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INVESTIGATING THE VARIATIONS IN COMORBIDITIES AMONG PATIENTS WITH DHF ACCORDING TO OUTCOME AND GENDER

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ABSTRACT:

INTRODUCTION: When the heart cannot pump enough blood to meet the needs of the body, decompensated heart failure, or DHF, develops. Comorbidities, also known as co-morbid disorders, are common in DHF patients and may make therapy and recovery more difficult. The purpose of the research is to determine how comorbidities differ depending on a patient's gender and prognosis in decompensated heart failure (DHF).

METHODS: From November 2020 to December 2022, the cardiology department of Mayo Hospital, Lahore, performed comparative analytical research using both the OPD and Hospital Emergency. 252 individuals with decompensated heart failure (DHF) participated in the trial. The participants in this study were chosen by a sequential sampling process. Using a self-administered structured questionnaire, information on sociodemographic traits, comorbidities, and health outcomes was collected. The analysis of the data was done using SPSS version 26. Comorbidities depending on gender and result were compared using the chi-square test and Fisher's Exact test. The Fisher's Exact test confirmed the link between health and comorbidities outcomes. To validate the connection between family history and comorbidity, the Chi-square test was used. The Fisher's Exact test was used to examine the statistical relationship between smoking and comorbidity. The significance level was set at p 0.05.

RESULTS: Overall, there were 252 patients with heart failure, 147 of whom were males and 105 of whom were women. The study subjects were 56.34±15.9 years old on average. The majority (48.4%) of our patients with heart failure were between the ages of 51 and 70. It was discovered that gender-based differences in all comorbid states were statistically negligible. A total of 207 patients had a variety of comorbidities, and of them, 74 (35.7%) had three or more. 103 individuals (49.7%) had ischemic heart disease; it was revealed. Diabetes was shown to have a statistically significant connection (p-value < 0.05)

with death in individuals with heart failure. However, there is no statistically significant correlation between the incidence of comorbid conditions and a family history of heart failure (p-value > 0.50).
CONCLUSION: Patients with heart failure who also have diabetes are more likely to have negative health consequences, thus they need to be closely watched. To prevent serious health repercussions, lifestyle variables should also be taken into account.
KEYWORDS: decompensated heart failure, comorbidities, heart failure
INTRODUCTION: In Pakistan in 2019, Non-Communicable Illnesses (NCDs), particularly cardiovascular diseases, showed an escalating trend. According to one study, one of the leading sources of disease burden in developing nations is coronary heart disease. Poor socioeconomic levels, sedentary lifestyles, and longer life expectancies are thought to be contributing factors to the rising incidence of heart disease in third-world countries. [1] Clinical and public health issues related to heart failure lead to significant mortality, morbidity, and healthcare costs, particularly for older people. [2] About 15 years ago, it was found that the risk of heart disease in Pakistan was the same for both sexes, with negligible variations in age groups. Except for those caused by secondary heart dysfunction, individuals with heart failure were found to exhibit the same symptoms as the initial presentation. [3] Coronary artery disease was shown to be strongly (p-value < 0.001) related to heart failure, followed by diabetes, hypertension, and obesity. [4] Breathing problems, exhaustion, and an aversion to physical activity are the main symptoms that seriously lower heart patients' quality of life. [5] The incidence and progress of heart failure across the world show various variances. [6] There have been significant reports of disparities between industrialized and underdeveloped countries' causes of heart failure. [7] Since the middle of the 1970s, there has been a notable drop in the mortality rate linked with heart illnesses as a result of a decline in risk factors and improved treatment options for cardiovascular problems. [8] According to reports, resource-constrained nations account for almost 80% of the worldwide burden of cardiovascular disease. However, it has been shown that heart failure patients all over the globe have a variety of comorbid conditions that should be wisely taken into account for the proper treatment of cardiac issues. [9] There is only a 50% chance of surviving one year of heart failure. [10] Despite the advancement of cardiac medicines, acute heart decompensating conditions are nevertheless known to be often recorded. [11]

The goal of the present study is to explore how gender variations in comorbidities affect heart failure patients who visited the cardiology department of Mayo Hospital, Lahore.

METHODS: Between November 2020 and December 2022, 252 patients with heart failure who were receiving care at the Cardiology Department of Mayo Hospital in Lahore underwent a comparative analytical study. This research was conducted using the STROBE checklist. Through successive non-probability sampling, 15 patients who were having consultations with cardiologists in the OPD or Emergency department were included in the research. The sample size was calculated using the WHO Sample Size Calculator with a 95% confidence interval, 80% power of the test, and an estimated population proportion of 8.2 in South Asian Regions. [12] A sample size of 116 was calculated. The availability of 252 suitable patients throughout two years was taken into consideration while selecting the sample size for the research. In the present research, decompensated heart failure is defined as decreased

heart function in blood ejection or retention that is predominantly caused by structural abnormalities and necessitates immediate therapeutic intervention. [13] Data on these individuals' sociodemographic traits, comorbidities, and health outcomes were gathered from them. The health result (living/dead) of patients exposed to different comorbid states was examined. By questioning the patients, a standardized questionnaire was created to collect all pertinent information. By obtaining the patients' or their guests' informed agreement before conducting the interviews, procedural bias was addressed in this research. The researcher completed the questionnaire. Because both men and women from lower socioeconomic groups used to use public sector tertiary healthcare, our study sample was representative of the whole population residing in Lahore and its vicinity. The data were analyzed using SPSS version 26. By using the chi-square test and Fisher's Exact test, comorbidities were statistically compared depending on gender and result. The Fisher's Exact test confirmed the link between health and comorbidities outcomes. To confirm the connection between family history and comorbidity, the chi-square test was used. The significance level was set at p-value ≤ 0.05.

RESULTS: About 147 (58.3%) of the 252 patients with heart failure who were recruited in this study were male, whereas 105 (41.7%) were female. A total of 137 respondents (66.3%) had no formal education, compared to 31 (15.1%) and 39 (9.9%) who had completed their elementary education and graduated. Only 1.6% of study participants had completed a degree, and 7.1% of patients had education only up to the intermediate level. The participants in the study had an average age of 56.34 and 15.9 years. Men and women with heart failure had mean ages that were statistically significantly different, as shown in Table 1 below. According to Figure 1, the majority (48.4%) of the study participants were between the ages of 51 and 70.

Table 1: Men and women with heart failure are diagnosed at different ages on average.

	Male	Female
Number	147	105
Average Age	58.6 ± 14.2	53.1 ± 17.1
p-value	0.006	

Our study's participants' mean time since being diagnosed with heart failure was found to be 2.92.74 years. Table 2 below shows how the study subjects' comorbid states varied based on gender.

There were 45 research participants, 26 of whom were men and 19 of whom were women, and none of them had any concomitant conditions. Approximately 60% of the research participants passed away while they were hospitalized. Table 3 presents an analysis of health outcomes for people with various comorbidities who have heart failure.

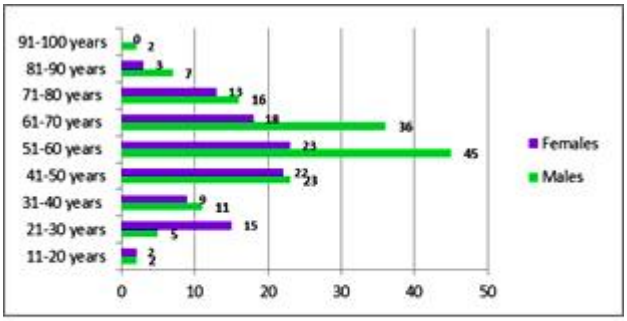

Figure 1: Age distribution of heart failure patients.

Table 2: Comparing comorbidity among individuals with heart failure according to gender.

	Comorbidity	Males (n = 147)		Females (n = 105)		Total patients with Comorbidities	p
		No	Yes	No	Yes		
Cardiovascular Comorbidities	VHD	135	12	94	11	23	> 0.25
	IHD	88	60	62	43	103	> 0.25
Non-Cardiovascular Comorbidities	Obesity	125	22	86	19	41	> 0.50
	Depression	145	2	105	0	2	0.522
	Dyslipidemia	129	18	94	11	29	> 0.25
	Dementia	146	1	105	0	1	12
	Cirrhosis	146	1	105	0	1	12
	Anaemia	136	11	98	7	18	> 0.80
	Cancer	145	2	104	1	3	12
	Atrial fibrillation	136	11	98	7	18	> 0.25
	COPD	128	19	99	6	25	> 0.05
	CKD	134	13	99	6	19	> 0.25
	Stroke	140	7	101	4	11	> 0.77
	Hypertension	122	25	82	23	48	> 0.25
	Diabetes	95	53	63	42	95	> 0.25

The majority of the 207 patients with heart failure who presented with a variety of comorbidities had three or more, as seen in Figure 2 below. Around 146 (70.5%) of the comorbid patients were between the

ages of 41 and 70, and 61 (16.9%) were over the age of 70. Only 12.6% of the participants in our study who were under 40 years old had comorbid states. Table 4 demonstrates the little correlation between comorbidity and health outcomes among heart failure patients.

Table 3: Comparison of health outcomes of coexisting conditions

Comorbidities	**Died (n=14)**	**Survived (n=238)**	**Total patients (n = 252)**	**p-value**
Obesity	0	41	41	0.132
Depression	0	2	2	12
Dyslipidemia	2	27	29	0.7
Dementia	0	1	1	12
Cirrhosis	0	1	1	12
Anaemia	0	18	18	0.612
Cancer	0	3	3	12
Atrial fibrillation	1	17	18	12
COPD	0	25	25	0.402
CKD	1	18	19	12
Stroke	1	10	11	0.502
Hypertension	3	45	48	0.732
Diabetes	9	86	95	< 0.05
VHD	1	22	23	12
IHD	6	97	103	> 0.90

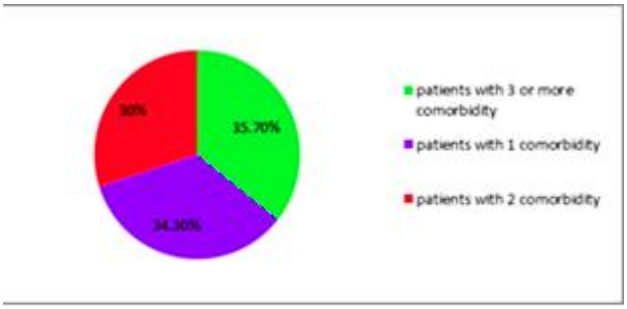

Figure 2: Frequency of comorbid states among heart failure patients.

Table 4: Heart failure patients' comorbidities and health outcomes are related.

	No	**Yes**	**Total**
Expired	1	13	14

Survived	44	194	238
Total	45	207	252

Table 5: Heart failure patients' comorbidity and family history are related

	No	**Yes**	**Total**
Negative	39	168	207
Positive	6	39	45
Total	45	207	252

A total of 14 fatalities among our heart failure patients were recorded; of those, 9 were found to be in the 51-70 age range, 2 in the 41-50 age range, 2 in the 71-80 range, and 1 in the 91-100 range. Heart failure sufferers totaling 8 men and 6 women passed away. Nearly 49.6% of men and 16.2% of women who had heart failure smoked. Only two of the 14 patients who died from heart failure had a favorable family history. Smoking was found to have a statistically insignificant association with the occurrence of comorbid states (p-value = 3.7). There were 17 female and 73 male smokers in the study. As shown in Table 5, the link between comorbidity and favorable family history among our heart failure patients appeared to be minimal.

DISCUSSIONS: Epidemiological transition is primarily responsible for the long-term change in the distribution of illnesses from infectious to non-communicable, notably heart-related disorders. Cardiovascular illnesses are thought to be the cause of 42% of fatalities in low- and middle-income nations. [14] According to a study between 1990 and 2020, the chance of cardiovascular disease will increase by 120% and 137%, respectively, for men and women living in developing countries. [15]

Approximately 35.3% and 48.4% of the patients in our research were between the ages of 51 and 70. The remaining patients were between the ages of 71 and 100. In contrast to the 9 patients who passed away, only 3 deaths among study participants older than 70 years old were reported.

Since over 70-year-old people account for 90% of heart failure-related deaths in our community, heart failure is commonly thought to affect the elderly. [16]

According to our research, the majority of patients in this age group with heart failure visit the hospital more frequently, which may be the cause of their higher mortality rates. For their medical consultations, patients over 70 years old may have gone to other cardiology hospitals. The fact that fewer heart failure patients in our sample were above 70 years old may be attributable to this.

Arrhythmia affected 7.1% of heart failure patients, and the majority (41%) had Ischemic heart disease as their primary diagnosis (IHD). In contrast to our results, another research discovered that arrhythmia and ischemia were present in 8.7% and 5.2%, respectively, of the cases with heart failure. [17] It is possible that the various sample sizes, research years, and hospital sectors are to blame for the stark variance in the frequency of concomitant comorbidities among hospitalized patients in twin cities. The doctors must, however, carefully take into account the co-existing heart diseases to fast turn around poor healthcare results.

In this study, it was discovered that older heart failure patients had more coexisting conditions than younger study participants. A similar study found that a higher percentage of elderly patients had comorbid conditions related to heart failure. [18] Longer life expectancy was highlighted in another study as one of the factors contributing to the rise in cardiovascular disease in our society. Additionally, it became clear that multi-comorbidity often coexists with heart failure in older people. [19] About 35.7% of the study participants in our study had three or more coexisting conditions. Another international study showed a fourfold increase in the correlation between heart disease and five or more comorbidities, but it also refuted the link to population aging. [20] A study highlighted the connection between multiple morbidities and heart failure as well as how they affect the prognosis of heart failure patients. [21] Cardiovascular diseases are the third most common cause of death for people over 35, according to the Centers for Disease Control (CDC). [22] In our study, there was a negligible (p-value < 0.50) correlation between the occurrence of comorbidity and family history in patients with heart failure. To understand the potential causes of the increased comorbidity among heart failure patients in our situation, it is necessary to analyze factors other than inheritance, such as lifestyle changes, through longitudinal studies.

73 men and 17 women out of the 252 study participants who were enrolled in the current study were smokers. Smoking appeared to have a negligible relationship (p-value = 3.7) with comorbidity in our patients with heart failure. Six and eight, respectively, of the 14 reported fatalities among study participants were smokers. Five of the six smokers were men. Men are at increased risk of coronary heart disease as a result of smoking, according to cohort research. [23] The daily active smoking habits of Canadian citizens also revealed a greater prevalence of cardiovascular ailments. [24] Similarly, it was shown that smoking had a favorable link with incident heart failure hospitalization. [25] To rule out the prevalence of related heart problems in society, factors such as duration, frequency, and type of smoking must be thoroughly investigated in addition to occupational exposure to smoke.

Out of the 252 patients with heart failure who were enrolled in the current study, only 14 (5.6%) deaths were reported. On the other hand, a global cohort study highlighted that heart failure was responsible for 33.2% of cardiovascular patients' fatalities. [26] The current study found a statistically significant association between diabetes and deaths among people with heart failure (p-value < 0.05). Similarly, a study revealed a statistically significant association between diabetes (p-value < 0.001) and poor health outcomes in heart failure patients, but in contrast to our findings, that study also revealed a statistically significant association between COPD, renal diseases, and anemia (p-value < 0.001) and fatality among heart failure cases. [27] This disparity between the two nations' results could be the result of different sociodemographic and cultural characteristics, which needs to be investigated in more comprehensive research. Heart failure appeared to have serious health effects across the board. [28] The current study's reporting of insignificant heart failure deaths could be the result of the small number of participants. Therefore, a large-scale study should be conducted to look for specific fatalities associated with different comorbid states in heart failure patients.

CONCLUSIONS: Patients with heart failure, especially those with diabetes, should be closely monitored by a cardiologist and other medical professionals to avoid life-threatening situations. To minimize

negative health effects, it is important to identify other risk factors in addition to smoking and family history.

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