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Original Article

Gender and Outcome Based Comparison of Comorbidities among Decompensated Heart Failure Patients Visiting Cardiology Department of Benazir Bhutto Hospital, Rawalpindi

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Abstract

Objective: To determine the gender and outcome based differences of comorbidities among the decompensated heart failure patients.
Study type, settings & duration: A comparative analytical study was conducted at Cardiology department of Benazir Bhutto Hospital, Rawalpindi both through Out Patient Department (OPD) and Hospital Emergency from February 2018 to March 2020.
Methodology: The study was carried out among 252 decompensated heart failure patients. The subjects were enrolled in this research through consecutive sampling. The data was gathered pertinent to socio-demographic characteristics, comorbidities and health outcomes by means of self-administered structured questionnaire. The data analysis was done by using SPSS version 25.0. Gender and outcome based comparison of comorbidities was carried out by application of chi-square test and Fisher's Exact test. Association between comorbidities and health outcome was verified by Fisher's Exact test. Chi-square test was applied to confirm association between comorbidity and family history. Statistical association of smoking with comorbidity was determined by Fisher's Exact test. The $p \leq 0.05$ was taken as significant.
Results: Of the total 252 heart failure patients, 147 were males and 105 were females. Mean age of our study subjects was 56.34±15.9 years. Majority (48.4%) of our heart failure patients were 51-70 years old. Gender based variations in all comorbid states were found to be statistically insignificant. About 207 patients had diverse comorbidities and among them, 74 (35.7%) had 3 or more comorbid states. Ischemic heart disease was reported among 103(49.7%) patients. Diabetes among heart failure patients was determined to have statistically significant association (p <0.05) with mortality. However, family history of heart failure established insignificant association (p >0.50) with occurrence of comorbid states.
Conclusion: Heart failure especially coupled with diabetes is prone to adverse health outcomes so such patients should be rigorously monitored. Life style factors should also be given due consideration to avoid grave health consequences.
Key words: Heart failure, comorbidities, gender, outcome, cardiology, ischemic heart disease, diabetes.

Introduction

Non-Communicable Diseases (NCDs) primarily cardiovascular diseases illustrated escalated trend in Pakistan during 2019.[1] Coronary heart diseases are reported to be one of the eminent causes of disease burden in under developed countries. The mounting load of heart diseases among third world nation is attributed to poor socioeconomic status, sedentary life styles and higher life expectancy.[2] Considerable mortality, morbidity and healthcare expenditures specifically

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Authors Contribution

ISA & TN conceptualized the project. ISA & GA did the data collection. RS & MSA did the literature search. RS & NSQ performed the statistical analysis. Drafting, revision & writing of manuscript were also done by ISA & RS.

among elders result from clinical and public health problems linked with heart failure.[3]

The risk of heart diseases in Pakistan about 15 years back was determined to be equal for both genders with insignificant differences among age groups.[4] Heart failure patients were determined to have same symptoms with primary manifestation apart from those resulting secondary to heart dysfunctioning.[5] Heart failure was found to be strongly associated (p <0.001) with coronary artery disease followed by diabetes, obesity and hypertension.[6] Difficulty in breathing, fatigue and exercise intolerance are the prime symptoms that significantly deteriorate the quality of life of heart patients.[7]

Worldwide trend and incidence of heart failure illustrate diverse variations.[8] Considerable differences have been reported with respect to the causes of heart failure among industrialized and developing nations.[9] Since mid-1970s the mortality rate associated with heart diseases has been remarkably reduced due to decline in risk factors and better treatment modalities for cardiovascular disorders.[10] About 80% of cardiovascular disease burden is reportedly globally in resource limited countries.[11] However, patients of heart failure across the world are determined to have many comorbid states that should be intelligently catered for appropriate management of heart problems.[12] One year survival with New York Heart Association (NYHA) IV heart failure is determined to be only 50%.[13] Despite the advent of cardiac interventions, acute heart decompensating situations are still known to be frequently reported.[14]

The present study is therefore intended to scrutinize the gender and outcome based difference in comorbidities among heart failure patients who visited Cardiology department of Benazir Bhutto Hospital Rawalpindi.

Methodology

A comparative analytical research was conducted among 252 heart failure patients who were treated at Cardiology department of Benazir Bhutto Hospital, Rawalpindi from February 2018 to March 2020. This study was carried out in accordance with STROBE checklist.[15] Patients having consultation with cardiologist via OPD or Emergency department were enrolled in the study through consecutive non- probability sampling. Sample size was calculated through WHO sample size calculator by taking 95% Confidence interval, 80% power of test and estimated population proportion of 8.2 in South Asian Regions.[16] Calculated sample size was 116. Keeping in view the availability of around 252 eligible patients during 2 years period, this much sample was included in the study. Decompensated heart failure in current study refers to diminished heart functioning with respect to ejection or retention of blood in it that is primarily attributed to its structural variations that calls for instantaneous therapeutic intervention.[17] The data was collected from these patients regarding their socio-demographic characteristics, comorbidities and health outcomes. Patient exposed to various comorbid states were analyzed with respect to their health outcome (living/ dead). A structured questionnaire was designed to gather all relevant data by interviewing the patients. Procedural bias in this study was eliminated by taking informed consent from the patients or their attendants before interviewing. The questionnaire was filled by the researcher. Our study sample comprised of both males and females who being of low social class used to avail the public sector tertiary healthcare facility and hence was representative of the general population residing in Rawalpindi and its vicinity. The data was analyzed by SPSS version 25.0. Gender and outcome based comparison of comorbidities was done statistically by application of chi-square test and Fisher's Exact test. Association between comorbidities and health outcome was validated by Fisher's Exact test. Chi-square test was applied to verify the association between comorbidity and family history. The $p \leq 0.05$ was considered as significant.

The Ethical approval was obtained from Research and Ethical Committee of Rawalpindi Medical University & Allied Hospitals, Rawalpindi.

Results

Of the total 252 heart failure patients enrolled in this research, about 147 (58.3%) were males while 105 (41.7%) patients were females. About 137 (66.3%) were uneducated while 31 (15.1%) and 39 (9.9%) respondents were educated up to primary level and matriculation. About 7.1% patients were educated up to intermediate level and only 1.6% of study subjects had done graduation. Mean age of the study participants was found to be 56.34±15.9 years. Statistically significant difference was observed in mean age of male and female heart failure patients as illustrated below in Table-1. Most (48.4%) of our study subjects were in 51-70 years age group as illustrated in Figure-1.

Mean duration of heart failure diagnosis among our study subjects was determined to be 2.9±2.74 years. Gender based differences in comorbid states among the study subjects are reflected below in Table-2.

Table 1: Difference in mean age of males and females diagnosed with heart failure.

Mean age of heart failure patients (n = 252)		*p-value*
Males (n = 147)	*Females (n = 105)*	
58.6 ± 14.2 years	53.1 ± 17.1 years	0.006

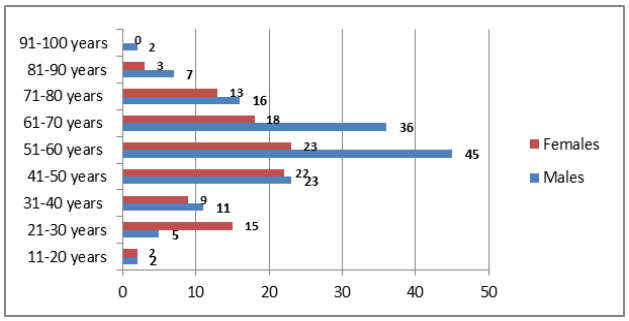

Figure 1: Age distribution of heart failure patients.

The 45 study subjects did not have any comorbidity and among them 26 and 19 were males and females respectively. Around 60% of the study subjects died during their hospital stay. Analysis of health outcome among heart failure patients with diverse comorbidities presented in Table-3.

Out of 207 heart failure patients presenting with diverse comorbidities, most of them had 3 or more comorbid states as illustrated below in Figure-2.

Among comorbid patients, around 146 (70.5%) patients were 41-70 years old and 61 (16.9%) subjects older than 70 years. Only 12.6% of our study participants up to 40 years age had comorbid states. Comorbidity among heart failure patients had insignificant association with health outcome as reflected in Table-4.

Out of total 14 deaths reported among our heart failure patients, 9 were determined to be in 51-70 years age group, 2 in 41-50 years of age, 2 in 71-80 and 1 in 91-100 years age bracket. Total 8 male and 6 female heart failure patients were expired. About 49.6% males and 16.2% females with heart failure were smokers. Of the total 14 expired heart failure patients, only 02 had positive family history. Statistically insignificant association (*p*-value =3.7) was established between smoking and occurrence of comorbid states. About 73 males and 17 females were indulged in the habit of smoking. Comorbidity among our heart failure patients seemed to have insignificant association with positive family history as mentioned in Table-5.

Discussion

Long term shift in illness pattern from infectious ailments to non-communicable diseases particularly heart related diseases are chiefly attributed to epidemiological transition. Approximately 42% deaths in low and middle income countries result from cardiovascular diseases.[18] A research by Leeder S et al revealed that risk of coronary heart diseases would augment by 120% and 137% among women and men respectively during 1990-2020 in developing regions of the world.[19]

Around 35.3% and 48.4% patients in our study were up to 50 years and 51-70 years old respectively. Rest of the patients was in 71-100 years age bracket. Only 3 deaths were reported among study subjects who were older than 70 years while 9 expiring patients were 51-70 years old.

Table 2: Gender based comparison of comorbidity among heart failure patients. (n = 252)

Cardiovascular Comorbidities	*Comorbidity*	*Males (n = 147)*		*Females (n = 105)*		*Total with Comorbidities*	*p - value*
		Yes	*No*	*Yes*	*No*		
Non-Cardiovascular Comorbidities	IHD	60	88	43	62	103	> 0.25[1]
	VHD	12	135	11	94	23	> 0.25[1]
	Diabetes	53	95	42	63	95	> 0.25[1]
	Hypertension	25	122	23	82	48	> 0.25[1]
	Stroke	07	140	04	101	11	> 0.77[2]
	CKD	13	134	06	99	19	> 0.25[1]
	COPD	19	128	06	99	25	> 0.05[1]
	Atrial fibrillation	11	136	07	98	18	> 0.25[1]
	Cancer	02	145	01	104	03	= 01[2]
	Anaemia	11	136	07	98	18	> 0.80[1]
	Cirrhosis	01	146	0	105	01	= 01[2]
	Dementia	01	146	0	105	01	= 01[2]
	Dyslipidemia	18	129	11	94	29	> 0.25[1]
	Depression	02	145	0	105	02	= 0.52[2]
	Obesity	22	125	19	86	41	> 0.50[1]

[1]. Chi-square test, [2]. Fisher's Exact test

Table 3: Comparison of health outcome in association with comorbid states. (n = 252)

Comorbidities	*Total patients (n = 252)*	*Survived (n=238)*	*Died (n=14)*	*p- value*
IHD	103	97	06	> 0.90[1]
VHD	23	22	01	= 1[2]
Diabetes	95	86	09	< 0.05[1]
Hypertension	48	45	03	= 0.73[2]
Stroke	11	10	01	= 0.50[2]
CKD	19	18	01	= 1[2]
COPD	25	25	0	= 0.40[2]
Atrial fibrillation	18	17	01	= 1[2]
Cancer	03	03	0	= 1[2]
Anaemia	18	18	0	= 0.61[2]
Cirrhosis	01	01	0	= 1[2]
Dementia	01	01	0	= 1[2]
Dyslipidemia	29	27	02	= 0.70
Depression	02	02	0	= 1[2]
Obesity	41	41	0	= 0.13[2]

[1]. Chi-square test, [2]. Fisher's Exact test

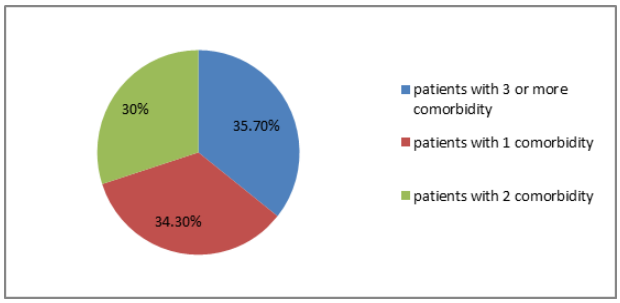

Figure 2: Frequency of comorbid states among heart failure patients. (n = 207)

Table 4: Association of comorbidity among heart failure patients with their health outcome. (n = 252)

Comorbidity	*Health outcome*		*Total*
	Survived & Discharged	*Expired*	
Yes	194	13	207
No	44	01	45
Total	238	14	252
	Fisher's Exact Test	$p = 0.50$	

Table 5: Association of Comorbidity among heart failure patients with family history. (n = 252)

Comorbidity	*Family History*		*Total*
	Positive	*Negative*	
Yes	39	168	207
No	06	39	45
Total	45	207	252
	Chi-square test	$p < 0.50$	

Heart failure in our community is professed as the malady of elderly population primarily due to attribution of about 90% of the resultant deaths to over 70 years age.[20] The higher mortality among 51-70 years aged heart failure patients in our research might be reported due to hospital visit of majority of this age group of patients. The patients above 70 years might have visited other cardiology hospitals for their health care consultation. This could be the reason for having fewer fractions of heart failure cases in our study that are above 70 years of age.

About 7.1% of heart failure patients were having arrhythmia and most (41%) were diagnosed with Ischemic heart disease (IHD). Contrary to our results, a national study was conducted among Cardiology unit patients of PIMS Islamabad during 2016 revealed arrhythmia and ischemia among 8.7% and 5.2% of the heart failure cases respectively.[14] This much difference in the frequency of accompanying comorbidities among patients admitting in hospitals of twin cities might be due to the difference in sample size, year of study and hospital sector (public or semi-public). However, the co-existing cardiac ailments also need thoughtfulness of the specialists for prompt reversal of poor healthcare outcomes.

In this study, older heart failure patients were found to be suffering from more comorbid states as compared to younger study participants. Likewise a study by Braunstein JB et al, revealed increased proportion of elders presenting with comorbid states associated with heart failure.[21] Another research by Rahimi K et al, emphasized on longer life expectancy as one of the factors for increased incidence of cardiovascular diseases in our society. Moreover, it also became evident that heart failure among elders is coupled with multi-comorbidity.[22] In our study, about 35.7% study subjects had three or more comorbid states. Another international research illustrated 4 times increase in the association of heart diseases with 5 or more comorbidities but at the same time its relationship with population aging was negated.[23] A research among Swedish heart failure patients pointed out not only the relationship of heart failure with multi-morbidities but also their impact on the prognosis of heart failure patients.[24] According to Centre for Disease Control (CDC), cardiovascular disorders constitute the third leading cause of mortality among people older than 35 years age.[25] In our research occurrence of comorbidity among heart failure patients showed insignificant association ($p < 0.50$) with family history. There is need to analyze the factors other than inheritance like life style changes by longitudinal studies that might be responsible for increased comorbidity among heart failure patients in our scenario.

Out of total 252 study subjects enrolled in current study, 73 males and 17 females were smokers. Smoking seemed to be insignificantly

associated (p =3.7) with comorbidity among our heart failure patients. Of the total, 14 fatalities reported among study participants, 6 and 8 were smokers and non-smokers respectively. Among 6 smokers, 5 were males. A cohort study among urban Eastern Mediterranean populates during 2019 concluded that males are at escalated risk of coronary heart disease due to smoking.[26] Similarly daily active smoking among canadian inhabitants elucidated higher incidence of cardiovascular diseases.[27] Likewise cigarette smoking was determined to have positive relationship with incident heart failure hospitalization in Jackson Heart study.[28] Duration, frequency and type of smoking need thorough exploration apart from occupational exposure to smoke in order to rule out the incidence of associated heart problems in the society.

In current study, only 14 (5.6%) deaths were reported out of 252 enrolled heart failure patients. On the other hand, an international cohort study emphasized that about 33.2% mortalities among cardiovascular patients was attributed to heart failure.[29] The present study showed statistically significant association of diabetes (p <0.05) with deaths among heart failure patients. Similarly a research by Pons F et al showed highly significant association of diabetes (p <0.001) with poor health outcome among subjects with heart failure but contrary to our results that study also elucidated statistically significant association of COPD, renal disorders and anaemia (p <0.001) with fatality among heart failure cases. This discrepancy among results of two nations might be due to difference in their socio-demographic and cultural attributes that should be explored in further studies. Globally heart failure seemed to be associated with grave health consequences.[30] The reporting of trivial deaths from heart failure in present study might be due to less study subjects. Therefore, a research on a large scale should be carried out to search for exact fatalities in association with diverse comorbid states in heart failure patients.

Heart failure patients particularly with diabetes should be under meticulous supervision of cardiologist and medical specialist to prevent critical situation. Risk factors other than smoking and family history should also be sorted out to avoid unfavorable health outcomes.

Conflict of interest: None declared.

References

1. Pakistan continues to face double burden of diseases in 2019. The News. (Accessed on 10th Septemeber 2022) Available from URL:https://www.thenews.com.pk/print/600776-pakistan-continues-to-face-double-burden-of-diseases-in-2019.
2. Gaziano TA, Bitton A, Anand S, Abrahams-Gessel S, Murphy A. Growing epidemic of coronary heart disease in low- and middle-income countries. Curr Probl Cardiol 2010; 35(2): 72-115.
3. Roger VL. Epidemiology of heart failure. Circ Res 2013; 113(6): 646-59.
4. Jafar TH, Jafary FH, Jessani S, Chaturvedi N. Heart disease epidemic in Pakistan: Women and men at equal risk. Am Heart J 2005; 150(2): 221-6.
5. Ahmad F, Ahmad S, Shah ST, Hayat Y, Adnan Y. Prevalence of risk factors in patients with Heart Failure with Normal Ejection Fraction (HFNEF). Pak Heart J 2014; 47(2): 67-71.
6. Dunlay SM, Weston SA, Jacobsen SJ, Roger VL. Risk factors for heart failure: a population based case control study. Am J Med 2009; 122: 1023-8.
7. Ziaeian B, Fonarow GC. Epidemiology and aetiology of heart failure. Nat Rev Cardiol 2016; 13(6): 368-78.
8. Zhao D, Liu J, Xie W, Qi Y. Cardiovascular risk assessment: a global perspective. Nat Rev Cardiol 2015; 12: 301-11.
9. Yusuf S, Rangarajan S, Teo K, Islam S, Li W, Liu L, et al. Cardiovascular risk and events in 17 low-, middle-, and high-income countries. N Engl J Med 2014; 371: 818-27.
10. O'Flaherty M, Buchan I, Capewell S. Contributions of treatment and lifestyle to declining CVD mortality: why have CVD mortality rates declined so much since the 1960s? Heart 2013; 99: 159-62.
11. Stringhini S, Viswanathan B, Gédéon J, Paccaud F, Bovet P. The social transition of risk factors for cardiovascular disease in the African region: evidence from three cross-sectional surveys in the Seychelles. Int J Cardiol 2013; 168: 1201-6.
12. Lawson CA, Solis-Trapala I, Dahlstrom U, Mamas MA, Jaarsma T, Kadum UT, et al. Comorbidity health pathways in heart failure patients: A sequences of regressions analysis using cross-sectional data from 10,575 patients in the Swedish Heart Failure Registry. PLoS Med 2018; 15(3): e1002540.
13. Mebazaa A, Yilmaz MB, Levy P, Ponikowski P, Peacock WF, Laribi S, et al. Recommendations on pre-hospital & early hospital management of acute heart failure: a consensus paper from the Heart Failure Association of the European Society of Cardiology, the European Society of Emergency Medicine and the Society of Academic Emergency Medicine. Eur J Heart Fail 2015; 17(6): 544-58.
14. Zahoor S, Arshad MS, Riaz A, Farhan M. Precipitants of acute decompensated heart failure and their correlation with the severity of decompensation in a resource poor country. J Islamabad Med Dent Coll 2017; 6(4): 219-223.
15. STROBE Checklist. (Accessed on 10th Septemeber 2022) Available from URL:https://www.strobe-statement.org/checklists/.
16. Joseph SM, Cedars AM, Ewald GA, Geltman EM, Mann DL. Acute decompensated heart failure. Tex Heart Inst J 2009; 36(6): 510-20.

17. Mangini S, Pires PV, Braga FGM, Bacal F. Decompensated Heart Failure. Einstein 2013; 11(3): 383-91.
18. Lopez AD, Mathers CD, Ezzati M, Jamison DT, editors. Global Burden of Disease and Risk Factors. ed. D.C.P. Project. New York, NY: The World Bank and Oxford University Press; 2006: 552.
19. Leeder S, Raymond S, Greenberg H, Liu H. A Race against Time: The Challenge of Cardiovascular Disease in Developing Economies. New York: Trustees of Columbia University; 2004.
20. Strait JB, Lakatta EG. Age-associated cardiovascular changes and their relationship to heart failure. Heart Fail Clin 2010; 8(1): 143-64.
Braunstein JB, Anderson GF, Gerstenblith G, Weller W, Niefeld M, Herbert R, et al. Noncardiac comorbidity increases preventable hospitalizations and mortality among Medicare beneficiaries with chronic heart failure. J Am Coll Cardiol 2003; 42(7): 1226-33.
22. Rahimi K, Lam CSP, Steinhubl S. Cardiovascular disease and multimorbidity: A call for interdisciplinary research and personalized cardiovascular care. PLoS Med 2018; 15(3): e1002545.
23. Tran J, Norton R, Conrad N, Rahimian F, Canoy D, Nazarzadeh M, et al. Patterns and temporal trends of comorbidity among adult patients with incident cardiovascular disease in the UK between 2000 and 2014: A population-based cohort study. PLoS Med 2018; 15(3): e1002513.
24. Lawson CA, Solis-Trapala I, Dahlstrom U, Mamas MA, Jaarsma T, Kadum UT, et al. Comorbidity health pathways in heart failure patients: A sequences of regressions analysis using cross-sectional data from 10,575 patients in the Swedish Heart Failure Registry. PLoS Med 2018; 15(3): e1002540 doi:
25. Kendir C, Akker MVD, Vos R, Metsemakers J. Cardiovascular disease patients have increased risk for comorbidity: A cross-sectional study in the Netherlands. Eur J Gen Pract 2018; 24(1): 45-50.
26. Amiri P, Mohammadzadeh-Naziri K, Abbasi B, Cheraghi L, Jalali-Farahani S, Momenan AA, et al. Smoking habits and incidence of cardiovascular diseases in men and women: findings of a 12 year follow up among an urban Eastern-Mediterranean population. BMC Public Health 2019; 19: 1042.
27. Shields M, Wilkins K. Smoking, smoking cessation and heart disease risk: a 16-year follow-up study. Health Rep 2013; 24: 12.
28. Kamimura D, Cain LR, Mentz RJ, White WB, Blaha MJ, DeFilippis AP, et al. Cigarette smoking and incident heart failure. Circulation 2018; 137 (24): 2572-82.
29. Pons F, Lupon J, Urrutia A, Gonzalez B, Crespo E, Diez C, et al. Mortality and cause of death in patients with heart failure: Findings at a specialist multidisciplinary heart failure unit. Rev Esp Cardiol 2010; 63(3): 303-14.
30. Kitzman DW, Rich MW. Age disparities in heart failure research. JAMA 2010; 304 (17): 1950-1.