



# The Effect of Coronary Artery Disease and Related Drugs on Sexual Activity in Turkish Society

## Türk Toplumunda Koroner Arter Hastalığı ve İlişkili İlaçların Cinsel Aktiviteye Etkisi

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### Abstract

**Objective:** Sexual dysfunction after acute coronary syndrome (ACS), is a frequently encountered problem in clinical practice. The aim of our study is to determine the time it takes for patients to switch to a healthy sexual life, which is one of the basic elements of a healthy social life, after a cardiovascular event in Turkish society and investigation of the effect of drugs related to ACS on sexual activity.

**Method:** In our study, volunteer women and men who had a cardiovascular event at least 3 months before and were sexually active before the ACS between January 2017-December 2019 were evaluated using a closed questionnaire. The demographic characteristics of the patients, their comorbidities and medications, and their sexual activity levels before and after the ACS were compared.

**Results:** After ACS, sexual dysfunction developed in 36% (n=117) of the patients. In the group with sexual dysfunction, heart failure [21% (n=25) - 9% (n=18) - p=0.001], chronic renal failure [9% (n=11) - 0% (n=0) p<0.001], and BPH presence [34% (n=40)- (11% (n=23) p<0.001] were higher. Similarly, beta-blocker use [95% (n=111) - 84% (n=172) p=0.001] and ACE-I/ARB use [62% (n=73) - 54% (n=111) p=0.05] were also higher in participants with sexual dysfunction.

**Conclusion:** In our study, an increase in the prevalence of sexual dysfunction was observed in patients with multiple comorbidities, especially heart failure. Sexual dysfunction was found to be higher in patients using beta-blockers.

**Keywords:** Acute coronary syndrome, beta-blocker, sexual dysfunction, Turkish society

### Öz

**Amaç:** Akut koroner sendrom (AKS) sonrasında cinsel fonksiyon bozuklukları klinik pratikte sıklıkla karşılaşılan problemlerdir. Çalışmamızın amacı Türk toplumunda AKS sonrası sosyal hayatlarına dönen hastaların sağlıklı bir sosyal hayatın temel unsurlarından olan sağlıklı bir cinsel yaşama geçebilme zamanının belirlenmesi ve AKS ile ilgili ilaçların cinsel aktiviteye etkisinin araştırılmasıdır.

**Yöntem:** Çalışmamızda, Ocak 2017-Aralık 2019 yılları arasında en az 3 ay önce AKS geçiren ve polikliniğe başvuran AKS öncesinde cinsel olarak aktif olan gönüllü kadın ve erkekler kapalı anket usulü ile değerlendirildi. Hastaların demografik özellikleri, ek hastalıkları ve kullandığı ilaçlar ile birlikte AKS öncesi ve sonrasındaki cinsel aktivite düzeyleri karşılaştırıldı.

**Bulgular:** AKS sonrasında hastaların %36'sında (n=117) cinsel disfonksiyon gelişmiştir. Cinsel disfonksiyonu olan grupta kalp yetmezliği [%21 (n=25) - %9 (n=18) - p=0,001], kronik böbrek yetmezliği [%9 (n=11) - %0 (n=0) p<0,001], BPH varlığı [%34 (n=40)- (%11 (n=23) p<0,001] yüksek saptanmıştır. Ayrıca beta-bloker kullanımı [%95 (n=111) - %84 (n=172) p=0,001] ve ACE-i/ARB kullanımı [%62 (n=73) - %54 (n=111) p=0,05] cinsel disfonksiyonu olan grupta daha yüksek saptanmıştır.

**Sonuç:** Çalışmamızda başta kalp yetmezliği olmak üzere multipl komorbiditesi olan hastalarda cinsel isteksizlik prevalansında artış izlenmiştir. Beta-bloker kullanan hastalarda cinsel isteksizlik fazla bulunmuştur.

**Anahtar kelimeler:** Akut koroner sendrom, beta-blocker, cinsel disfonksiyon, Türk toplumu



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## Introduction

Cardiovascular disease (CVD), are among the most important causes of mortality and morbidity all over the world. Approximately one-third of all deaths in the world are caused by CVD, mainly due to ischemic heart disease (1). CVD, especially acute coronary syndrome (ACS) affects the quality of life in terms of physical activity, psychosocial state as well as sexual life (2). Sexual dysfunction, mainly erectile dysfunction (ED) and decreased libido, especially in male gender are common in patients with CVD. Psychologic factors, side effects of medications such as beta-blockers and lipid-lowering agents, the number of the medications, the accompanying risk factors, such as hyperlipidemia, diabetes mellitus, cigarette smoking, and metabolic syndrome are related to an increased prevalence of sexual dysfunction after CVE (2,3). Although, it takes a long time to regain the normal physical and psychosocial functions after cardiovascular events, this process can be facilitated by regular multidisciplinary rehabilitation (2,3).

The effect of ACS and related factors on sexual dysfunction in the Turkish population has not yet been clearly clarified. The aim of this study was to determine the time of transition to a healthy sexual life and the effects of the medication or other factors on sexual activity in Turkish men and females with ACS who return to their social lives.

The aim of our study is to determine the time of transition to a healthy sexual life, which is one of the basic elements of a healthy social life, and the factors affecting sexual life in patients who return to their social lives after ACS in Turkish society. In addition, it we defined the effects of the use of beta-blockers on sexual functions.

## Materials and Methods

A total of 321 (female =100, male =221) Caucasian (Turkish) patients between January-2017 and December-2019, from 6 centers were included in the study. The present study was planned as a closed-envelope questionnaire survey study, taking into account social factors. This study was conducted in ACS patients. Patients with any form of ACS (STEMI, NSTEMI and USAP) and have >50% coronary artery stenosis diagnosed with conventional angiography and have active sexual life were included in the study. Patients without active sexual life were excluded from the study. Patients with previous coronary artery disease and major psychological disorders were not included in the study.

Sexual dysfunction includes sexual reluctance (lack of sexual desire), ED, impaired arousal, inability to achieve

orgasm, diminished libido, and ejaculatory disorders (4). In this article in general we examined sexual dysfunction. Active sex position was defined as; to be more active and/or on top during sexual intercourse, and passive sexual position was defined as; to be on the bottom or more passive in contrast to the partner (5).

Due to the cultural and religious traditions of Turkish society, instead of asking such a subject openly in the form of a mutual conversation, it was asked in closed envelopes containing a few questions. Furthermore, female sexual function index (6) and international erectile function index (7) are scales that can be used for this purpose. However, since it is not possible to use these scales simultaneously in men and women, they were not used in our study.

Participants were asked whether they have diabetes mellitus (DM), hypertension, hyperlipidemia, chronic renal failure (CRF), chronic obstructive pulmonary disease (COPD), cerebrovascular accident, peripheral artery disease, malignancy and benign prostatic hypertrophy (BPH).

A glomerular filtration rate calculated by the Cockcroft-Gault formula and glomerular filtration rate below 30 was defined as severe chronic renal failure. An ejection fraction (EF) below 40% was defined as heart failure. GFR and EF were considered during data collection but were not reported quantitatively. The New York Heart Association (NYHA) Classification was used defining the functional capacity of the patients. Frequency of the sexual intercourse before and after the cardiovascular event, and the time of the first intercourse after the cardiovascular event were evaluated. Since there is no accepted classification for the evaluation of sexual activity according to the frequency of sexual activity, the patients were asked about their weekly frequency of sexual activity. This study was conducted in accordance to the guidelines proposed in the Declaration of Helsinki and has been approved by a Local Clinical Research Ethics Committee of Dokuz Eylül University (date: 03.03.2016, no: 2016/06-39). Written informed consent was obtained from the all participants included in the present study.

## Statistical Analysis

Statistical analyses were performed using SPSS version 20.0 (SPSS Inc., Chicago, IL, USA). Two-tailed  $p < 0.05$  indicated statistical significance. A histogram with a bell curve and one-sample Kolmogorov-Smirnov and Shapiro-Wilk tests were used in assessing the distribution of age; the only continues variable of the sample. The normally distributed age was described as the mean and standard deviation, while the remaining categorical variables were expressed as frequencies and percentages. Differences between age

of the groups were analyzed by Independent-Samples t-test. On the other hand, chi-square and Fisher's Exact tests were performed to determine whether there was a difference between the groups in terms of categorical variables. Logistic regression analysis was used to assess the role of related variables for the likelihood of the sexual dysfunction.

## Results

This study included a total of 321 patients [100 (31.2%) female and 221 (68.2%) male]. The mean age of the population was  $58 \pm 8.94$ . HT, DM, HL, cigarette smoking, HF, history of CVA, CRE, COPD, PAH, malignancy and BPH were found to have the frequencies of [150 (46.7%), 76 (23.7%), 219 (68.2%), 121 (37.7%), 43 (13.4%), 3 (0.9%), 11 (3.4%), 19 (5.9%), 2 (0.6%), 1 (0.3%), 63 (19.6%)] respectively. RASI, beta-blocker, statin, PDE5-I and sexual performance enhancing drug usage were as 186 (57.9%), 283 (88.2%), 250 (77.9%), 18 5.6 (%) and 66 (20.6%) respectively. 117 of 321 patient reported to have sexual dysfunction after ACS. Individuals with sexual dysfunction were significantly older and have a significant high rate of HT, DM, HF, CRE, BB treatment, performance enhancing drug usage and passive sex position in contrast to the without sexual dysfunction group. On the other hand, cigarette smoking, being informed about sexual dysfunction before the ACS and active sex position were significantly higher in patients without sexual dysfunction. There was no statistically significant difference between the groups in terms of gender, HL, CVA, COPD, PAH, malignancy, RASI, statin and PDE5-I usage and outpatient policlinic information (Table 1) (note: Calculations regarding BPH and performance enhancing drug are done within the male gender only).

General characteristics of the study population was shown in Table 2. 37 (31.6%) of patients with sexual dysfunction were in NYHA class I, while 80 (68.3%) were in a NYHA class II functional state. In contrast, patients without sexual dysfunction have a 152 (74.5%) and 52 (25.5%) of NYHA class I and II respectively. While the number of patients who underwent coronary stent procedure without myocardial infarction (MI) was 83 (71%) in the group with sexual dysfunction, it was found 161 (79%) in the group without sexual dysfunction. In the group with sexual dysfunction, the time after MI was 3-6 months in 4 (3%) patients, 6-12 months in 6 (5%) patients, 12-36 months in 7 (6%) patients, and >36 months in 17 (14%) patients. In the group without sexual dysfunction, the time after MI was 3-6 months in 7 (3%) patients, 6-12 months in 2 (1%) patients, 12-36 months

in 16 (8%) patients, and >36 months in 18 (9%) patients. No hospitalization after ACS was reported in 52 (89.7%) and 96 (89.7%) of with and without sexual dysfunction groups respectively. Once and twice hospitalization were 5 (8.6%) and 1 (1.7%) in sexual dysfunction group and 10 (9.3%) and 1 (0.9%) in without sexual dysfunction group respectively. Two persons in sexual dysfunction group were illiterate, 100 (85%) were primary educated, 9 (8%) were high school educated and 6 (5%) were a university educated, where these rates were 2 (1%), 142 (70%), 32 (16%) and 28 (14%) in without sexual dysfunction group respectively.

Beta-blockers receiving group encountered 88.1% ( $n=283$ ) of the sample. Information about the medical history and sexual functions of patients using beta-blockers are shown in Table 3. While the mean age of the group using beta-blockers was  $58.69 \pm 8.89$ , the mean age was found to be  $55.37 \pm 8.88$  in the group not using beta-blockers ( $p=0.031$ ). There was no significantly difference related to gender, DM, HT, HL, smoking, HF, CVA, CRE, COPD, PAH, malignancy, BPH, MI and RAS-I and statin usage in both groups.

However, values of age ( $p=0.031$ ), PDE5-I usage ( $p=0.012$ ), and sexual dysfunction [111 (39.2%) vs. 6 (15.8%),  $p=0.005$ ] were higher in patients who are on beta-blocker treatment than in patients are not on beta-blocker treatment (note: Calculations regarding BPH were done only for males).

81.6% of the patients stated that they did not receive counseling from any health personnel about sexual intercourse before discharge and 78.8% of them stated that they did not receive any counseling about sexual intercourse during their follow-up outpatient clinic controls. A significant decrease was observed in the frequency of intercourse compared to pre-ACS period. Before the ACS, 71 (22.1%) individuals have sexual intercourse once a week, 143 (44.5%) twice a week, 40 (12.5%) three times or more per week, 43 (13.4%) biweekly and 24 (7.5%) once in a month. In post ACS period the rates of sexual intercourse were changed to 81 (25.2%) once a week, 78 (24.3%) twice a week, 28 (8.7%) three times or more per week, 78 (24.3%) biweekly and 56 (17.4%) once in a month. In pre and post ACS periods the rate of sexual intercourse was higher in beta-blocker user group. Furthermore, in post ACS period the rate of sexual intercourse was significantly lower in contrast to the pre-ACS period ( $p<0.001$ ). Sexual intercourse after ACS was initiated at first week by 23 (7.2%) individuals, 15 days later by 145 (45.2%), one month later by 99 (30.8%), two months later by 30 (9.3%), three months later by 18 (5.6%) and four months later by 4 (1.2%). Two (0.6%) persons had never sexual intercourse after ACS (Table 4).

Binary multivariate logistic regression analysis was done to investigate the role of age, gender, BB treatment, statin treatment, functional capacity, information before discharge and sexual intercourse position for the likelihood of the sexual dysfunction. The model as a whole that included all eight predictors was statistically significant [ $X^2$  (8, n=321)=7.678,  $p<0.001$ ], determining that the model can discriminate presence/absence of sexual dysfunction. The full model clarified between 29.2% (Cox & Snell R square) and 39.9% (Nagelkerke R square) of the variance in sexual dysfunction and correctly classified 77.3% of the cases. Age showed an odds ratio (OR) of 1.064; this indicates that each one-year increase in age, increases the probability of sexual dysfunction by 1.064 times. Similarly, functional capacity was among independent explanatory variables related to sexual dysfunction. Moreover, sexual intercourse position was also a significant predictor of the sexual dysfunction (OR: 6.299  $p<0.001$ ). However, gender, beta-blocker

treatment, statin treatment and having information before discharge did not contributed significantly to this model (Table 5).

## Discussion

Many physical and psychosocial pathologies are observed in patients after cardiovascular events, especially after MI. It may take a long time for individuals to regain their functions before the cardiovascular event. In our study, a decrease was found in the frequency of sexual intercourse after a cardiovascular event. This process may be associated with regression in cardiac functions and psychosocial factors in the post-MI period. In a study on the subject, a decrease in sexual activity of 22-75% was found as a result of physiological and psychosocial effects in the period after MI (8). In a review study by Drory et al. (9), male patients who were sexually active before CVE were evaluated with information obtained from one-to-one

**Table 1. Clinical characteristics of the entire sample and by sexual reluctance**

Variables	Entire study sample n=321	With sexual dysfunction n=117	Without sexual dysfunction n=204	p
Age (year)	58.3±8.94	62.01±7.56	56.16±9	<0.001
<b>Gender</b>				
Female n (%)	100 (31.2%)	39 (33.3%)	61 (29.9%)	0.523
Male n (%)	221 (68.8%)	78 (66.7%)	143 (70.1%)	
<b>Hypertension, n (%)</b>	150 (46.7%)	66 (56.4%)	84 (41.2%)	0.008
<b>Diabetes mellitus, n (%)</b>	76 (23.7%)	35 (29.9%)	41 (20.1%)	0.046
<b>Hyperlipidemia n (%)</b>	219 (68.2%)	81 (69.2%)	138 (67.6%)	0.769
<b>Smoking, n (%)</b>	121 (37.7%)	27 (23.1%)	94 (46.1%)	<0.001
<b>Heart failure n (%)</b>	43 (13.4%)	25 (21.4%)	18 (8.8%)	0.001
<b>CVA n (%)</b>	3 (0.9%)	2 (1.7%)	1 (0.5%)	0.275
<b>Severe CRF n (%)</b>	11 (3.4%)	11 (9.4%)	0 (0%)	<0.001
<b>COPD, n (%)</b>	19 (5.9%)	9 (7.7%)	10 (4.9%)	0.308
<b>PAH n (%)</b>	2 (0.6%)	1 (0.9%)	1 (0.5%)	0.692
<b>Malignancy n (%)</b>	1 (0.3%)	1 (0.9%)	0 (0%)	0.186
<b>BPH n (%)*</b>	63 (19.6%)	40 (34.2%)	23 (11.3%)	<0.001
<b>RAS inhibitors n (%)</b>	186 (57.9%)	73 (62%)	111 (54%)	0.050
<b>Beta-blocker n (%)</b>	283 (88.2%)	111 (95%)	172 (84%)	0.005
<b>Statin n (%)</b>	250 (77.9%)	86 (73%)	164 (80%)	0.152
<b>PDE-5 inhibitors n (%)</b>	18 5.6 (%)	4 (3.4%)	14 (6.9%)	0.197
<b>Performance enhancing drug*</b>	66 (20.6%)	32 (27.4%)	34 (16.7%)	0.023
<b>Pre-event information n (%)</b>	59 (18.4%)	8 (0.8%)	51 (25%)	<0.001
<b>Outpatient clinic inform. n (%)</b>	68 (21.2%)	24 (20.5%)	44 (21.6%)	0.824
<b>Active sex position n (%)</b>	271 (84.4%)	80 (68.4%)	191 (93.6%)	<0.001
<b>Passive sex position n (%)</b>	50 (15.6%)	37 (31.6%)	13 (6.4%)	<0.001

\* Calculations regarding BPH and performance-enhancing drugs were done only for males. CVA: Cerebrovascular accident, CRF: Chronic renal failure, COPD: Chronic obstructive pulmonary disease, PAH: Pulmonary arterial hypertension, BPH: Benign prostatic hypertrophy

**Table 2. General characteristics of the study population**

Variables	With sexual dysfunction n=117	Without sexual dysfunction n=204	p
<b>Functional capacity</b>			
NYHA-I n (%)	37 (31.6%)	152 (74.5%)	<0.001
NYHA-II n (%)	80 (68.3%)	52 (25.5%)	
<b>MI time</b>			
None n (%)	83 (71%)	161 (79%)	0.026
3-6 months n (%)	4 (3%)	7 (3%)	
6-12 months n (%)	6 (5%)	2 (1%)	
12-36 months n (%)	7 (6%)	16 (8%)	
>36 months n (%)	17 (14%)	18 (9%)	
<b>Post-ACS hospitalization</b>			
None n (%)	52 (89.7%)	96 (89.7%)	0.898
Once n (%)	5 (8.6%)	10 (9.3%)	
Two times n (%)	1 (1.7%)	1 (0.9%)	
<b>Level of education</b>			
Illiterate n (%)	2 (2%)	2 (1%)	0.008
Primary education n (%)	100 (85%)	142 (70%)	
High school n (%)	9 (8%)	32 (16%)	
University n (%)	6 (5%)	28 (14%)	

ACS: Acute coronary syndrome, MI: Myocardial infarction

**Table 3. Clinical characteristics of the study population in regard to beta-blocker treatment**

Variables	Total n=321	Taking BB n=283	Do not taking BB n=38	p
Age (year)	58.3±8.94	58.69±8.89	55.37±8.88	0.031
Gender (female)	100 (31%)	87 (30.7%)	13 (34.2%)	0.665
DM n (%)	76 (23.7)	67 (23.7%)	9 (23.7%)	0.999
HT n (%)	150 (46.7%)	135 (39.5%)	15 (47.7%)	0.340
HL n (%)	219 (68.2%)	193 (68.2%)	26 (68.4%)	0.978
Smoking n (%)	121 (37.7%)	105 (37.1%)	16 (42.1%)	0.550
HF n (%)	43 (13.4%)	40 (14.1%)	3 (7.9%)	0.289
CVA n (%)	3 (0.9%)	3 (1.1%)	0 (0%)	0.684
CRF n (%)	11 (3.4%)	11 (3.9%)	0 (0%)	0.244
COPD n (%)	19 (5.9%)	16 (5.7%)	3 (7.9%)	0.396
PAH n (%)	2 (0.6%)	2 (0.7%)	0 (0%)	0.776
Malignancy n (%)	1 (0.3%)	1 (0.4%)	0 (0%)	0.882
BPH n (%)*	63 (19.6%)	58 (20.5%)	5 (13.2%)	0.285
MI n (%)	321 (100%)	283 (100%)	38 (100%)	0.395
ACEI/ARB n (%)	186 (57.9%)	168 (59.4%)	18 (47.4%)	0.160
Statin n (%)	250 (77.9%)	219 (77.4%)	31 (81.6%)	0.559
PDE5-I n (%)	18 (5.6%)	12 (4.2%)	6 (15.8%)	0.012
Sexual dysfunction n (%)	117 (36.4%)	111 (39.2%)	6 (15.8%)	0.005

\* Calculations regarding BPH were done only for males. DM: Diabetes mellitus, HT: Hypertension, HL: Hyperlipidemia, HF: Heart failure, CRF: Chronic renal failure, COPD: Chronic obstructive pulmonary disease, PAH: Pulmonary arterial hypertension, BPH: Benign prostatic hypertrophy, MI: Myocardial infarction, CVA: Cerebrovascular accident

interview records and treatment cards. In the study, it was concluded that the most important factor determining the frequency of sexual activity before MI was the frequency of intercourse before MI (9). While the major factors affecting the frequency of sexual intercourse and pleasure were determined as education status and age; medical and physiological variables (diabetes, depression, medication) were determined as minor factors. In our study group, we see that the frequency of sexual intercourse decreased in each group compared to the pre-MI, and this decrease was associated with the previous frequency, as in the study by Drory et al. (9). In a study published in ESC in 2015, in which sexual activity in women and men 1 year before and

after MI was evaluated on 128 patients, it was found that the frequency of sexual activity, desire and pleasure from sexual activity decreased in the male population after MI, and erection problems developed in patients. However, it was determined that there was no significant change in women. In addition, it was stated that the results of the study did not reach statistical significance and that larger study groups were needed (10). In our study, there was no significant difference between male and female patients in terms of sexual dysfunction. The frequency of ED was found to be higher in the group using beta-blockers. There is no consensus on the effects of beta-blockers in the development of erectile dysfunction, which

**Table 4. Sexual activity related data of the study population in regard to beta-blocker treatment**

Variables	Total n=321	Taking BB n=283	Do not taking BB n=38	p
<b>Frequency of intercourse before CV event</b>				
1/week	71 (22.1%)	65 (23%)	6 (15.8%)	0.001
2/week	143 (44.5%)	126 (44.5%)	17 (44.7%)	
≥3/week	40 (12.5%)	28 (9.9%)	12 (31.6%)	
Biweekly	43 (13.4%)	40 (14.1%)	3 (7.9%)	
Once in a month	24 (7.5%)	24 (8.5%)	0 (0%)	
<b>Frequency of intercourse after CV event</b>				
1/week	81 (25.2%)	76 (26.9%)	5 (13.2%)	0.002
2/week	78 (24.3%)	62 (21.9%)	16 (42.1%)	
≥3/week	28 (8.7%)	21 (7.4%)	7 (18.4%)	
Biweekly	78 (24.3%)	70 (24.7%)	8 (11%)	
Once in a month	56 (17.4%)	54 (19.1%)	2 (5.3%)	
<b>First intercourse time after the CV event</b>				
First week	23 (7.2%)	16 (5.7%)	7 (18.4%)	0.089
15 days later	145 (45.2%)	128 (45.2%)	17 (44.7%)	
After 1 month	99 (30.8%)	88 (31.1%)	11 (28.9%)	
After 2 months	30 (9.3%)	27 (9.5%)	3 (7.9%)	
After 3 months	18 (5.6%)	18 (6.4%)	0 (0%)	
After 4 months	4 (1.2%)	4 (1.4%)	0 (0%)	
Never	2 (0.6%)	2 (0.7%)	0 (0%)	

**Table 5. Binary multivariate logistic regression analysis for the likelihood of the sexual reluctant**

Variables	B	SE	Wald	df	p	Odds	95% CI for p
Age	0.062	0.019	10.908	1	0.001	1.064	1.025-1.103
Gender (male)	0.245	0.347	0.499	1	0.480	1.278	0.647-2.524
Betablocker taking	-0.755	0.532	2.010	1	0.156	0.470	0.166-1.334
Statin taking	0.122	0.342	0.128	1	0.721	1.130	0.578-2.211
NYHA (I)	-1.536	0.297	26.787	1	<0.001	0.215	0.120-0.385
Being informed before discharge	0.861	0.442	3.788	1	0.052	2.365	0.994-5.626
Sexual intercourse position (active)	1.840	0.407	20.441	1	<0.001	6.299	2.836-13.987
Constant	-4.472	1.208	13.714	1	<0.001	0.011	-

SE: Standard error, CI: Confidence interval

is a multifactorial process. The physical and psychosocial transformations of patients after MI and the use of multiple drugs contribute to this process. In a study evaluating the relationship between cardiac drug use and the frequency of erectile dysfunction, a relationship was shown between cardiac drug use and erectile dysfunction. Especially in patients using calcium channel blockers [RR=1.6, confidence interval (CI) 95% 1.0-2.4], ARB users (RR=2.2, 95% CI 1.0-4.7), non-selective beta-blockers (RR=1.7, 95% CI 0.9-3.2) and diuretic users (RR=1.3, CI 0.7-2.4) ED was found to be high. However, no correlation could be found between organic nitrates, ACE inhibitors and selective beta-blockers and ED (11). In our study, age was found to be significantly higher in the group using beta-blockers. Although the frequency of heart failure and BPH were found to be higher in the group using beta-blockers, this did not create a statistically significant difference. However, the frequency of PDE5 inhibitor use was found to be higher in the group that did not use beta-blockers. This may have had an effect on the lesser development of sexual dysfunction in the group that did not use beta-blockers. Age, functional capacity and sexual intercourse position contributed significantly when binary multivariate logistic regression analysis was performed in our study.

There are also opinions that the negative effects of beta-blockers on sexual functions are related to psychogenic factors. In individuals with newly diagnosed cardiovascular disease, the frequency of ED was found to be higher in the group that was informed about the relationship between beta-blockers and erectile dysfunction, compared to the group that was not informed. This situation has been primarily related to anxiety related to drug side effects (12).

All these data show that the psychological component is also effective in the effects of beta-blockers on erectile dysfunction. It is of great importance to provide sexual counseling during the cardiac rehabilitation process and to inform patients in detail about cardiac drugs, especially beta-blockers, and their side effects. In our study, the rate of patients who received sexual counseling after discharge and at the outpatient clinic controls was 21.2%. In a way, it should be considered that this may be one of the factors in the decrease in sexual activity disorder and the frequency of intercourse in the study population. In support of our hypothesis, in a study published in the Journal of Cardiovascular Nurse in 2014, it was investigated how much counseling the patients received regarding their return to their sexual life during the cardiac rehabilitation process after MI in Sweden and how effective it was on their sexual life. It was determined that only 41% of the patients and 31% of the partners of the patients received sexual

intercourse counseling after MI. In the sexual satisfaction scoring questionnaire of the study population after sexual counseling, it was concluded that there was a significant improvement in these patients after the training (13).

### Study Limitations

As a result of cardiovascular events and also predisposition factors of sexual dysfunction, the psychological components, such as anxiety and/or depression are not reported in our analyzes. In addition, the lack of data on the various classes of beta-blockers with different effects on sexual activity is another shortcoming of this study. Furthermore, no validated questionnaire was used to determine sexual activity in both sexes.

### Conclusion

After acute coronary syndrome, sexual life is affected by organic and psychosocial reasons. However, in this process, it is not considered reasonable to stay away from beta-blockers due to their side effects. Implementing cardiac rehabilitation, including sexual counseling, and preferring selective beta-blockers, if possible, should be adopted as an appropriate process.

### Ethics

**Ethics Committee Approval:** This study was conducted in accordance to the guidelines proposed in the Declaration of Helsinki and has been approved by a Local Clinical Research Ethics Committee of Dokuz Eylül University (date: 03.03.2016, no: 2016/06-39).

**Informed Consent:** Written informed consent was obtained from the all participants included in the present study.

**Peer-review:** Externally and internally peer-reviewed.

### Authorship Contributions

Surgical and Medical Practices: A.A., G.A., Concept: B.D., Ö.Ş., O.Ç., A.O.E., Design: B.D., Ö.Ş., O.Ç., A.O.E., Data Collection or Processing: T.Y., G.A., L.B., A.A., Analysis or Interpretation: D.E.A., A.N., Drafting Manuscript: D.E.A., A.N., T.Y., O.Ç., Critical Revision of Manuscript: L.B., A.A., G.A., A.O.E., Ö.Ş., B.D., Final Approval and Accountability: Ö.Ş., D.E.A., A.N., Supervision: B.D., A.O.E., T.Y., Ö.Ş., L.B., Writing: Ö.Ş., D.E.A., A.N.

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