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Research Article

The Role of Gender in Heart Diseases

Kalp Hastalıklarında Cinsiyetin Rolü

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Abstract
Background: In our study, we aimed to investigate the course and frequency of cardiovascular diseases in female and men and whether there is a change in their cardiac functions in the follow-up of these patients.
Material and Method: The files of the patients who applied to the cardiology outpatient clinic of our hospital due to various heart conditions were analyzed retrospectively, the patients' coronary angiography, heart surgeries, first and follow-up echocardiographic findings were compared to between two groups as male and female.
Results: Two hundred and seventy female (mean age 63.8 years) and 271 male (mean age 62.4 years) patients were included in the study. The rate of coronary artery disease (CAD), heart failure, degenerative mitral valve disease (MVD) and serum creatinine levels were higher in men ($p<0.05$). There was no difference between the two groups in terms of diabetes mellitus, chronic obstructive pulmonary disease, dialysis treatment, cerebrovascular diseases, hypertrophic cardiomyopathy, and pacemaker implantation ($p>0.05$). Hypertension, rheumatic MVD, Takotusbo Cardiomyopathy were more common in female than in man ($p<0.05$). In the clinical course of both female and men, a significant decrease in left ventricle ejection fraction (LVEF) and a significant increase in systolic pulmonary artery pressure (SPAP) were observed ($p<0.001$). The age was found an independent risk factor for both genders ($p<0.05$).
Conclusion: CAD, degenerative MVD and heart failure were higher in men, rheumatic MVD and Takotsubo cardiomyopathy were higher in female. LVEF was relatively protected in female, but follow-up both genders it was observed that LVEF significant decreased and SPAP increased.
Key words: heart disease, gender, echocardiography
Öz
Amaç: Çalışmamızda, kardiyovasküler hastalıkların kadın ve erkeklerdeki seyrini, sıklığını, bu hastaların takiplerinde kalp fonksiyonlarında değişiklik olup olmadığını araştırmayı hedefledik.
Materiyal ve metod: Hastanemiz kardiyoloji polikliniğine çeşitli kalp rahatsızlıkları nedeniyle başvuran hastaların dosyaları geriye dönük tarandı, erkek ve kadın olarak iki gruba ayrılan hastaların koroner anjiografileri, geçirmiş oldukları kalp ameliyatları, başvuru ve sonrasındaki ekokardiyografik bulguları karşılaştırıldı.
Bulgular: Çalışmaya 270 bayan (ortalama yaş 63.8 yıl) ve 271 erkek (ortalama yaş 62.4 yıl) hasta alındı. Koroner arter hastalığı (KAH), kalp yetersizliği, dejeneratif mitral kapak hastalığı (MKH) oranı ve serum kreatinin düzeyleri erkeklerde fazlaydı ($p<0.05$). Diyabetes mellitus, kronik obstrüktif akciğer hastalığı, diyaliz tedavisi, serebrovasküler hastalıklar, hipertrofik kardiyomiyopati, kalp pili uygulaması açısından her iki grup arasında fark yoktu ($p>0.05$). Kadınlarda hipertansiyon, Takotusubo kardiyomyopatisi, romatizmal MKH erkeklere göre sıktı. Hem kadınların hem erkeklerin takiplerinde sol ventrikül ejeksiyon fraksiyonunda (SVEF) belirgin düşme ve sistolik pulmoner arter basıncında (SPAB) anlamlı artış izlendi ($p<0.001$). Her iki cinsiyette yaş, önemli bağımsız bir risk faktörü olarak bulundu ($p<0.05$).
Sonuç: Erkeklerde KAH, dejeneratif MKH ve kalp yetersizliği, kadınlarda ise romatizmal MKH ve Takotsubo kardiyomyopatisi daha fazlaydı. SVEF nispeten kadınlarda korunmuştu, fakat, her iki cinsiyette de takipte, hem SVEF'de düşme, hem SPAB da artış olmaktaydı. Yaş her iki cinsiyette KAH için bağımsız prediktif risk faktörü idi.
Anahtar kelimeler: Kalp hastalıkları, cinsiyet, ekokardiyografi

Introduction

Heart diseases progress differently in men and female due to genetic structure, the effect of hormones, the interaction of psychosocial and environmental factors, eating habits and behavioral differences (1,2). Although the age at which female suffer from heart diseases is 10 years later compared to men, in recent years, female have come to be diagnosed with heart diseases at an early age (1). Although mortality and morbidity rates seem to be close to each other, since ischemic etiology is at the forefront in men, the effect is stronger; ischemic heart diseases in female are more uncertain, and the diagnosis can be missed (2). Less use of health services by female and delayed diagnosis have given rise to the increase in cardiovascular mortality in female in recent years (3). Hormones secreted in female of childbearing age are known to protect against atherosclerosis thanks to their positive effects on the vascular endothelium and sympathetic system (4). Female who benefits from the beneficial effects of estrogen in the period before menopause, unfortunately, do not enjoy this benefit even if they take hormone replacement therapy after menopause (4). Cardiovascular mortality rate in female exceeds that of men especially after the age of 65. Apart from ischemic heart diseases, the involvement of valvular heart diseases can be different in men and female. While mitral valve prolapse is common in female, aortic stenosis due to congenital bicuspid aortic valve is 3 times more common in men (5). One of the most significant differences between the genders is that female have heart failure with preserved ejection fraction, even at advanced age.

In this study which intended for investigating the distribution of heart diseases by gender, we aimed to reveal the differences between the characteristics of male and female patients that we followed up for various heart problems, together with their echocardiographic measurements.

Material and Method

The files of the patients who applied to the cardiology clinic of our hospital due to various heart diseases were reviewed retrospectively. All patients' age, previous diseases, biochemical parameters, coronary angiography (CAG) results, coronary artery disease (CAD), coronary artery bypass graft (CABG) results, heart valve surgery [mitral valve replacement (MVR), aortic valve replacement (AVR), tricuspid valve replacement (TVR)] results, heart failure and whether cardiac resynchronization (CRT) treatment was administered in consequence of it, echocardiography results at the first admission to our hospital and follow-up (within 1-2 years) [left ventricular ejection fraction (LVEF), left and right atrial measurements, systolic pulmonary artery pressures (SPAP)] were recorded (6). The study investigated whether they have co-morbid diseases [hypertension (HT), diabetes mellitus (DM), chronic obstructive pulmonary disease (COPD), end-stage chronic kidney disease on dialysis (ESRD), cerebrovascular disease (CVD), hypertrophic obstructive cardiomyopathy (HOCM)]. In the center where the study was conducted, the glomerular filtration rate was calculated with the Cockcrouft-Gault formula. Coronary angiography reports were examined, and we recorded whether they have and occlusive or non-occlusive coronary artery disease and whether stent implantation was performed. The patients included in the study were divided into two main groups as male and female.

Statistics

The data obtained from the medical histories of the patients were recorded in the statistical program of SPSS version 20.0 (Statistical Package for Social Sciences, Inc. Chicago, IL, USA). The distribution was expressed as mean ± standard deviation (SD) in numerical data with normal distribution, and as percentage (%) in categorical data. Comparisons between the two groups were made using the Students t-test for normally distributed data, and the Chi-square test for categorical variables. Whether the data were suitable for normal distribution was evaluated with the Kolmogorov Smirnov test. Data showing abnormal distribution were expressed as median, min-max values, and Mann Whitney U test was used to compare the two groups. Multivariate logistic regression analyzes were used to identify independent predictors of gender and CAD association. A p value of <0.05 was considered significant in all results.

Results

270 female (mean age 63.8 ± 14.5 years) and 271 male (mean age 62.4 ± 12.6 years) patients were included in the study, and the mean age of both groups was found to be close to each other ($p > 0.05$). Serum creatinine values were slightly higher in males [1.0 (0.5-5.1) vs 0.8 (0.5-2.0) mg/dL, $p < 0.001$]. Significantly, CAD [204 (75.2%) vs 67 (24.8%), $p < 0.001$], CABG [90 (33.2%) vs 26 (9.6), $p < 0.001$], CAG [222 (81.9%) vs. 90 (33.3%), $p<0.001$], stent implantation [117(43.1%) vs 37(13.7%), $p < 0.001$], low LVEF on echocardiography [83 (30.6%) vs 36(13.3%)] were high in men (Table 1).

Table 1. Comparison of demographic characteristics and comorbidities of female and men

Variables	Female (n=270)	Men (n=271)	P
Age, years	63.8 ± 14.5	62.4 ± 12.6	0.256
Creatinine, mg/dL	0.8 (0.5-2.0)	1.0 (0.5-5.1)	0.001*
GFR ml/dk/1.73 m^2	79.6 ± 29.9	83.5 ± 29.9	0.187
CAD (%)	67 (24.8)	204 (75.2)	0.001
CAG (%)	90 (33.3)	222 (81.9)	0.001
CABG (%)	26 (9.6)	90 (33.2)	0.001
Stent implantation (%)	37 (13.7)	117 (43.1)	0.001
MVR (%)	14 (5.1)	14 (5.1)	0.332
AVR (%)	9 (3.3)	13 (4.7)	0.984
TVR (%)	3 (1.1)	4 (1.4)	0.311°
º HFrEF (%)	36 (13.3)	83 (30.6)	0.003
HFpEF (%)	67 (24.8)	127 (46.8)	0.284
CRT (%)	3 (1.1)	7 (2.5)	0.537°
COPD (%)	15 (5.5)	21 (7.7)	0.936
ESRD (%)	3 (1.1)	4 (1.4)	0.921°
Hypertension (%)	89 (32.9)	100 (36.9)	0.036
Diabetes Mellitus (%)	41 (15.1)	42 (15.4)	0.092
CVD (%)	9 (3.3)	13 (4.7)	0.990
Takotsubo CMP (%)	2 (0.7)	0 (0)	0.022°
HOCM (%)	4 (1.4)	3 (1.1)	0.383°

Aberreations:*: Mann-Whitney U test, °: Fisher's Exact test, º: Those with an EF value below 50% are expressed. n= number of people, AVR: Aortic valve replacement; CABG: Coronary artery by-pass graft; GFR: Glomerular filtration rate; HOCM: Hypertrophic obstructive cardiomyopathy; CAD: Coronary artery disease; CAG: Coronary angiography; MVR: Mitral valve replacement; CMP: Cardiomyopathy; CRT: Cardiac resynchronization therapy; COPD: Chronicobstructive pulmonary disease; HFrEF: Heart failure with low Ejection Fraction; HFpEF: Heart failure with preserved Ejection Fraction; TVR: Tricuspid valve replacement; ESRD: End-stage chronic renal failure; CVD: Cerebrovasculardisease

Considering the co-morbid diseases, the rate of HT in female [89 (32.9%) vs. 100 (36.9%), p=0.036]) was higher than in men. In echocardiographic examination, LVEF was lower in men at first admission [50 (18-65) vs 56.0 (30-67), p < 0.001]; Left ventricular wall motion defect [149 (54.9%) vs 66 (24.3%), p < 0.001] was higher. Left ventricular end diastolic diameter (LVEDD) [4.9 ± 0.5 vs. 5.2 ± 0.6, p < 0.001], left ventricular end systolic diameter (LVESD) [3.4 ± 0.6 vs 3.7 ± 0.7, p < 0.001], inter ventricular septum (IVS) thickness [1.0 ± 0.1 vs 1.1 ± 0.2, p < 0.001], posterior wall (PW) thickness [1.0 ± 0.1 vs 1.1 ± 0.2, p < 0.001] was smaller (Table 2). Rheumatic mitral valve disease was more common in female [(14 (5.1%) vs. 5 (1.8%), p = 0.003)], while degenerative mitral valve disease was more common in men [(95 (35.1%) vs 168 (61.9%), p = 0.005] (Table 2)

Table 2. Echocardiographic differences in male and female hearts

Variables	Female (n=270)	Men (n=271)	P
LVEF (%)	56.0 (30-67)	50.0 (18-65)	0.001*
LVEDD cm	4.9 ± 0.5	5.2 ± 0.6	0.001
LVESD cm	3.4 ± 0.6	3.7 ± 0.7	0.001
IVS thickness cm,	1.0 ± 0.1	1.1 ± 0.2	0.001
PW thickness cm	1.0 ± 0.1	1.1 ± 0.2	0.001
RVDD cm	2.3 ± 0.4	2.4 ± 0.4	0.201
LA cm	4.0 ± 0.6	4.1 ± 0.6	0.322
RA cm	3.7 ± 0.5	3.8 ± 0.5	0.074
TAPSE mm	2.3 ± 0.4	2.2 ± 0.4	0.068
SPAP mmHg	30.0 (17-86)	28.5 (20-70)	0.298*
LVWMD (%)	66 (24.3)	149 (54.9)	0.001
Mitral valve disease			
Normal (%)	49 (18.1)	59 (21.7)	0.330
Mitral valve prolapse (%)	7 (2.5)	6 (2.2)	0.344
Rheumatic (%)	14 (5.1)	5 (1.8)	0.003
Degenerative (%)	95 (35.1)	168 (61.9)	0.005
Mechanical (%)	6 (2.2)	4 (1.4)	0.227°
Severe stenosis (%)	4 (1.4)	0 (0)	0.008°
Severe unsufficient (%)	15 (5.5)	14 (5.1)	0.242
Aort valve disease			
Normal (%)	56 (20.7)	7 (2.5)	0.517
Aorta valve prolapse (%)	5 (1.8)	3 (1.1)	0.221°
Rheumatic (%)	5 (1.8)	3 (1.1)	0.221°
Degenerative (%)	98 (36.2)	157 (57.9)	0.119
Mechanical (%)	3 (1.1)	5 (1.8)	0.821°
Bicuspid aorta (%)	1 (0.3)	1 (0.4)	0.805°
Severe stenosis (%)	4 (1.4)	4 (1.4)	0.621°
Severe insufficient (%	1 (0.3)	4 (1.4)	0.306°
Tricuspid valve diseases			
Normal (%)	155 (57.4)	225 (83.0)	0.389
Degenerative (%)	2 (0.7)	4 (1.4)	0.686°

Abereations: *: Mann-Whitney U test, °: Fisher's Exact test, n=Number of people; LVEF: Left ventricular ejection fraction, LVEDS: Left ventricular end-diastolic diameter; LVESD: Left ventricular end-systolic diameter; RVDD: Right ventricular diastolic diameter; IVS: Left ventricular interventricular wall diameter; PW: Left ventricular posterior wall diameter; TAPSE: Tricuspid annular plane systolic excursion; SPAP: Systolic pulmonary artery pressure; LVWMD: Left ventricular wall motion defect.

Significant reductions in LVEF [56.0 (30-67) vs 54.0 (25-73), p < 0.001], LVEDD [4.9 ± 0.4 vs 5.1 ± 0.5, p = 0.003], LVESD (3.4 ± 0.5 vs 3.5 ± 0.7, p = 0.046), and increase in left atrial diameter (4.2 ± 0.6 vs 4.4 ± 0.8, p = 0.019) and right atrial diameter (3.8 ± 0.5 vs 4.0 ± 0.6, p = 0.010) diameters and SPAP values [30 (17-86) vs 37 (20-72), p < 0.001] were observed on echocardiograms during follow-up of the female (Table 3). Similar to female, men had a significant decrease in LVEF [50 (18-65) vs. 47 (20-65 p < 0.001]), although LVEDD (5.3 ± 0.1 vs 5.4 ± 0.6, p = 0.013), LVESD (3.8 ± 0.6 vs 3.9 ± 0.7, p = 0.009), left atrial diameter (4.2 ± 0.7 vs 4.3 ± 0.6, p = 0.009), right atrial diameter (3.8 ± 0.6 vs 3.9 ± 0.5, p = 0.029) and SPAP (30.6 ± 9.7 vs 32.3 ± 9.0, p = 0.035) values were increased (Table 3).

The study investigated independent predictors of coronary artery disease in both men and female using multivariate logistic regression analysis and Chi-Square test. Unfortunately, the study found that, apart from age factor, other factors were not gender-specific independent predictor risk factors [RR: 1.019, 95% CI (0.598-0.904), p = 0.011], in males [RR: 1.098, 95% CI (0.280- 0.916), p = 0.041] (Table 4).

Table 4. Independent predictors of coronary artery disease in men and female

Variables	Female			Men		
	OR	% 95 CI	P	OR	% 95 CI	P
Age	1.019	(0.598-0.904)	0.011	1.098	(0.280-0.916)	0.041
HT	0.705	(0.388-1.280)	0.249	0.885	(0.542-1.444)	0.624
DM	1.431	(0.702-2.918)	0.349	1.480	(0.726-3.017)	0.306
COPD	0.336	(0.074- 1.533)	0.115	1.137	(0.445-2.918)	0.728
CVD	1.164	(0.282-4.799)	0.833	0.468	(0.153-1.426)	0.172
ESRD	0.981	(0.959-1.003)	0.140	0.992	(0.078-4.025)	0.567

Aberations: DM: Diabetes Mellitus; HT: Hypertension; COPD: Chronic obstructive pulmonary disease; ESRD: End stage renal disease; CVD: Cerebrovasculardiseas

Table 3. Comparison of the basal and control echocardiograms of the patients

Female	**First**	**Countrol**	**P**
LVEF, (%)	56.0 (30-67)	54.0 (25-73)	0.001[e]
LVDD, cm	4.9 ± 0.4	5.1 ± 0.5	0.003
LVDD, cm	3.4 ± 0.5	3.5 ± 0.7	0.046
İVS thickness, cm	1.0 ± 0.1	1.0 ± 0.2	0.748
PW thickness, cm	1.0 ± 0.1	1.0 ± 0.1	0.122
LA, cm	4.2 ± 0.6	4.4 ± 0.8	0.019
RA, cm	3.8 ± 0.5	4.0 ± 0.6	0.010
SPAP, mmHg	30.0 (17-86)	37 (20-72)	0.001 [e]
TAPSE, mm	2.2 ± 0.4	2.0 ± 0.4	0.221
Men			
LVEF, (%)	50.0 (18-65)	47 (20-65)	0.001 [e]
LVDD, cm	5.3 ± 0.1	5.4 ± 0.6	0.013
LVDD, cm	3.8 ± 0.6	3.9 ± 0.7	0.009
İVS thickness, cm	1.1 ± 0.2	1.1 ± 0.1	0.183
PW thickness, cm	1.0 ± 0.1	1.0 ± 0.1	0.738
LA, cm	4.2 ± 0.7	4.3 ± 0.6	0.009
RA, cm	3.8 ± 0.6	3.9 ± 0.5	0.029
SPAP, mmHg	28.5 (20-70)	32.0 (20-75)	0.001 [e]
TAPSE, mm	2.3 ± 0.6	2.3 ± 0.7	0.481

Aberrations: [e] Wilcoxon was used. n=Number of people; LVEF: Left ventricular ejection fraction, LVEDS: Left ventricular end-diastolic diameter; LVESD: Left ventricular end-systolic diameter; RVDD: Right ventricular diastolic diameter; IVS: Left ventricular interventricular wall diameter; PW: Left ventricular posterior wall diameter; TAPSE: Tricuspit annuler plane systolic excursion; SPAP: Systolic pulmonary artery pressure; LVWMD: Left ventricular wall motion defect

Discussion

In this study, in which we tried to compare the hearts of men and female in many aspects, found that, as expected, ischemic heart diseases, degenerative mitral valve disease, and heart failure with low LVEF are more common in men. In female, hypertension and mitral valve stenosis were common. Age was an important risk factor for CAD in both genders. Unfortunately, at follow-up within 1-2 years, the study observed that the ejection fraction decreased, cardiac diameters increased, and pulmonary artery pressure increased in both men and female.

While ischemic heart diseases are found 3-4 times more frequently in men than in female until the age of 60, female constitute most of these patients after the age of 75. However, in recent years, it is known that younger female suffers from ischemic heart diseases (7). Smoking habits, stressful life, irregular release of hormones due to active working life, early menopause can be considered among the contributing factors. In this study, the rates of CAD, CAG and CABG were higher in men. Also, due to the damaged myocardial tissue, men had lower LVEF rates and larger cardiac cavities. While obstructive coronary artery diseases are more common in men presenting with acute coronary syndrome, non-occlusive or completely normal coronary arteries are found in most female (8). While decision is made for placement of stent or by-pass for most of the men, no action is taken for normal or mild atherosclerotic coronary vessels in female. In our study, the rate of stent implantation and CABG was higher in men than in female.

In recent years, one of the most common causes of non-occlusive coronary artery disease has been thought to be microvascular angina (9). Other conditions that cause acute coronary syndrome in female can be listed as follows; spontaneous coronary artery dissection, vasospastic angina, Takotsubo cardiomyopathy (10,11). However, normal coronary arteries in female should be taken seriously. Because, after the next 5-8 years, the risk for obstructive coronary artery disease for these patients are found to be 2 times higher (12,13).

In the premenopausal period, the rate of hypertension and the cholesterol levels in female are lower than in men. The presence of diabetes (gestational or type 1, type 2 DM) affects cardiovascular outcomes adversely (14).

Unlike these generalizations, the rate of hypertension in female was higher than in men in this study. We attributed this result to the fact that most of our female patients who participated in the study were in the postmenopausal period. In the subgroup analyzes, when we compared the patients under 50 years of age and above, there was no difference between men and female under 50 years of age, while the prevalence of hypertension was more prevalent in female above 50 years of age. In addition, we thought that we achieved such a result due to the high birth rate in our country, salty eating habits and the fact that female are exposed to more stress. Likewise, the rate of DM was the same in both groups and we thought that we achieved such a result because the patients were over a certain age.

Heart failure affects almost 10% of the elderly population and is more common in female (15). Evidence suggesting this fact can be listed as the longer life expectancy in female than in men, the higher incidence of ischemic heart failure in men and therefore a shorter life span, and the higher incidence of heart failure with preserved EF (HFpEF) in female (16).

Dilated cardiomyopathy (DCM) and hypertrophic cardiomyopathy (HCM) are slightly higher in men than in female (15,16), while Takotsubo cardiomyopathy (TTC) is more common in female (11). Estrogen activates vasodilation by decreasing catecholamine-mediated vasoconstriction and may possibly increase the ß2 adrenergic receptor response (4). The decrease in estrogen with advancing age may contribute to increased catecholamine sensitivity, which may contribute to both Takotsubo cardiomyopathy (TCM) and heart failure with HFpEF (4).

In the study, the rate of men with low ejection fraction (HFrEF) was higher, but HFpEF was equal in both groups. The number of female patients diagnosed with TCM was low, but they were more than males, and HCM was found to be equal in both groups. We are of the opinion that the reason for this was that both genders were affected equally, since HCM is more of a genetic disease.

CRT, which is used in the treatment of heart failure, can reduce the progression of heart failure by increasing the quality of life and reducing conduction defects (17). In many studies, it is controversial whether female benefit from this treatment because the number of females included in the study is low and LVEF is higher in female (17,18,19). Since the number

of patients who underwent CRT in this study was few, it is very difficult to express a general opinion on this issue. However, unlike other studies, the rates of CRT administration in both men and female were close to each other in this study.

Although aortic stenosis, which is one of the most common valvular heart diseases in adults, seems to be dominant in males, it was found to be similar in both sexes in our study.

There was no difference between the two groups in terms of severe aortic regurgitation. Although mitral valve prolapse was more common in female (20), it was the same in both groups in our study. The low number of our patients and the advanced age of the patients may have caused detection of mitral valve prolapse less frequently. While severe mitral regurgitation is similar in both groups, one of the reasons why severe mitral stenosis is more common in female may be that female are more likely to have rheumatic mitral valve disease in childhood.

In our country, one of the largest studies investigating gender differences in heart diseases is the TEKHARF study (21). A total of 1852 men and 1835 female participated in that study. The frequency of CAD in men was 4.1%; the frequency of HT was 1.5; the rate of rheumatic heart diseases was 0.2%; the rate of other diseases was 0.2%; the frequency of CAD was 3.5% in female; the frequency of HT was 2.8%; rheumatic heart diseases 0.7; other heart diseases was 0.3. Also, according to this large-scale study, the presence of DM, systolic blood pressure, and high C-reactive protein were predictors of the most important risk factors for the development of coronary heart diseases in both groups, while smoking and high rates of LDL-cholesterol were independent predictors for CAD only in the male group (21).

In our study, when HT, DM, COPD, LVH, and CRF were evaluated separately in both genders, they were not found to be independent predictors of CAD. Only age was found to be an independent predictor for both genders. The reason for such a different result may be that our age range was not as wide as that in the TEKHARF study, and that already known heart patients were included in the study. Many risk factors (medical history of CAD in the family, stressful personality, inactivity, obesity, pre-diabetes, smoking, cholesterol values, hormonal changes, etc.) for coronary artery disease should be considered together (22).

In this study, unlike other studies conducted so far, the first admission and control echocardiograms of our patients were also available. Thus, data on the course of heart diseases in both genders were obtained.

Limitations

The most important limitations were the retrospective nature of this study, the small number of patients, and the inability to follow-up most of the patients.

Conclusion

In this study, we tried to present the differences found between male and female hearts in the light of the data in literature. The study found that men are more prone to ischemic heart diseases; heart failure with low LVEF is more common in men; hypertension and rheumatic mitral valve diseases are more common in female. LVEF was relatively preserved in female, but although the genders were different, both groups had a decrease in LVEF and an increase in SPAB over time. Therefore, regardless of gender and co-morbid diseases, the heart was getting tired over time. Heart diseases appear in different roles in men and female. Symptoms in female should not be ignored if they are associated with mood changes, and microvascular angina should be considered in non-occlusive coronary artery diseases. Patients who present with palpitations and shortness of breath should be alert for rheumatic mitral stenosis. In the future, more extensive studies are needed to determine the risk factors for heart diseases in both genders.

Conflict of Interest: The author has no conflicts of interest to declare.

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