

## Differences in Symptoms, Treatment, and Behavior Between Genders in Individuals with Acute Coronary Syndrome: A Cross-Sectional Study

### Akut Koroner Sendromlu Bireylerde Cinsiyetler Arasında Semptom, Tedavi ve Davranış Farklılıkları: Kesitsel Bir Çalışma

#### ABSTRACT

**Objective:** This study was conducted to determine gender differences in symptoms, treatment, and behaviors in individuals presenting with acute coronary syndrome (ACS).

**Methods:** The research was conducted as a comparative, cross-sectional study. The study was completed in 18 months with 366 conscious/orientated patients who were hospitalized in the cardiology intensive care unit of a university hospital, which is a regional hospital in a city, with the diagnosis of ACS and volunteered for the study. The data were collected with the questionnaire questions prepared when the condition of the patients was stable 24 hours after their admission to the intensive care unit. In the data analysis, the conformity of the data to the normal distribution was examined by applying the Shapiro-Wilk test, and number, percentage, chi-square, parametric and non-parametric tests was used.

**Results:** In the study, it was determined that women had more comorbidities, showed asymptomatic symptoms, and were admitted to the hospital with the diagnosis of non-segment elevation myocardial infarction, while percutaneous intervention and angiography were more common treatment methods in men. It was determined that the diagnosis and some symptoms of women at hospital admission were different from those of men, and this difference was statistically significant. In addition, it was found that vital signs showed similar changes in both genders, the duration of admission to the hospital (30 minutes), transportation with their own vehicles at admission, and they did not consult anyone for symptoms. Their behaviors were similar, and there was no statistical significance.

**Conclusion:** According to this study, it may be recommended that health professionals be sensitive to gender-specific differences in terms of ACS and provide an approach by considering these in treatment and care.

**Keywords:** Acute coronary syndrome, behavior, sex characteristics, signs and symptoms

#### ÖZ

**Amaç:** Kardiyovasküler hastalıklar arasında akut koroner sendrom ölümlere neden olan hastalıkları kapsayan önemli bir sorundur. Bu çalışma akut koroner sendrom ile başvuran bireylerde cinsiyete yönelik semptom, tedavi ve davranış farklılıklarının belirlenmesi amacıyla yapılmıştır.

**Yöntem:** Araştırma karşılaştırmalı, kesitsel bir çalışma olarak yapılmıştır. Araştırma bir şehirde bulunan bölge hastanesi niteliğinde olan bir üniversite hastanesinin kardiyoloji yoğun bakım ünitesine akut koroner sendrom tanısı ile yatırılmış, şuuru açık/ oryante olan ve çalışmaya gönüllü olan 366 hasta ile 18 ayda tamamlandı. Veriler hastaların yoğun bakıma yatışlarından 24 saat sonrasında durumları stabil olduğunda hazırlanan anket soruları ile toplandı. Veri analizinde verilerin normal dağılıma uygunluğu Shapiro-Wilk testi uygulanarak incelenmiş ve sayı, yüzde, ki kare ve parametrik olmayan testler kullanılmıştır.

**Bulgular:** Araştırmada kadınların daha fazla komorbiditelerinin olduğu, asemptomatik belirti gösterdikleri ve Non STMI tanısı ile hastaneye kabul edildikleri, erkeklerde tedavi yöntemi olarak daha çok perkutan girişim ve anjio yapıldığı belirlenmiştir. Kadınların hastaneye geliş tanıları ve bazı semptomlarının erkeklerden farklı olduğu ve bu farkın istatistiksel olarak anlamlı olduğu saptanmıştır. Ayrıca her iki cinsiyette de vital bulguların benzer değişiklik gösterdiği, hastaneye başvurma süresi (30 dak.), başvurmada kendi araçları ile ulaşım ve semptomlara yönelik kimseye danışmadıkları gibi davranışlarının benzer olduğu ve istatistiksel anlamlılık olmadığı saptanmıştır.


#### ORIGINAL ARTICLE

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**Sonuç:** Bu araştırmaya göre sağlık profesyonellerinin akut koroner sendrom açısından cinsiyetlere özgü farklılıklara duyarlı olması, tedavi ve bakımda bunları göz önüne alarak yaklaşım sağlaması önerilebilir.

**Anahtar Kelimeler:** Akut koroner sendrom, davranış, cinsiyet, semptom

## Introduction

Cardiovascular diseases (CVDs) are the leading cause of mortality and morbidity in the world, despite the rapid development of diagnostic and treatment methods.<sup>1</sup> Acute coronary syndrome (ACS), which occurs acutely and is the most common cause of death among CVDs, is a clinical picture characterized by increased oxygen demand of the myocardium as a result of plaque rupture in the coronary artery blocking coronary blood flow.<sup>2</sup> The largest increase in deaths in the world since 2000 has been in ACS disease, which has increased from 2 million to 8.9 million.<sup>3</sup> According to 2019 data from the Turkish Statistical Institute, 39.1% of deaths from circulatory system diseases were due to ACS, while 25.7% were due to other heart diseases.<sup>4</sup>

The most important factor determining survival after ACS is the restoration of coronary blood flow.<sup>5</sup> However, for many patients, the time between the onset of symptoms and the initiation of treatment is quite long. In studies, the reasons for delay are waiting for the symptoms to disappear, living alone, attributing symptoms to non-cardiac causes, thinking that the symptoms are not serious, thinking that they can control the symptoms, going to the hospital with their own means, incompatibility of expected and experienced symptoms, gender differences in symptoms, and lack of information.<sup>6-12</sup>

The detection and differentiation of symptoms that guide the diagnosis of ACS affect the treatment and survival of individuals.<sup>13</sup> For this reason, it is important to know the gender-specific symptoms of ACS to identify the problem. In a study looking at gender-specific symptom differences in ACS, it was reported that women presented with more nausea, neck pain, and back pain, while chest pain, epigastric pain, and shortness of breath were seen at similar rates in both genders.<sup>14</sup> In another study, it was found that women were more likely to present to the hospital with neck pain, back pain, jaw pain, nausea, and vomiting, while men tended to present with chest pain and sweating.<sup>15</sup> The parallelism of the symptoms, especially in women with musculoskeletal and gastrointestinal system problems, causes these symptoms to be interpreted as non-cardiac. This may lead to delays in treatment, repeated hospital admissions, and situations that result in death.

### MAIN POINTS

- This study will reveal gender-specific symptom differences in acute coronary syndrome (ACS) and enable healthcare professionals to focus on these symptoms.
- Providing gender-specific evaluation of symptoms in patients will enable faster diagnosis and a delay in treatment.
- Based on gender-specific behavioral differences in ACS, it can provide gender-specific guidance in public education and counseling.

Knowledge of gender-specific symptom differences by health personnel is important in terms of reducing mortality in diagnosis and planning appropriate interventions. Furthermore, providing information to individuals on this subject will affect the duration and patterns of hospitalization, early initiation of treatment, and survival rates.<sup>7-9,16,17</sup>

Although there are studies in the literature to determine gender-specific symptom differences in coronary artery diseases, there are no studies on gender-specific differences in hospital admission behaviors and their reasons. It is necessary to determine these gender-specific differences, provide education and counseling services to patients diagnosed with coronary artery disease about coronary risk factors, signs/symptoms, and what to do in emergencies, and draw the attention of health personnel to this issue. This study was conducted to determine gender differences in symptoms, treatment, and behaviors in individuals presenting with ACS.

### Research questions were as follows:

1. Is there a symptom difference between genders in ACS?
2. Are there differences in the treatment method between the sexes in ACS?
3. Is there a difference in treatment-seeking behavior between genders in ACS?

## Materials and Methods

### Study Design

The study was conducted as a comparative and cross-sectional study to determine gender differences in symptoms, treatment, and behaviors in individuals with ACS.

### Sampling and Participants

The study was carried out in the cardiology intensive care unit of a regional university hospital. The study was conducted with 366 conscious/orientated patients who were admitted to the intensive care unit with the diagnosis of ACS and volunteered to participate in the study. The data were collected by the researcher in their intensive care environment 24 hours after the patients came to the intensive care unit and when their condition stabilized. This research was continued for 18 months, and the sampling was finalized with post hoc power analysis. The post strength of the study was calculated as 99%.

### Data Collection

The data for the study were collected with the "patient information form" prepared by the researchers by reviewing the literature.<sup>6-9,16,17</sup>

### Patient information form

It includes sociodemographic characteristics, coronary risk factors (hypertension, family history, obesity, diabetes mellitus, hyperlipidemia, and smoking), symptoms (pain, cold sweats, dyspnea, nausea and vomiting, palpitations, and syncope), lipid levels (LDL, HDL, triglycerides, and cholesterol), treatment

administered in the hospital (antiaggregant-antithrombotic, coronary vasodilator,  $\beta$ -blocker, thrombolytic, etc.), and duration and type of hospital admission. In order to test the functionality of the information form, a preliminary application was made with 5 patients hospitalized in the cardiology intensive care unit, and the questionnaire was finalized by making corrections in the sentences to make the 3 questions comprehensible.

### Ethical Considerations

The study was conducted in accordance with the Declaration of Helsinki. The approval of the Erciyes University Clinical Research Ethics Committee as well as institutional permission was obtained (Date: July 30, 2013, Approval Number: 2013/435). Verbal and written informed consent from the patients was obtained to conduct the study.

### Data Analysis

Statistical analysis was performed using the Statistical Package for Social Science Statistics software, version 22.0 (Armonk, NY, USA). Number, percentage, and chi-square tests were applied for statistically descriptive findings. The normal distribution of the data was examined by applying the Shapiro-Wilk test. Since the data were not normally distributed, parametric and nonparametric tests were used. Wilcoxon and Mann-Whitney *U*-tests were performed on the means. The value of  $P < .05$  was accepted as statistically significant in comparisons.

### Results

When the descriptive characteristics of the patients included in the study were analyzed according to gender, it was found that ACS developed mostly in the age range of 60-69 years in both men and women (34.7%, 30.3%), and that age caused a difference between the genders in the development of ACS ( $P < .05$ ). Furthermore, it was determined that women who developed ACS were mostly housewives (96.7%), while men were working and engaged in self-employment (43.3%), and it was determined that employment status and education level made a difference between genders, and this difference was significant ( $P < .05$ ). Besides, it was determined that 90.5% of women and 58.7% of men had another chronic disease, and this difference between genders was statistically significant ( $P < .05$ ) (Table 1). Family history, frequency of previous hospitalization for CAD, and previous ACS were not significantly different between the 2 genders ( $P > .05$ ).

When the types of ACS according to the gender of the patients were analyzed, it was determined that half of the women were hospitalized with the diagnosis of non-segment elevation myocardial infarction (non-STMI) and the men were hospitalized with the diagnosis of STMI, and the difference in the type of ACS between the genders was statistically significant ( $P < .05$ ). Regarding the treatment received by the patients, it was observed that women were more frequently discharged with drug treatment after coronary angiography (34.8%), while men were treated with percutaneous coronary angioplasty (PTCA) and stenting (42.6%). However, the difference in treatment between genders was not significant ( $P > .05$ ) (Table 1).

**Table 1. Descriptive Characteristics of the Patients by Gender**

Descriptive Feature	Female (n=95) n (%)	Male (n=271) n (%)	Total (n=366) n (%)	P
<b>Age group</b>				
30-39 years	3 (3.2)	11 (4.1)	14 (3.8)	<b>.039*</b>
40-49 years	7 (7.4)	50 (18.4)	57 (15.6)	
50-59 years	25 (26.3)	78 (28.8)	103 (28.2)	
60-69 years	33 (34.7)	82 (30.3)	115 (31.4)	
70 years or older	27 (28.4)	50 (18.4)	77 (21.0)	
<b>Educational status</b>				
Not literate	38 (40.0)	11 (4.1)	49 (13.3)	<b>.000*</b>
Literate	19 (20.0)	26 (9.5)	45 (12.2)	
Primary school graduate	30 (31.6)	153 (56.5)	183 (50.0)	
High school/college graduate	8 (8.4)	82 (29.9)	90 (24.5)	
<b>Working status</b>				
Officer/worker	1 (1.1)	54 (19.5)	55 (15.0)	<b>.000*</b>
Retired/housewife	92 (96.7)	100 (37.2)	192 (52.4)	
Self-employment	2 (2.2)	117 (43.3)	119 (32.6)	
<b>Chronic disease status</b>				
There is	86 (90.5)	159 (58.7)	245 (66.9)	<b>.000*</b>
None	9 (9.5)	112 (41.3)	121 (33.1)	
<b>Acute coronary syndrome type</b>				
STMI	27 (28.7)	123 (45.4)	151(41.1)	<b>.013*</b>
Non-STMI	52 (54.3)	102 (37.6)	153 (41.9)	
Subacute MI	16 (17.0)	46 (17.0)	62 (17.0)	
<b>Treatment received</b>				
Medication	33 (34.8)	80 (29.6)	113 (31.0)	.213*
PTCA	23 (24.2)	50 (18.5)	73 (20.0)	
Stent	9 (9.5)	23 (8.5)	32 (8.8)	
PTCA and stent	28 (29.5)	115 (42.6)	143 (39.2)	
Bypass surgery	2 (2.0)	2 (0.8)	4 (1.0)	

MI, myocardial infarction; PTCA, percutaneous coronary angioplasty; STMI, non-segment elevation myocardial infarction. \* $\chi^2$  test,  $P < .05$  (test significance).

When the symptoms seen in ACS according to the gender of the patients were analyzed, it was determined that women mostly experienced chest pain (96.8%), sweating (87.4%), and nausea (75.8%), while men mostly experienced chest pain (94.8%), sweating (80.4%), and arm-shoulder pain (60.1%). Chest pain, arm-shoulder pain, sweating, fainting, anxiety, and indigestion developed at similar rates in the symptoms experienced by both genders, and the difference between the genders in terms of these symptoms was not significant ( $P > .05$ ). Moreover, it was determined that symptoms of jaw pain, back pain, respiratory distress, palpitations, nausea,

**Table 2. Symptom Characteristics of the Patients by Gender**

Symptoms	Female (n=95) n (%)	Male (n=271) n (%)	Total (n=366) n (%)	P
Chest pain	92 (96.8)	257 (94.8)	349 (95.4)	.576*
Arm-shoulder pain	56 (58.9)	163 (60.1)	219 (59.8)	.837*
Jaw pain	19 (20.0)	32 (11.9)	51 (14.0)	<b>.049*</b>
Back pain	56 (58.9)	120 (44.3)	176 (48.1)	<b>.014*</b>
Respiratory distress	63 (66.3)	104 (38.4)	167 (45.6)	<b>.000*</b>
Sweating	83 (87.4)	218 (80.4)	301 (82.2)	.129*
Palpitation	48 (50.5)	96 (35.4)	144 (39.3)	<b>.010*</b>
Nausea	72 (75.8)	130 (48.0)	202 (55.2)	<b>.000*</b>
Vomiting	45 (47.4)	83 (30.6)	128 (35.0)	<b>.003*</b>
Fainting	14 (14.7)	29 (10.7)	43 (11.7)	.293*
Dizziness	47 (49.5)	93 (34.3)	140 (38.3)	<b>.009*</b>
Anxiety	49 (51.6)	125 (46.1)	174 (47.5)	.360*
Indigestion	35 (36.8)	92 (33.9)	127 (34.7)	.610*
Stomach ache	45 (47.4)	99 (36.5)	144 (39.3)	<b>.063*</b>

\* $\chi^2$  test,  $P < .05$  (test significance).

vomiting, dizziness, and stomach pain developing in ACS developed more frequently in women than in men, and the difference between them was statistically significant ( $P < .05$ ) (Table 2).

It was observed that there was a significant decrease in the systolic and diastolic pressure and pulse rate values of the women after admission to the intensive care unit ( $P < .001$ ). However, the change in respiratory rate was not significant ( $P > .05$ ). Moreover, it was determined that there was a significant decrease in the values of systolic and diastolic pressure and pulse rate values of the men after admission to the intensive care unit ( $P < .001$ ). However, the change in respiratory rate did not show significance in men ( $P > .05$ ). When analyzed

between genders, it was found that the vital signs of men and women were similar and there was no significant difference between them ( $P > .05$ ) (Table 3).

It was determined that women (30 minutes) and men (30 minutes) arrived at the hospital at similar times; both genders used their own car or taxi as a means of transportation (women 64.2%, men 60.9%); both genders mostly did not consult anyone when symptoms started (women 75.8%, men 80.1%); and half of those who did consult preferred friends and neighbors (women 43.5%, men 50.9%). It was observed that these behaviors of women and men were similar, and there was no statistically significant difference ( $P > .05$ ). It was determined that most of the women had their children with them when they experienced symptoms (48.4%), while most of the men had their spouses with them (47.3%). This difference in both genders was statistically significant ( $P < .05$ ) (Table 4).

### Discussion

This study provides new findings on gender-specific differences in symptoms, treatment, and situational behaviors in the ACS patient population in Turkey.

In this study, it was found that ACS developed mostly in the age range of 60-69 years in both men and women, and ACS was more common in men. In the study by Ribeiro et al<sup>18</sup> 17 studies were analyzed, and of 13526 patients affected by ACS, 4207 (31.1%) were women and 9319 (68.9%) were men, and a higher incidence of ACS was reported in men. In previous studies, it has been emphasized that coronary artery diseases occur almost 10 years earlier and more frequently in men than in women.<sup>19</sup> When all these processes are considered, it can be said that this is due to the difference in lifestyle between the sexes and the direct inhibitory effect of estrogen hormone on the impairment of baroreflex function and sympathetic nerve activity.<sup>20</sup> It has also been reported that women have more significant comorbid diseases when coronary artery diseases develop.<sup>19,21</sup> In this study, it was determined that women had more chronic diseases than men, and this difference between genders was statistically significant.

**Table 3. Vital Findings of the Patients by Gender**

Vital Signs	Female Median (Minimum–Maximum)	P	Male Median (Minimum–Maximum)	P	P
Initial systolic pressure	144 (81-229)	<b>.000*</b>	140 (80-239)	<b>.000*</b>	.390**
Final systolic pressure	121 (84-170)		115 (80-201)		.261**
Initial diastolic pressure	80 (32-179)	<b>.000*</b>	79 (47-183)	<b>.000*</b>	.324**
	65 (40-92)		63 (36-161)		.621**
Final diastolic pressure	83 (47-140)	<b>.000*</b>	80 (20-148)	<b>.000*</b>	.302**
	80 (50-121)		76 (20-117)		.602**
First pulse	20 (20-28)	<b>.017*</b>	20 (18-30)	.172*	.147**
	20 (20-29)		20 (18-36)		.084**

\*Z Wilcoxon signed rank test (between in-group values),  $P < .05$  (test significance).

\*\*Z Wilcoxon signed-rank test (between group),  $P < .05$  (test significance).



**Table 4. Behaviors of the Patients Regarding the Symptoms Experienced by Gender**

Patient Behaviors	Female (n=95) n (%) Median (Minimum–Maximum)	Male (n=271) n (%) Median (Minimum–Maximum)	Total (n=366) n (%) Median (Minimum–Maximum)	P
Hospital arrival time (minutes)	30 (5-420)	30 (5-600)	55.15 (5-600)	.206*
<b>Having someone by your side</b>				
Wife	29 (30.5)	128 (47.3)	157 (42.9)	
Child	46 (48.4)	58 (21.4)	104 (28.4)	
Relatives/friends	6 (6.4)	37 (13.6)	43 (11.8)	.000**
There is nobody	14 (14.7)	48 (17.7)	62 (16.9)	
<b>Transport to the hospital</b>				
Own car/taxi	61 (64.2)	165 (60.9)	226 (61.7)	
Ambulance	32 (33.7)	101 (37.3)	133 (36.4)	
Taxi	2 (2.1)	5 (1.8)	7 (1.9)	.927**
<b>Consulting someone during symptoms</b>				
The client	23 (24.2)	55 (19.9)	78 (21.0)	
Non-consultant	72 (75.8)	216 (80.1)	288 (79.0)	.378**
<b>Consultant</b>	<b>(n=23)</b>	<b>(n=55)</b>	<b>(n=78)</b>	
Relative	5 (21.7)	9 (16.4)	14 (17.9)	
Health personnel	8 (34.8)	18 (32.7)	26 (33.3)	.522**
Friend/neighborhood	10 (43.5)	28 (50.9)	38 (48.7)	

\*Mann-Whitney U-test,  $P < .05$  (test significance).

\*\* $\chi^2$  test,  $P < .05$  (test significance).

Looking at the symptoms that develop in ACS according to gender, it was found that jaw pain, respiratory distress, palpitations, nausea, vomiting, dizziness, and stomach pain symptoms developed significantly and more frequently in women than in men. It has also been stated in previous studies that the female gender shows more atypical symptoms.<sup>19,22</sup> Similarly, Allana et al<sup>23</sup> found that women with ACS presented with atypical symptoms such as shortness of breath, nausea/vomiting, palpitations, epigastric pain, and back pain. In a meta-analysis study conducted previously, 26 studies conducted on ACS patients from different parts of the world were examined, and similar to the findings of this study, it was reported that women experienced ACS symptoms such as back pain, palpitations, and nausea and vomiting.<sup>24</sup> In the study by An et al,<sup>25</sup> it was also found that women experienced unusual shortness of breath, difficulty breathing, or dizziness compared to men. These findings suggest that women experience atypical symptoms more frequently than men, which may lead to delayed presentation to emergency treatment and delayed treatment and should be handled with caution.

In the present study, when gender-specific ACS type was examined, it was determined that half of the women were hospitalized with a diagnosis of non-STMI, and the men were hospitalized with a diagnosis of STMI and the difference between genders was statistically significant. In the study conducted by Assiri,<sup>26</sup> it was determined that men developed STMI and unstable angina at a higher rate, while women were admitted

with unstable angina, and this difference was significant. These differences between genders in coronary syndromes may be thought to be due to differences in thrombotic and fibrinolytic activity or the presence of collateral circulation.

Considering the treatment received by the patients in the study, it was found that women were more frequently discharged with drug treatment after coronary angiography, while PTCA and stenting were performed in men. In the previous studies, it was recommended by guidelines not to use revascularization, especially after coronary angiography in elderly women.<sup>19</sup> In addition, it is emphasized that although the overall benefit of invasive revascularization in treatment is high, the increased risk of bleeding and vascular complications during percutaneous interventions in the female gender is high.<sup>27-29</sup> Lee et al<sup>21</sup> also found that women were less likely to undergo percutaneous coronary intervention.

The results show that more caution should be exercised in the female gender, especially in terms of shaping the treatment. For this reason, it is important to interpret gender-specific symptoms without skipping and to start treatment as soon as possible to avoid the need for percutaneous interventions and to reduce mortality. This issue has also been emphasized in previous studies.<sup>20,27</sup>

In the present study, it was determined that women (30 minutes) and men (30 minutes) arrived at the hospital at similar times, and when the symptoms started, both genders mostly came

to the health institution without consulting any person. This is an indication that women and men are in equal conditions in terms of knowledge and social status in Turkey and that women do not experience any deficiency in any subject. Unlike the study, Allana et al<sup>23</sup> reported that Pakistan is a male-dominated society; most women are less educated and less conscious about their health and do not pay attention to the symptoms of their bodies. Such gender-related social perspectives should be determined in cultures, and planning interventions in societies that are deficient in this regard can be considered. Looking at other studies in the literature, Rivero et al<sup>30</sup> concluded that women had longer prehospital delay times than men, while another study found that there was no difference between men and women in the duration of hospitalization.<sup>31</sup> Studies have shown that factors such as ethnicity, culture, education, and socioeconomic status are effective on gender-specific symptoms and help-seeking behaviors in ACS.<sup>32</sup> The need to prevent inequalities and prejudices against women in access to health services and processes for both health professionals and patients comes to the forefront once again.

## Conclusion

In the study, it was determined that women experienced asymptomatic symptoms in ACS more frequently than men, percutaneous intervention and angiography were performed more frequently as treatment methods in men, and the duration of hospital admission was similar in both genders.

According to these results, it is recommended that healthcare professionals should be sensitive to women who do not present with classic ACS. Moreover, ACS evaluations in women should be performed very well, and women should be informed and encouraged to seek further investigation and care resources in these cases. Further studies are also recommended to understand the underlying pathophysiology and medical and interventional treatments and to identify gender differences, if any, in ACS.

**Ethics Committee Approval:** Ethics committee approval was obtained from the Clinical Research Ethics Committee of Erciyes University (Approval Number: 2013/435, Date: July 30, 2013).

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