)	9 (6.1)	0.552
Diuretic	20 (21.5)	23 (15.5)	0.239
Fibrate	3 (3.2)	6 (4.1)	0.741
Omega-3-fatty acid	13 (14.0)	29 (19.6)	0.263

If not otherwise marked, significance determined at p-value of 0.05. \* - significance of p-value = 0,008 (due to Bonferroni correction) \*\* - significance of p-value = 0,006 (due to Bonferroni correction).

UHCZG – University Hospital Centre Zagreb; RAAS – renin-angiotensin-aldosterone system; ACE – angiotensin-converting enzyme; ARB – angiotensin II receptor blocker; MRA – mineralocorticoid receptor antagonist.

## LITERATURE

- Hao Y, Liu J, Liu J, Yang N, Smith SC Jr, Huo Y, et al. Sex Differences in In-Hospital Management and Outcomes of Patients With Acute Coronary Syndrome. *Circulation*. 2019 Apr 9;139(15):1776-1785. <https://doi.org/10.1161/CIRCULATIONAHA.118.037655>
- Hoit BD, Gilpin EA, Henning H, Maisel AA, Dittrich H, Carlisle J, et al. Myocardial infarction in young patients: an analysis by age subsets. *Circulation*. 1986 Oct;74(4):712-21. <https://doi.org/10.1161/01.CIR.74.4.712>
- Davis M, Diamond J, Montgomery D, Krishnan S, Eagle K, Jackson E. Acute coronary syndrome in young women under 55 years of age: clinical characteristics, treatment, and outcomes. *Clin Res Cardiol*. 2015 Aug;104(8):648-55. <https://doi.org/10.1007/s00392-015-0827-2>