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A Study of Etiology and Clinical Presentation of Pericardial Diseases in Adults

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Abstract

Pericardial diseases represent an important subset of cardiovascular disorders with diverse etiologies and variable clinical presentations. Despite advancements in diagnostic and therapeutic approaches, there remains limited region-specific data linking etiology with clinical manifestations and outcomes. To evaluate the etiological factors, clinical presentation, and association between etiology and disease types in adult patients with pericardial diseases. A retrospective observational study was conducted at a tertiary care hospital involving 80 adult patients diagnosed with pericardial diseases. Data were collected from hospital records, including demographic details, etiological factors, clinical features, and diagnostic findings. Descriptive and inferential statistical analyses were performed, and results were presented using tables. Acute pericarditis was the most common condition, followed by pericardial effusion. Idiopathic and infectious causes were the predominant etiologies. The most frequent clinical symptoms were dyspnea and chest pain, with systemic features such as fever and fatigue observed mainly in infectious cases. Diagnostic evaluation showed moderate pericardial effusion as the most common echocardiographic finding. No statistically significant association was found between disease type and etiology ($p = 0.632$). Clinical outcomes were generally favorable, with most patients recovering or improving during hospitalization. Pericardial diseases exhibit diverse etiologies and clinical presentations, with idiopathic and infectious causes predominating. Early diagnosis and appropriate management contribute to favorable outcomes, emphasizing the importance of comprehensive clinical evaluation.

Keywords: Pericardial diseases, Pericarditis, Etiology, Clinical presentation, Pericardial effusion

1. Introduction

Pericardial diseases are an important group of cardiovascular disorders, which include a continuum of diseases that cause problems with the pericardium, the fibrous sack around the heart. These conditions are of a relatively benign and self-limiting nature as well as life-threatening emergencies that need immediate intervention. The most frequent types are acute and chronic pericarditis, pericardial effusion, cardiac tamponade, and constrictive pericarditis, which have different pathophysiological processes and clinical consequences (Burazor et al., 2018). Pericardial participation can be the result of diverse etiological causes such as infections, autoimmune diseases, malignancies, and systemic diseases, which indicate the complexity of the diseases in question (Caforio et al., 2017). Improvements in the techniques of diagnosing imaging and treatment have improved the management and diagnosis of diseases involving the pericardium. Techniques such as echocardiography, CT scanning, and cardiac MRI play an important role in identifying structural abnormalities and guiding therapy (Chetrit et al., 2020). Nevertheless, the clinical manifestation of pericardial diseases is very unpredictable and may be determined by the etiology and the severity of the disease. The symptoms of chest pain, dyspnea, fatigue, and fever can be observed in the patients and they may be confused with other cardiovascular and system disorders (Collini et al., 2024). Pericarditis, which is one of the most common pericardial diseases, is inflammation of the pericardium and can occur on an acute or chronic basis. However, early identification and proper risk stratification will help avoid such complications as cardiac tamponade or the development of constrictive pericarditis (Cremer et al., 2024). The relationship between infectious diseases, such as viral infections such as COVID-19, and the emergence of pericardial involvement has also been mentioned in recent research, more broadening the clinical spectrum of such conditions (Dimopoulou et al., 2021; Furqan et al., 2021).

Etiologies, especially bacterial ones, may result in severe types of pericardial disease with high morbidity and mortality in case of untimely treatment (Galar et al., 2019). Also, systemic diseases like amyloidosis can engage the pericardium, which leads to complicated clinical manifestations and difficulty in diagnosing them (Garcia-Pavia et al., 2021). Pericardial effusion has been shown to be one of the most frequent manifestations found in hospitals and may need in-depth analysis to identify the cause and manage it (Gupta et al., 2023). Due to this etiological and presentation diversity, it is essential to diagnose and intervene in due time to enhance patient outcomes.

Although the literature on pericardial diseases has increased, there are still some gaps in the literature on the epidemiology and clinical manifestation of the pericardial diseases. There is an emerging evidence that pericardial involvement can be affected by cardiovascular complications related to such conditions as long COVID, but extensive data about these relationships have not been collected yet (Gyöngyösi et al., 2023). Moreover, although the etiology and clinical course of pericardial effusion have been described individually, there is no unified data of various populations and healthcare environments (Hori et al., 2024).

The inconsistency of clinical manifestation in different populations is another problem. Systemic inflammatory diseases, e.g., adult-onset Still's disease, may involve the pericardium, although the clinical picture may vary widely based on the demographic and geographical factors (Hu et al., 2019). Additionally, the less frequent pericardial disorders such as pericardial cysts are traditionally underreported which results in the gaps in the overall perception of pericardial pathologies (Khayata et al., 2019). Despite the recent progress in multimodality imaging, there is still a requirement of combined data between etiology and clinical presentation and outcomes (Klein et al., 2024).

Due to the gaps in the literature, the studies that offer the real-life clinical data on pericardial diseases, especially in the hospital environment, are clearly needed. This data can help to deepen the understanding of disease trends, diagnose it earlier, and manage patients better (Maisch, 2025). The variation in the causes and prevalence of pericardial diseases has been shown in epidemiological studies in various regions, highlighting the need to conduct region-specific studies (Noubiap et al., 2019).Moreover, the systematic reviews of infectious pericarditis have pointed to the necessity to better identify clinical manifestations and respond to them in time to minimize complications (Radovanovic et al., 2022). The current influence of global health issues, including COVID-19, further highlights the significance of comprehending cardiovascular presentations, including pericardial involvement, in various patient groups (Sattar et al., 2020). Thus, the proposed study will give in-depth information about the etiology and the clinical manifestation of the pericardial diseases in adults, which will help in enhancing diagnostic and treatment methods.

Research Objectives

- To identify the etiological factors of pericardial diseases in adults.
- To evaluate the clinical presentation of patients with pericardial diseases.
- To analyze the association between etiology and clinical features.

2. Methodology

2.1 Study Design and Setting

This research was done as a retrospective observational study in a tertiary care hospital which is a referral center in cardiovascular diseases, which has advanced diagnostic facilities such as echocardiography and electrocardiography. The retrospective design provided the opportunity to evaluate the existing clinical data consecutively registered over a certain time, which made it possible to identify trends in the etiology and clinical manifestation of pericardial diseases without access to patients.

2.2 Study Population and Sample Size

The population was composed of adult patients aged 18 years or older with a diagnosis of pericardial diseases which include acute pericarditis, pericardial effusion, cardiac tamponade, and constrictive pericarditis. Hospital medical records were used to identify patients due to established clinical and diagnostic criteria. The study involved a total of 80 patients who were chosen on the basis of what was considered to be sufficient to do a descriptive analysis, availability of complete and reliable medical records in the study period.

2.3 Inclusion and Exclusion Criteria

The inclusion criteria were that patients had a proven diagnosis of pericardial disease with the help of clinical examination and diagnostic tests and that they possessed full medical records with appropriate demographic, clinical and diagnostic data. Patients were not included in case their records were not complete or did not contain the necessary data, and in case they were pediatric patients (under 18 years old).

2.4 Data Collection

The retrospective data collection was done through the hospital medical records and patient case files in a structured format to ensure uniformity. Variables observed were demographic data (age, gender), etiology (infectious, idiopathic, malignancy-related, autoimmune, post-surgical, etc.), clinical data (chest pain, dyspnea, fever, fatigue, palpitations), and diagnostic data (echocardiographic evaluation of pericardial effusion and electrocardiographic changes). To preserve confidentiality, all patient data were anonym

2.5 Statistical Analysis

Data collected were formatted and processed with descriptive statistics. The ranges or averages were used to summarize continuous variables where necessary, and frequencies and percentages were used to depict the categorical variables. The findings were summarized in tables and figures to ensure easy interpretation since the main purpose of the research was to conduct a descriptive analysis.

3. Results

3.1 Demographic Characteristics

A total of 80 adult patients with pericardial diseases were included in the study. Based on the age structure, the age group of the middle-aged (3150 years) was the most prevalent, but younger and older people were also well represented, which underlines the fact that pericardial diseases occur across the wide age span. The male bias was also minimal and the overall gender distribution was fairly equal. This suggests that pericardial disorders do not affect one specific population and have significant clinical importance in both sexes and at different ages (Table 1).

Table 1. Demographic characteristics of patients (n = 80)

Variable	Frequency	Percentage
Age Group (years)		
18–30	21	26.2%
31–50	25	31.2%
51–65	18	22.5%
>65	16	20.0%
Gender		
Male	45	56.2%
Female	35	43.8%

3.2 Distribution of Pericardial Diseases and Etiology

The most frequent type of pericardial diseases included acute pericarditis and pericardial effusion with relatively rare instances of cardiac tamponade and constrictive pericarditis. From the perspective of their causative agents, idiopathic and infectious ones dominated, which indicates that a large proportion of cases either lack an apparent cause or relate to the infectious etiology. The cases of malignancy, autoimmune conditions, and post-surgical causes, on the other hand, were relatively rare (Figure 1).

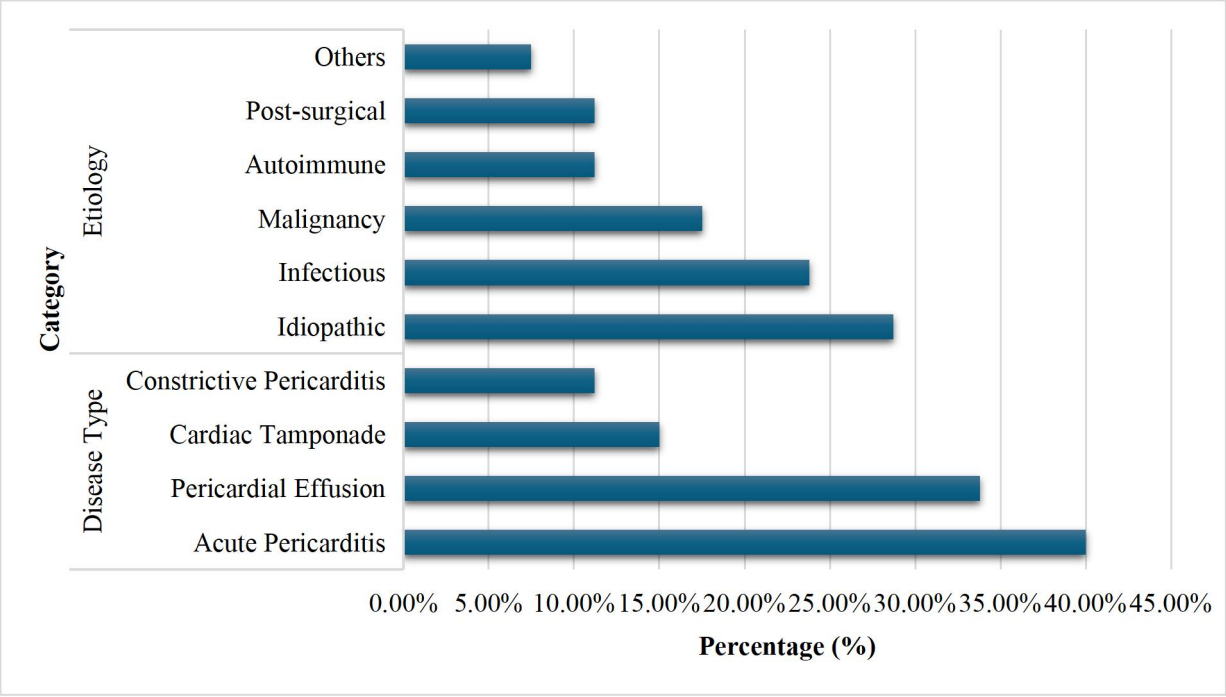

Figure 1. Distribution of Pericardial Disease Types and Etiological Factors

3.3 Clinical Presentation

Cardiopulmonary symptoms predominated the clinical presentation with the most common complaints being dyspnea and chest pain as a result of the physiological effects of the pericardial inflammation and fluid accumulation on cardiac functioning. The presence of such symptoms like fatigue and fever also pointed to the involvement of the system and inflammatory processes, especially in those cases where the etiology is infectious. Conversely, palpitations were less frequently noted, and it is possible that rhythm disorders were not the main manifestation. Interestingly, infectious and inflammatory etiologies were more likely to be manifested more frequently with systemic symptoms like fever and fatigue, and idiopathic cases tended to be represented by non-specific cardiopulmonary complaints (Table 2).

Table 2. Clinical features of patients

Clinical Feature	Frequency	Percentage
Dyspnea	54	67.5%
Chest Pain	52	65.0%
Fatigue	49	61.3%
Fever	37	46.2%
Palpitations	29	36.2%

3.4 Diagnostic Findings

Diagnostic assessment showed inconsistent results of echocardiographic and electrocardiographic. The most frequent echocardiographic findings were moderate pericardial effusion, which meant that a significant proportion of patients went to clinics with fluid accumulation that could be detected but without severe cases. The fact that mild and severe effusions are present indicates a great range of severity of the disease. Electrocardiographic changes were also heterogeneous with non-specific changes being the most common, then came the ST elevation, which is usually a characteristic of inflammatory diseases like acute pericarditis. These results indicate the need to combine imaging and electrocardiographic data to diagnose and determine the degree of the disease (Figure 2).

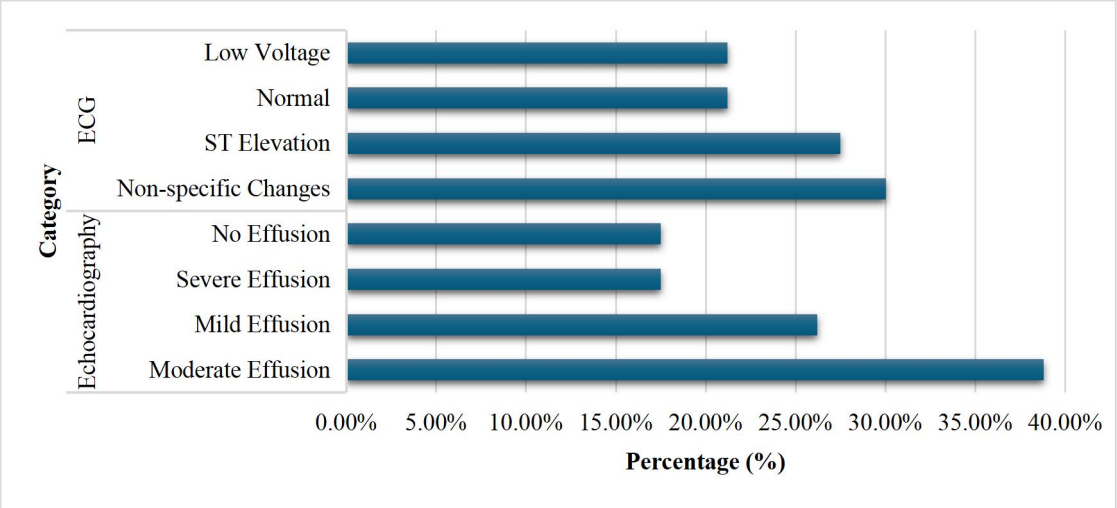

Figure 2. Diagnostic findings (Echocardiography and ECG)

3.5 Association Between Disease Type and Etiology

Chi-square analysis showed no statistically significant difference in disease type and etiology, indicating that etiological factors are spread rather uniformly across the various types of pericardial disease. Despite some descriptive trends, e.g., an increased prevalence of infectious and idiopathic causes of acute pericarditis and a relatively larger role of malignancy in constrictive pericarditis, were statistically non-significant. This implies that there are several etiological factors that interplay to cause pericardial diseases and not just a single one (Table 3).

Table 3. Association between disease type and etiological factors

Disease Type	Idiopathic	Infectious	Malignancy	Autoimmune	Post-surgical	Others
Acute Pericarditis	8	9	7	4	2	2
Pericardial Effusion	10	6	1	3	4	3
Cardiac Tamponade	3	1	2	2	1	1
Constrictive Pericarditis	2	3	4	0	2	0
χ^2	12.61					
p-value	0.632					

3.6 Clinical Outcome

The overall clinical outcome was positive, most patients showed recovery or improvement during their stay and only a few showed complication. More severely manifested patients, who have

advanced effusion or tamponade, were more likely to spend a relatively longer period in the hospital and have more complications. In general, these data indicate that early diagnosis and proper treatment have a positive prognosis in the short-term in the majority of pericardial disease cases (Figure 3).

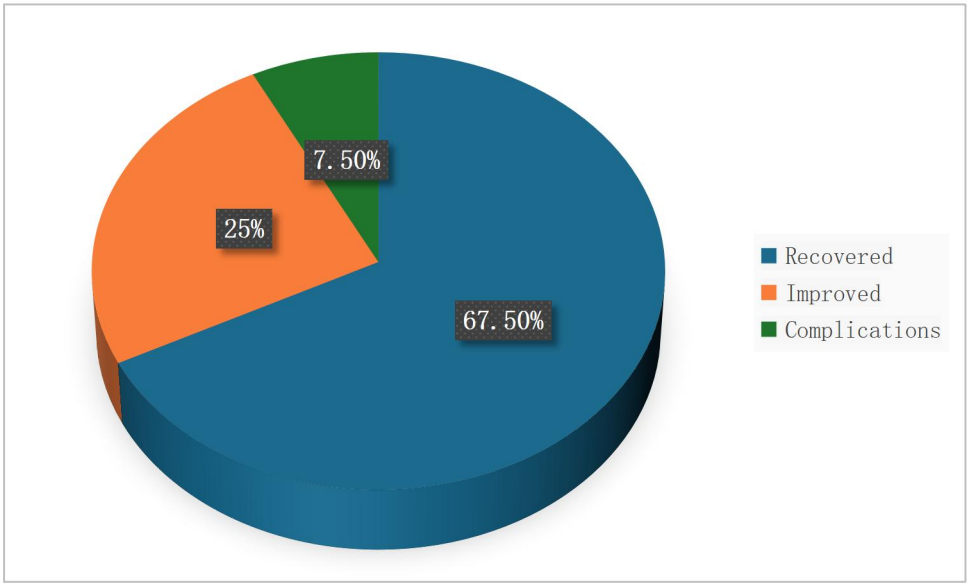

Figure 3. Clinical outcomes

3.7 Correlation Analysis

The results of the correlation analysis showed that the dyspnea and the severity of pericardial effusion are statistically significantly but weakly correlated, which means that the severity of symptoms is not necessarily directly related to the level of fluid retention and can be affected by other clinical variables. Conversely, the correlation between age and length of stay was weak and non-significant implying that age might not be a significant factor of length of stay in hospitals. The results underline the multifaceted nature of clinical variables and point to the idea that the manifestation and progression of a disease are affected by numerous interdependent factors (Table 4).

Table 4. Correlation analysis between clinical variables

Variables Compared	Correlation Coefficient (r)	p-value
Dyspnea vs Effusion Severity	-0.257	0.021
Age vs Hospital Stay	0.099	0.381

4. Discussion

The study gives a clear insight into the etiology and clinical manifestation of the pericardial diseases in an adult population served by a hospital. The results have shown that the pericardial diseases are mostly seen in middle aged people with slight predominance of males but the distribution is quite balanced as far as age and gender are concerned. Acute pericarditis was the most common clinical presentation, then pericardial effusion, and the less common but more serious forms of cardiac

tamponade and constrictive pericarditis occurred. Etiologically, the majority of cases were idiopathic and infectious, and this complexity and multifactoriality of the involvement of the pericardium. Cardiopulmonary symptoms were predominant and dyspnea and chest pain are typical of the physiological effects of pericardial inflammation and fluid buildup on cardiac functioning. These inflammatory nature of the conditions is further emphasized by the fact that systemic symptoms like fever and fatigue are present, particularly in infectious etiology. Interestingly, the paper failed to show statistically significant relationship between disease type and etiology implying that etiological factors are relatively well-balanced in various types of pericardial disease. Moreover, the correlation analysis has shown that dyspnea and the severity of effusion have a weak but statistically significant negative correlation, which may be explained by the fact that the symptom severity may not necessarily correlate with the extent of pericardial involvement since several interacting clinical variables are likely to be involved.

The results of the current study have similarities and differences with those of the earlier studies. One study by Strobbe et al. (2017) was found to have provided some similarity with the current results, namely idiopathic etiologies were predominant in patients undergoing pericardiocentesis, but malignancy was relatively low. Likewise, Vecchié et al. (2020) found that the most common clinical presentation was acute pericarditis, which justifies why this disease is predominant among the pericardial diseases today. Conversely, other studies that dwelled more on particular etiologies, including radiation-associated pericardial disease have highlighted the importance of therapeutic interventions in the development of the disease, which was not as evident in the current cohort (Szpakowski & Desai, 2019). Moreover, the pericardial pathology has been reported to be a part of the processes of systemic diseases, such as diabetic myocardial disorders, further supporting the multifactorial nature in the present study (Seferović et al., 2024). Past literature has also implicated infectious etiologies especially fungal and bacterial infections as a major cause of cardiac complications, which agrees with the role of infections in the current study (Thompson et al., 2023). Moreover, the flexibility of clinical manifestations in different patient groups, observed in other studies of diseases like the Kounis syndrome, is another reason to believe that the patterns of symptoms and etiological determinants observed in the given analysis are heterogeneous (Youcefi et al., 2024).

The findings of this study have important clinical implications. The overwhelming prevalence of idiopathic and infectious causes highlights the importance of careful diagnostic assessment that may aid in determining underlying etiologies and inform proper management. The variability in the clinical presentation highlights the importance of considering pericardial conditions in patients who demonstrate nonspecific signs of cardiopulmonary abnormalities, particularly in the hospital settings. Furthermore, the generally positive prognosis for the majority of the patients suggests that early diagnosis and appropriate treatment plan can have a great effect on the patient's outcome even when

the condition is moderately to severely advanced.

However, despite the contribution made by the study to the area, there are several issues regarding its methodology that should be considered. First of all, the retrospective design may limit the possibility of establishing causation and introduce the potential bias into the findings due to the use of only available medical records. Moreover, the limited number of participants included in the study can influence the application of the results of the analysis and the statistical significance of identifying the correlations between variables. Finally, the use of only one tertiary care center for conducting the study limits its representativeness and applicability to other settings and areas.

Future research on pericardial diseases should include more comprehensive investigations performed in multicenter settings to verify the results obtained and provide more insights into the characteristics of pericardial diseases among various populations. Prospective designs would be helpful in analyzing the causative associations and the progress of pericardial diseases. Research that aims at investigating the connection between a particular cause and patient outcomes and how new diagnostic approaches perform would be valuable in enhancing early detection and risk assessment. Furthermore, research assessing prognosis and recurrence rates would contribute significantly to pericardial diseases' management and outcomes.

5. Conclusion

This particular research is a significant addition to the etiology and symptoms of pericardial diseases in adults hospitalized. From the findings, it is clear that pericardial diseases affect not only people in different age groups but also have a slight male preference. However, what is more prominent is the occurrence of acute pericarditis, pericardial effusion, and other rare cases such as cardiac tamponade and constrictive pericarditis. Etiological findings reveal that idiopathic and infectious causative factors prevailed, hence pointing to the fact that pericardial diseases can be multifactorial in nature and can prove challenging to trace the exact underlying cause. Furthermore, the diseases had a combined cardiovascular, pulmonary, and inflammatory involvement characterized by respiratory difficulties, chest pains, fever, and fatigue. Interestingly, there was no statistically significant relation between the type and etiology of pericardial diseases. This implies that factors causing pericardial diseases are fairly equally distributed among all the different types of diseases. There is also a low correlation between clinical variables, making it evident that the manifestation of the disease is complex in nature and depends on multiple factors. Overall, the majority of patients experienced positive clinical outcomes, suggesting that early diagnosis and treatment are essential for optimal outcomes.

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