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# Frequency and etiology of pericardial effusion among patients with dyspnea presenting at emergency department

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**Abstract**---Aim: To determine the frequency and etiology of pericardial effusion among patients with dyspnea presenting at emergency department. Material and Methods: This retrospective observational study was carried out at emergency Department Hayatabad Medical Complex Peshawar from September 2022 to March 2023 on 120 patients. Patients having age more than 18 years presenting with dyspnea. The frequency and etiology of pericardial effusion were determined. Results: Mean age observed was 45.23±7.52 years. Pericardial effusion in our study was 15%. The most leading etiology found was para-pneumonic effusion 33.3%, renal failure 27.7%, and malignancy 22.2% while other factors 16.6%. Conclusion: we conclude that the frequency of pericardial effusion among patients presenting with dyspnea was 15%, the most common etiological

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factors identified were para-pneumonic effusion, renal failure and malignancy.

Keywords---Pericardial effusion, Etiology, Dyspnea.

### Introduction

Shortness of breath, or dyspnea, is a subjective experience that involves a variety of symptoms of varied intensity that collectively render breathing difficult. The major manifestation of cardiac, respiratory, neuromuscular, psychogenic, systemic, or any combination of these illnesses, it affects millions of individuals. Acute dyspnea lasts less than four weeks, while chronic dyspnea lasts longer than eight weeks <sup>1, 2</sup>.

The pericardial sac is made up of two layers: the thin, cell-layer-by-cell-layer visceral pericardium that adheres to the cardiac epicardium, and the thicker, collagen- and elastin-rich parietal pericardium that adheres to the lung diaphragm, sternum, blood vessels, and various other mediastinal organs surrounding the heart. The pericardial sac of a healthy person holds 15 mL to 50 mL of serous fluid <sup>3, 4</sup>.

Any age group or ethnicity might develop pericardial effusion. The most common cause of effusion can change depending on age, location, and co-morbidities. Pericardial effusion incidence and prevalence are poorly understood. The primary cause of effusion in the industrialized world is viral pericarditis. Mycobacterium tuberculosis causes a lot of pericardial effusion in underdeveloped countries. Causes by bacteria and parasites are unusual <sup>5-7</sup>.

Over a decade ago, it was revealed that emergency echocardiography might be used to quickly detect life-threatening conditions like cardiac tamponade in the ED setting <sup>8</sup>. A rapid assessment of the heart is a part of focused abdominal sonography after trauma (FAST). Effusions in the heart's chambers can be detected with an ultrasound examination in the emergency department (ED). Patients with pericardial effusions who do not receive immediate treatment are at high risk of an adverse outcome. In contrast, distended jugular veins, pulsusparadoxus, and electrical alternans typically manifest late in the disease's progression <sup>9, 10</sup>.

There could be a number of causes for a patient's dyspnea that necessitated a trip to the emergency room. Dyspnea is a common complaint heard by emergency physicians (EPs), and it can have many different causes. Some of these include reactive airway ailments, infections of the lungs, mental illness, cardiac disease, anemia, coronary artery disease, and pulmonary embolism. However, even if pathology is ruled out, some people still have a diagnosis of inexplicable dyspnea. Even if pericardial effusion seems unlikely to the EP, it should be investigated as a possible cause of the patient's unexplained dyspnea <sup>11, 12</sup>.

Pericardial effusion is a therapeutic condition described by the accumulation of fluid in the pericardial sac, which surrounds the heart. This state can vary in severity, fluctuating from asymptomatic cases to life-threatening circumstances where the accumulated fluid exerts pressure on the heart, impairing its ability to function properly. Understanding the frequency and causes of pericardial effusion is essential for clinical management, timely diagnosis, and effective treatment. This rationale aims to explore the importance of studying the frequency and underlying causes of pericardial effusion.

## Material and Methods

This retrospective observational study was carried out at Emergency Department Hayatabad Medical Complex Peshawar from September 2022 to March 2023 which is a tertiary care hospital. The study period spanned from September 2022 to March 2023. The study focused on patients with dyspnea. Data were collected from local records in the ward, specifically targeting patients above 18 years of age who had undergone physical examination and were diagnosed with dyspnea. Inclusion criteria encompassed individuals above 18 years old who exhibited dyspnea. Patients with incomplete records or those who were unavailable for follow-up were excluded from the analysis.

To compile the patients' information, a researcher-developed checklist was utilized. This checklist covered a range of variables, including demographic characteristics, common clinical symptoms, pericardial effusion and etiology of PE. The causes of pericardial effusion were categorized as para-pneumonic effusion, renal failure, malignancies, and other underlying factors. Cases with less than two instances were grouped as miscellaneous causes.

The study evaluated the presence or absence of Pericardial effusion, whether on one side or both sides, in conjunction with echocardiography results. Clinical symptoms were classified as either having an acute onset (within two weeks of initial symptoms) or a gradual onset.

Data were analyzed using the IBM SPSS 20. Continuous data like age was presented as mean and standard deviation while categorical data like gender, etiology, pericardial effusion and socioeconomic status was presented as frequencies, percentages and charts. Chi Square test was used for association keeping P value less than 0.05 as significant.

#### Results

This research was conducted on 120 patients. The mean age of the patients recorded was 45.23±7.52 years. We observed that the male patients were higher in frequency as compared to the female patients, male patients were 60% while female patients were 40%. Regarding the socioeconomic status we observed that 37.5% patients had a monthly income of more than 50000 Rs/month, about 35.8% patients had monthly income between 20000 to 50000 Rs/Month while 26.7% patients had income upto 20000 Rs/Month. The frequency of pericardial effusion in our study was 15%. The most leading etiology found was parapneumonic effusion which was observed in 33.3% patients, renal failure was observed in 27.7% patients, malignancy was found in 22.2% patients while other

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factors were found only in 16.6% patients. We observed no significant association between pericardial effusion and gender.

Figure 1 Gender distribution



Figure 2 Frequency of pericardial effusion

Etiological factor	Frequency	Percentage	
Para-pneumonic effusion	6	33.3	
Renal failure	5	27.7	
Malignancy	4	22.2	
Other	3	16.6	

## Table 1 Etiology of pericardial effusion

		Gender		Total	P value
		Male	Female		
Pericardial Effusion	Yes	11	7	18	0.91
		61.1%	38.9%	100.0%	
	No	61	41	102	
		59.8%	40.2%	100.0%	
Total		72	48	120	
		60.0%	40.0%	100.0%	

## Table 2 Association of pericardial effusion with gender

## Discussion

Pericardial effusion (PE) is associated with a range of underlying causes. The occurrence of idiopathic pericarditis contributes to a significant portion (37% to 68%) of hospitalizations for PEs or acute pericarditis.<sup>13</sup> Ordinarily, the pericardial sac contains below 50 ml of clear fluid, and any additional fluid buildup is considered pathological. Several underlying factors and medical conditions can trigger PE, with bacterial pericarditis being a significant contributor historically. hypothyroidism, Other triggers encompass chylous pericardium, and hemopericardium.<sup>14</sup>Additionally, PE can be prompted by autoimmune disorders, collagen-vascular ailments, radiation exposure, heart attacks, harmful substances, cancers, metastases, and kidney malfunction. Symptoms range from absent to severe, contingent upon the quantity and rate of fluid accumulation. Those experiencing symptoms might encounter breathlessness (dyspnea), discomfort when lying down (orthopnea), coughing, mild fever, palpitations, and chest pain typically centralized behind the breastbone or on the left side.<sup>15</sup>

Pericardial effusion can manifest across various age groups and populations. The primary cause of effusion varies based on demographic factors like age, location, and existing health conditions. Data on the occurrence and onset of pericardial effusions is limited.<sup>16</sup> Viral pericarditis leading to effusion is prevalent in developed nations. In less developed regions, pericardial effusion attributed to Mycobacterium tuberculosis is notably common. Bacterial and parasitic causes are less frequent. Regarding non-inflammatory cases, numerous malignant tumors can lead to pericardial effusion. Malignancy rates in patients with pericardial effusion range between 12% and 23%. In HIV patients, reported occurrences of pericardial effusion range from 5% to 43%, depending on study criteria, with 13% exhibiting moderate to severe effusion. In a study, post-cardiac surgery cases accounted for 54%, neoplasms for 13%, renal issues for 13%, while

idiopathic or viral pericarditis and rheumatologic causes each constituted 5% of underlying triggers for pericarditis and pericardial effusions.<sup>17</sup>

We conducted this study on 120 patients presenting with dyspnea. The patients belonged to the age group of 1 to 7 having mean age  $45.23\pm7.52$  years, we observed that the majority of the patients belonged to the male gender. The frequency of pericardial effusion in our study was 18 (15%), similar frequency has been reported by a study<sup>18</sup> which showed that 17% patients had pericardial effusion, and another study reported the prevalence of pericardial effusion 19.3% <sup>19</sup>.

Regarding the etiology of pericardial effusion we observed that the most common etiological factor was para-pneumonic effusion which was found in 6 patients out of 18 (33.3%), while renal failure was found in 5 patients out of 18 (27.7%), malignancy was found in 4 patients (22.2%) while other factors were found only in 3 patients (16.6%), a study reported that renal failure was the leading cause of pericardial effusion while para- pneumonic effusion was second leading cause in their study.<sup>20</sup>

## Conclusion

We found that the frequency of pericardial effusion among patients presenting with dyspnea was 15%, the most common etiological factors identified were parapneumonic effusion, renal failure and malignancy. As a catalyst for future research endeavors, these findings hold the promise of improving patient care, refining treatment algorithms, and ultimately advancing the understanding of pericardial effusion.

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