



## Original Contribution

## Sex-based differences in prevalence and clinical presentation among pericarditis and myopericarditis patients ☆☆☆☆☆



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## ABSTRACT

**Background:** Sex differences in heart diseases, including acute coronary syndrome, congestive heart failure, and atrial fibrillation, have been studied extensively. However, data are lacking regarding sex differences in pericarditis and myopericarditis patients.

**Objectives:** The purpose of the study was to evaluate whether there are sex differences in pericarditis and myopericarditis patients as well.

**Methods:** We performed a retrospective, single-center observational study that included 200 consecutive patients hospitalized with idiopathic pericarditis or myopericarditis from January 2012 to April 2014. Patients were evaluated for sex differences in prevalence, clinical presentation, laboratory variables, and outcome. We excluded patients with a known cause for pericarditis.

**Results:** Among 200 consecutive patients, 55 (27%) were female. Compared with men, women were significantly older ( $60 \pm 19$  years vs  $46 \pm 19$  years,  $P < .001$ ) and had a higher rate of chronic medical conditions. Myopericarditis was significantly more common among men (51% vs 25%,  $P = .001$ ). Accordingly, men had significantly higher levels of peak troponin ( $6.8 \pm 17$  ng/mL vs  $0.9 \pm 2.6$  ng/mL,  $P < .001$ ), whereas women presented more frequently with pericardial effusion (68% vs 45%,  $P = .006$ ). Interestingly, women had a significantly lower rate of hospitalization in the cardiology department (42% vs 63%,  $P = .015$ ). Overall, there were no significant differences in ejection fraction, type of treatment, complications, or in-hospital mortality.

**Conclusions:** Most patients admitted with acute idiopathic pericarditis are male. In addition, men have a higher prevalence of myocardial involvement. Significant sex differences exist in laboratory variables and in hospital management; however, the outcome is similar and favorable in both sexes.

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## 1. Introduction

Sex differences in heart diseases have been studied extensively. Numerous studies have shown that females diagnosed as having acute coronary syndrome or atrial fibrillation have adverse outcomes compared with males [1–3]. The increased risk is attributed to older age and higher prevalence of chronic conditions [4,5]. On the other hand, female sex is associated with better survival among patients with advanced heart failure [6].

There are limited data regarding sex differences among pericarditis and myopericarditis patients. Previous research revealed conflicting results regarding sex differences in the prevalence of pericarditis. Several studies found males to be at increased risk for acute pericarditis and myopericarditis [7–9], whereas other studies have reported no specific sex predisposition for pericarditis [10]. None of the studies addressed differences in clinical presentation, laboratory variables, diagnostic tests, and management.

The incidence of acute pericarditis is difficult to quantify because there are undoubtedly many undiagnosed cases. It is a common disease, accounting for up to 5% of patients presenting to the emergency department with nonischemic chest pain [11,12]. Therefore, it is important to recognize whether there are sex differences in prevalence, clinical presentation, and outcome, to improve the diagnosis and management of these patients.

The aim of the current study was to evaluate sex differences in prevalence, clinical presentation, laboratory variables, and outcomes among patients admitted with the diagnosis of pericarditis and myopericarditis.

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## 2. Methods

### 2.1. Study population

We performed a retrospective, single-center observational study at the Tel-Aviv Medical Center. The study population included all 264 consecutive patients 18 years or older who were admitted to our facility between January 2012 and April 2014, and who were discharged with the diagnosis of idiopathic pericarditis or myopericarditis (*International Classification of Diseases* codes 420, 422, 423, 429). We excluded patients with an underlying etiology for pericarditis or myopericarditis, among them 21 patients with malignancy, 12 with autoimmune disease exacerbation, 1 with active tuberculosis infection, 5 with status post-myocardial infarction, and 25 with status postprocedural intervention, leaving a total of 200 patients in our cohort (Fig. 1).

The diagnosis of acute pericarditis was made according to the 2015 European guidelines [13], which require 2 of the following clinical criteria: pericarditic chest pain, pericardial rubs, new widespread ST-elevation or PR depression, or pericardial effusion (new or worsening). Additional supporting findings were evaluated as well, including inflammatory markers (white blood cells, C-reactive protein), chest x-ray, and echocardiography. A diagnosis of idiopathic pericarditis was made when no specific cause could be found with routine diagnostic testing, including immunology and viral panel [14]. The term *myopericarditis* indicates a primarily pericarditic syndrome with minor myocardial involvement, which describes most of combined pericarditis and myocarditis cases encountered in clinical practice [13]. The diagnosis of myopericarditis was established if the patient fulfilled the definite diagnosis of acute pericarditis and showed biochemical evidence of myonecrosis (abnormal levels of ultra-high-sensitive troponin >0.05 ng/mL or creatine kinase >174 U/L [7,13]).

Sex differences were evaluated for prevalence, duration of hospitalization, clinical presentation, laboratory results, electrocardiographic changes, echocardiography findings, in-hospital management (type of imaging, what department were they treated in), type of treatment, in-hospital complications, and in-hospital mortality.

The study was approved by the institutional ethics committee.

**Table 1**  
Baseline characteristics

Variable	Male (n = 145)	Female (n = 55)	P
Age (y), mean ± SD	46 ± 19	60 ± 19	<.001
History of smoking, n (%)	46 (32)	13 (24)	.263
Hypertension, n (%)	29 (20)	19 (34)	.032
Hyperlipidemia, n (%)	24 (17)	17 (31)	.025
Diabetes mellitus, n (%)	12 (8)	10 (18)	.046
Ischemic heart disease, n (%)	14 (10)	5 (9)	.903
Congestive heart failure, n (%)	4 (3)	1 (2)	.699
Valvular disease, n (%)	2 (1)	0 (0)	.381
Permanent pacemaker, n (%)	3 (2)	1 (2)	.910
History of atrial fibrillation, n (%)	5 (3)	4 (7)	.244
History of Stroke, n (%)	6 (4)	3 (5)	.688
History of pericarditis, n (%)	10 (7)	3 (5)	.712

### 2.2. Statistical analysis

All data were summarized and displayed as mean ± SD for continuous variables and as number (percentage) of patients in each group for categorical variables. The *P* values for the categorical variables were calculated with the  $\chi^2$  test. Continuous variables were compared using the independent-sample *t* test or Mann-Whitney tests as appropriate and not an analysis of variance testing for which the Bonferroni correction is used. Therefore, we did not add the Bonferroni correction. We analyzed the whole cohort and then conducted a subgroup analysis only on troponin-positive patients (myopericarditis) for sex differences. A 2-tailed *P* value less than .05 was considered significant for all analyses. All analyses were performed with the SPSS software (SPSS Inc, Chicago, IL).

## 3. Results

### 3.1. Baseline Characteristics

The study population included 200 consecutive patients (Fig. 1), of whom 55 (27%) were female. Baseline characteristics of the patient population are presented in Table 1.

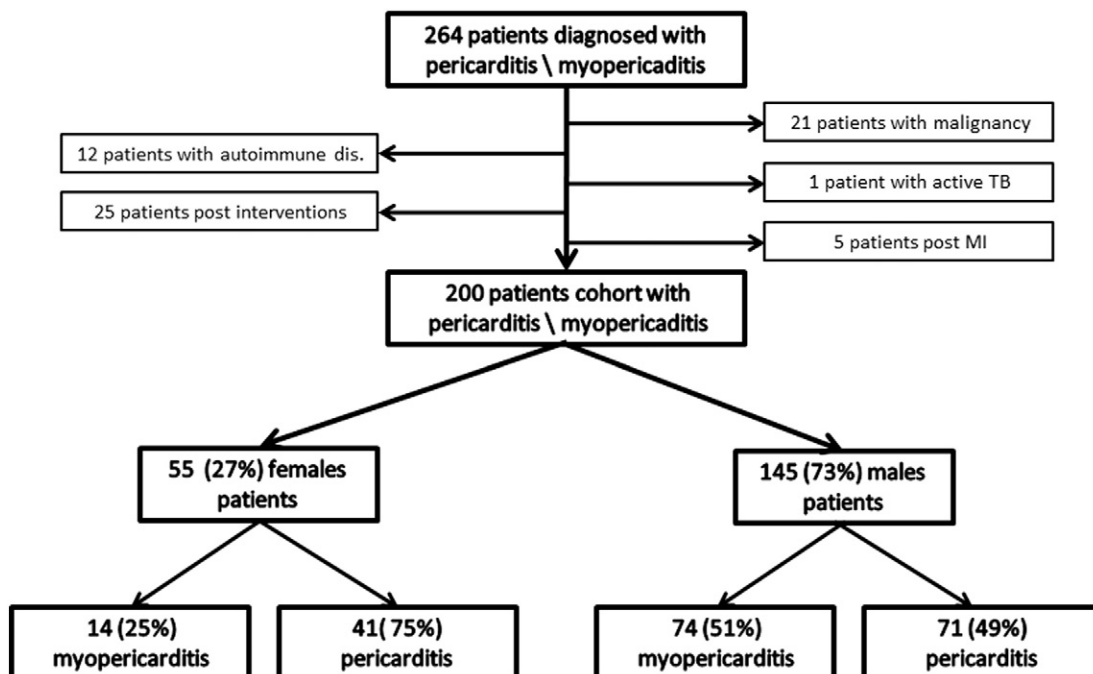


Fig. 1. Flowchart of the study design.

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