

Association of Heart Failure Admission with Age, Sex, Risk Factors and Co-Morbidities in Tertiary Care Hospital in Bangladesh

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Abstract

Background: Heart failure is a significant medical and societal concern worldwide. It continues to be a major source of morbidity and mortality and causes a significant and rising cost on the health care system. There is a seasonal fluctuation in the number of people who are admitted to hospitals for heart failure, with winter seeing the highest rate. **Objective:** To assess the seasonal variation of heart failure admission with age, sex, risk factors and co-morbidities in tertiary care hospital in Bangladesh. **Materials and Methods:** This cross-sectional study was carried out among the patients hospitalized with heart failure at the Department of Cardiology, Dhaka Medical College Hospital (DMCH), Dhaka, between April 2015 and March 2016. The history, clinical characteristics, and investigational data were used to diagnosis the patients. Statistical tests were used to examine the impact of seasonal fluctuation on patients admitted with heart failure. **Results:** In the age range of 41 to 60 years, 302 patients with heart failure at the highest level (51.7%) were hospitalized. Heart failure admission patients were 2.8 times more likely to be male than female, with a mean age of 55.18±12.42 years. Heart failure patients in the age ranges of 20 to 40, 41 to 60, and 61 to 80 years were hospitalized more frequently in the winter and post-monsoon. Seasons and gender had a statistically significant relationship ($p=0.030$). Smoking is the greatest risk factor compared to other risk factors in all seasons, and all risk factors were more prevalent in the winter than they were in other seasons. **Conclusion:** This study may help improve the healthcare system and alter how easily accessible hospital resources such as emergency rooms are throughout the winter. More information regarding the heart failure events that occur throughout the winter should be made available to patients and general practitioners.

Keywords: Heart Failure, Risk Factors, Seasonal Distribution, Age, Gender Distribution.

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INTRODUCTION

With a current incidence of 5.8 million in the United States of America (USA) and over 23 million worldwide, heart failure (HF) is a significant public health issue. More than 550,000 people are diagnosed with heart failure each year in the USA, and one in five people is at risk of acquiring this disease during their lifetime [1]. Despite improvements in contemporary management, heart failure continues to be one of the primary causes of morbidity and death and poses a significant and rising cost to the healthcare system [2]. About 2.4 million individuals with heart failure are

hospitalized in the USA each year, and heart failure is directly responsible for almost 300,000 fatalities. Heart failure (HF) affects roughly 2–3% of the population as a whole. The National Health and Nutrition Examination Survey found that 2.6% of Americans had heart failure in 2006 [3]. Compared to 0.7% in people aged 45–54, prevalence rose with age, reaching 8.4% in those over 75. For establishing a fair assessment of heart failure, the most recent data from poor nations is insufficient [4]. The world's most densely inhabited geographical area is Southeast Asia. Heart failure incidence and prevalence in this area are not well estimated [5]. In

several nations throughout the world, a seasonal fluctuation in hospital admissions for heart failure that peaked in the winter has been seen [10]. Age, sex, risk factors, and co-morbidities also have an impact on the seasonal variance of heart failure admissions. Increased sympathetic activity and circulatory catecholamine levels brought on by the cold result in an increase in blood pressure, heart rate, and left ventricular end diastolic pressure and volume. Since the heart must work harder to overcome the afterload, failure eventually sets in because it is unable to meet the higher demand. Vascular fluid is lost from the arteries due to cold-induced vasoconstriction, which increases the risk of thrombosis [11]. It increases plasma cholesterol content, blood viscosity, and platelet count [4]. Hematological, coagulation, and a variety of hormones, including steroids, are also increased by cold [12]. Infections of the respiratory tract and other kinds are more common in the winter and can cause bouts of coronary heart disease. The vessel wall may become damaged by infection, which also promotes atherosclerosis [13]. There was a little increase in food and salt consumption throughout the winter [19]. Older adults are more susceptible to cold weather than younger people are because their thermogenesis slows down, which affects their ability to regulate their body temperature, and because they have less body fat [6]. Summertime physical activity levels are much higher than wintertime levels. CVDs and physical inactivity are related [7]. Numerous studies have been conducted in various nations throughout the world. In Italy's St. Anna Hospital, Gallerani *et al.*, (2011) discovered that hospital admissions for heart failure occurred more frequently in the winter (28.1%) than in the summer (20.4%) [13]. The age group under 75 years old saw the most seasonal fluctuation in both men and women. There is virtually no information available in Southeast Asia about seasonal variations in admissions for heart failure. RC Khan and Debabrata Halder (2014) conducted research on the seasonal fluctuation of cardiovascular diseases (CVDs) at the Sher-e-Bangla Medical College Hospital in Barisal, Bangladesh [14]. Then, using hospital registration books, the number of patients hospitalized for various CVDs and the number of deaths among these hospitalized patients were noted. 8371 CVD patients in all were hospitalized over the research period (2010–2012). Of these, 1582 patients (18.4%) were hospitalized owing to acute left ventricular failure, and the largest percentage of these admissions, 513 (32.4%), occurred in the winter. The investigation was carried out in a community hospital in the southern Bangladeshi district of Barisal. We conducted our study at the Dhaka Medical College Hospital's Cardiology Department, the largest and most prestigious tertiary care facility in the city, where patients travel from all over the nation. Significant morbidity and death are brought on by heart failure. The aim of the study was to assess the seasonal variation of heart failure admission with age, sex, risk factors and co-morbidities in tertiary care hospital in Bangladesh.

OBJECTIVE

To assess the seasonal variation of heart failure admission with age, sex, risk factors and co-morbidities in tertiary care hospital in Bangladesh.

MATERIALS AND METHODS

Study Design: Cross sectional observational study.

Place of Study: Department of Cardiology, Dhaka Medical College Hospital (DMCH) Dhaka.

Period of Study: The study was conducted over a period of one year from April 2015 to March 2016.

Study Population: The patients of heart failure admitted in the Cardiology Department of DMCH. The patients with heart failure admitted in the Cardiology Department of DMCH with in the study period who fulfilled the inclusion and exclusion criteria.

Sample Size: All the patients admitted in the cardiology Department of DMCH with heart failure from 1st April, 2015 to 30th March 2016 and sample size was 584.

Inclusion Criteria:

- Patients with heart failure who have been admitted to the DMCH's cardiology department.

Exclusion Criteria:

- Those who refused to participate.
- Patients with chronic obstructive pulmonary disease (COPD), bronchial asthma, and who were incorrectly predicted to have heart failure (HF) when they were hospitalized.

Ethical Considerations:

The research protocol was approved by the DMC Ethical Committee and the Research Review Committee of the Department of Cardiology. The permission was obtained from each patient after each one had been told of the study's objectives, risks, and benefits in an easy-to-understand and comprehensible local language. The confidentiality of all records would be maintained, and the process would aid both the doctor and the patient in developing logical illness management strategies.

Data Collection and Study Procedure:

The history, symptoms, clinical findings, and results of any investigations were all recorded on a structured data collecting sheet for the patients. The patients who met the inclusion and exclusion criteria and were hospitalized to the Cardiology Department of DMCH with heart failure were included in the study. In a standardized questionnaire, history, signs and symptoms, clinical and investigative data were documented. The patients who exhibited clinical signs

of heart failure had undergone examinations such as an echocardiogram, an electrocardiogram (ECG), and chest X-rays.

DATA ANALYSIS

All information was shown in the most appropriate tables or graphs based on their affinity. To make each table and graph easier to read, an explanation was included. The statistical analysis of the data was performed using the SPSS 22.0 programs (Statistical Package for Social Science). In order to determine the correlation between the occurrence of heart failure and the seasons, the ANOVA test was

utilized. Chi-square and other statistical tests were also run to determine the relationship between the variables. By a p value of 0.05, the findings were deemed statistically significant.

RESULTS

Table 1 showed that the maximum 302 (51.7%) heart failure patients were admitted in the age group of 41-60 years, then gradually decreased 185 (31.7%) in 61-80 years; 77 (13.2%) in 20-40 years and 20 (3.4%) patients were in 81-100 year so age group and it was statistically significant (p<0.001). Mean age was 55.18±12.42 years.

Table 1: Distribution of heart failure admission patients by age group(n=584)

Age group	Frequency (n)	Percentage (%)
20-40	77	13.2%
41-60	302	51.7%
61-80	185	31.7%
81-100	20	3.4%
Total	584	100
Mean ±SD	55.18±12.42	

Figure 1 showed among 584 respondents, 74.3% were male and 25.7% were female; M: F ratio

was 2.8:1.Heart failure admission patients were 2.8 times predominant male than female.

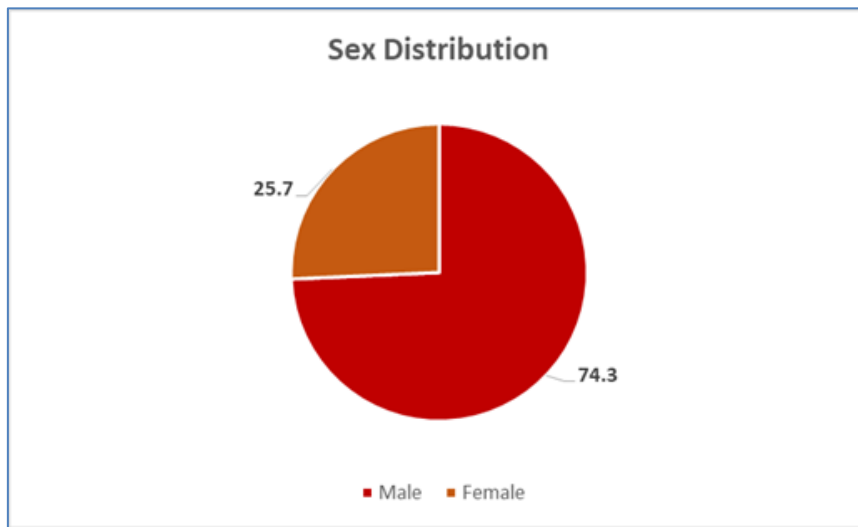


Figure 1: Distribution of heart failure admission patients by gender

Table 2 showed that heart failure patients were admitted more frequently in the winter and post-monsoon in the age groups of 20 to 40 years, 41 to 60 years, and 61 to 80 years. However, in the age group of

81 to 100 years, the pattern was reversed, with more heart failure patients admitted in the winter and post-monsoon than in the summer and least in the monsoon. It is not statistically significant(p>0.05).

Table 2: Distribution of heart failure admission patients by age group and seasons (n=584)

Age groups	Winter	Post monsoon	Monsoon	Summer	
20-40 years	37.7%	16.8%	23.4%	22.1%	P value 0.511
41-60 years	34.8%	26.5%	19.9%	18.9%	
61-80 years	35.1%	25.9%	22.2%	16.8%	
81-100 years	40%	40%	5.0%	15%	

Table 3 showed that heart failure admission of male patients were more in winter (28.4%) than female

(7.0%), in post monsoon, monsoon and summer male patients were 18.8%, 15.1%, 12.0% and female were

6.7%, 5.5%, 6.5% respectively. The association of seasons and gender was statistically significant

($p < 0.030$).

Table 3: Distribution of heart failure admission patients by gender and seasons (n=584)

Seasons	Male	Female	Total	
Winter	28.4%	7.0%	35.4%	P value 0.030
Post monsoon	15.1%	5.5%	20.5%	
Monsoon	18.8%	6.7%	25.5%	
Summer	12.0%	6.5%	18.5%	

Figure 2 showed risk factors & co-morbidities in heart failure admission patients, were 60.1% smokers, 52.9% dyslipidaemic, 51.7% hypertensive, 44.7% CKD, 24.1% anaemic, 25.5% AMI, 41.1% diabetes mellitus, and 9.1% patients were thyroid disorders.

CKD 44.7%, OM 41.1%, AMI 25.5%, 24.1% anaemic and 9.1% patients were thyroid disorders.

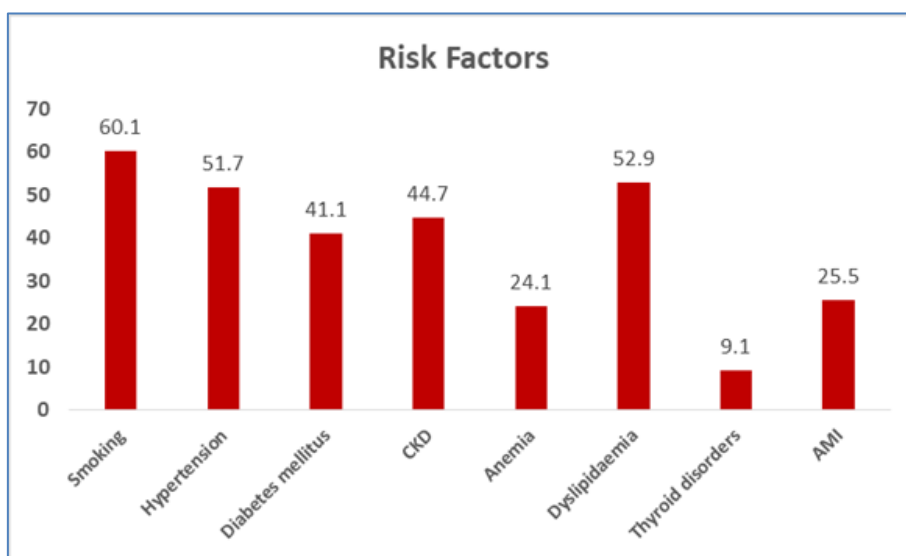


Figure 2: Distribution of heart failure admission patients by risk factors & co-morbidities

Table 4 showed hospital admission patients due to heart failure related to risk factors, co-morbidities and seasons. All the risk factors were more frequent in winter compared to other seasons and Smoking is the most risk factor compared to other risk

factors in all seasons. It is statistically significant (p -value < 0.001 , < 0.001 , < 0.022 , < 0.001 , < 0.001 , < 0.006) except thyroid disorders and the dyslipidaemia (0.223 and 0.577).

Table 4: Distribution of heart failure admission patients by risk factors, co-morbidities and seasons (n=584)

Risk Factors	Winter	Post Monsoon	Monsoon	Summer	P value
Smoking	44.7%	24.8%	20.5%	10.0%	$< 0.001^*$
HTN	43.9%	21.8%	20.1%	14.2%	$< 0.001^*$
OM	42.5%	22.9%	19.6%	15%	0.022*
Dyslipidemia	35.6%	23.3%	21.7%	19.4%	0.577"
Acute MI	49.7%	27.5%	19.4%	13.4%	$< 0.001^*$
CKD	42.1%	17.6%	19.9%	20.3%	$< 0.001^*$
Anemia	44.7%	27.7%	17%	10.6%	0.006*
Thyroid	39.6%	34.0%	15.1%	11.3%	0.223"8

DISCUSSION

Globally, heart failure is a serious issue for public health. Despite improvements in contemporary management, it continues to be a significant and rising burden on the health care system and a major source of morbidity and death. 5.8 million People in the United States of America (USA) and more than 23 million people worldwide now predominate. Many cardiac

disease processes conclude in heart failure. In the industrialized world, the two main causes of heart failure (HF) are coronary heart disease and hypertension (either separately or jointly).

According to Khan RC and Debabrata Halder (2014) [19], there is seasonal fluctuation in hospital admissions for heart failure, which peaks in the winter.

Age, sex, risk factors, and co-morbidities all have an impact on how seasonally variable HF admissions are. The seasonal fluctuation of heart failure admission was analyzed by Boulay *et al.*, in France (1999) [4]; Khan RC and debabrata Halder in Bangladesh (2014) [19]; and they found that it varied most during the winter and least during the summer, which was consistent with our findings. Male heart failure patients made up 74.3% of those hospitalized in our research, while female patients made up 25.7%.

Stewart *et al.*, (2002) from Scotland, Galleran M *et al.*, (2011) from St. Anna hospital in Italy, and Jorge *et al.*, (2009) from Brazil. Similarly in Bangladesh, Khan RC and Debabrata Halder (2014) found that hospital admissions for HF were more common in males than in females, which is comparable to our data. No differences were discovered in the subgroups by gender, age, hypertension, and OM with heart failure hospitalization by Gallerani M *et al.*, (2011) in Italy [13]. Smoking, hypertension, OM, dyslipidemia, AMI, CKO, anemia, and thyroid disorders were risk factors and co-morbidities that were more prevalent in winter than summer in patients with heart failure who were hospitalized. Except for thyroid conditions and dyslipidemia ($p > 0.05$), all risk factors and co-morbidities were statistically significant when compared to the seasonal fluctuation of heart failure, with p -values of 0.001, 0.001, 0.022, 0.577, 0.001, >0.005 , and $>0.223\%$, respectively.

The prevalence of smoking, hypertension, OM, CKO, anemia, dyslipidaemia, and thyroid diseases was higher in the winter (60.1%) than in the summer (10.0%, 14.2%, 15.0%, 18.9%, 13.4%, 11.1%, and 10.6%, respectively). Smoking raises blood pressure, lowers one's capacity for exercise, and makes blood more likely to clot. It increases cholesterol, white cell count, and other coronary heart disease, palpitations, and atherosclerosis risk factors [15], as well as the prevalence and patterns of tobacco use in Bangladesh. Due to an increase in blood pressure and heart rate during the winter, smokers may have a higher chance of developing heart disease (Cold Weather Raises Heart chance for Smokers, Heart in Fo.org, June 2001). Due to the impacts of cold, exercise, decreased vitamin-D levels, elevated blood cholesterol, noradrenaline, catecholamine, and vasopressin levels, both systolic and diastolic hypertension were more prevalent in the winter. Winter saw more of DM. Infections, obesity, and increased food consumption during the winter all contribute to rising DM [20].

CONCLUSION

Regarding age, sex, risk factors, and co-morbidities, the seasonal fluctuation of heart failure admission was found. Patients who are susceptible may be made aware of the elevated risk of heart failure throughout the winter, and they would receive sufficient education on heart failure and what to do. The impact of

cold weather on patients with heart failure and how to manage them might be taught to general practitioners. Additionally, this research might be used to enhance the healthcare system and change how readily available emergency services and other hospital resources are in the winter. Patients and general practitioners should be aware and educate more about the heart failure events during the winter.

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