Original Research Article

Clinical Profile of Patients with Heart Failure and Type 2 Diabetes Mellitus Admitted In IGIMS

Authors
Dr Arshad Ahmad¹, Dr Ravi Vishnu², Dr Bhim Ram³, Dr Ved Prakash⁴, Dr Faiyaz Ahmad Ansari⁵, Dr Chandrakishore⁶

¹Additional Professor, Deptt of Gen Medicine, IGIMS, Patna
²Associate Professor, Deptt of Cardiology, IGIMS, Patna, Bihar
³Assistant Professor, Deptt of General Medicine, IGIMS, Patna, Bihar
⁴Associate Professor, Deptt of Endocrinology, IGIMS, Patna
⁵Assistant Professor, Deptt of General Medicine, IGIMS, Patna, Bihar
⁶Senior Resident, Deptt of General Medicine, IGIMS, Patna, Bihar

*Corresponding Author
Dr Bhim Ram
Assistant Professor, Deptt of General Medicine, IGIMS, Sheikhpura, Patna, Bihar, India

Abstract
HF with concomitant diabetes mellitus may have further increase risk through different pathophysiologic, hemodynamic and neurohormonal abnormalities

Aim: To evaluate the clinical presentation of patients with heart failure who were also diabetic.

Method: 100 patients coming with signs and symptoms of HF who were diabetic, between May 2018 to April 2019 were selected.

Results: Among them 64 were male and 36 were female. All patients had SOB, next common symptoms were swelling. Commonest sign found in our patients were edema, second most common finding were basal crepitations. In our study 39 patients with LVEF >50% had HbA1c between 6% -9%. However 46 patients with this level of HbA1c had LVEF <50%. P value was >0.5 which was not significant. In our study the association between HbA1c and NYHA class was not significant. In our study we found that as HbA1c level goes up there were more chances of diastolic dysfunction. P value was < 0.5, which is statistically significant.

Conclusion: Although DM and HF are each individually associated with considerable morbidity and mortality, they often occur together, which further worsens adverse patient’s outcomes, quality of life, and cost of care.

Keywords: Heart failure, Diabetes mellitus, HaemoglobinA1C (HbA₁c), Diabetic Cardiomyopathy, diastolic dysfunction, left ventricular (LV) hypertrophy.

Introduction
Heart failure (HF) is a clinical manifestation of diverse cardiac and noncardiac abnormalities and represents a heterogeneous group of patients ranging from stable outpatients with chronic HF to those with worsening symptoms requiring hospitalisation for HF.¹

Among all the endocrininal metabolic diseases, Diabetes mellitus is the most common disorder seen. India is facing an epidemic of diabetes.² The
impact of this disease on the quality of life, and on morbidity and mortality through the complications has been emphasized by finding of the national commission (USA) on diabetes and DCCT trial. International Diabetes Federation has projected that 578 millions individual will have diabetes by year 2030.

HF with concomitant diabetes mellitus may have further increase risk through different pathophysiologic, hemodynamic and neurohormonal abnormalities. This is especially critical as approximately 24% of HF patients overall and 40% of hospitalised HF patients have DM, and these figures are expected to grow exponentially in the next decades with growth of aging population.

In patients with DM, the prevalence of HF is between 9% and 22%, which is 4 times higher than the general population, and the prevalence is even higher in patients with DM who are ≥ 60 years old.

Poor glycemic control is associated with greater risk for the development of HF; for each 1% increase in HaemoglobinA1C (HbA1c), the risk of incident HF increase by 8% to 36%.

DM commonly causes structural heart disease and HF via myocardial ischaemia/infarction. DM can also cause myocardial disease in the absence of major epicardial coronary artery disease (CAD) through Diabetic Cardiomyopathy, which is the presence of diastolic or systolic dysfunction in a patient with DM without other obvious causes, such as CAD, hypertension or valvular heart disease.

Moreover, data for possible differential effects of drugs in HF patients with or without DM are emerging from the ASTRONAUT (Aliskiren Trial on Acute Heart Failure Outcomes) trial in patients admitted to the hospital with reduced ejection fraction, and from possible increased risk of HF for antidiabetic drugs, as in the SAVOR- TIMI (Saxagliptins and Cardiovascular Outcomes in patients with Type 2 Diabetes Mellitus-Thrombolysis In Myocardial Infarction) trial for the dipeptidyl peptidase (DPP-4) saxagliptin.

Among patients with heart failure and a reduced ejection fraction, those who received the SGLT2 inhibitor dapagliflozin had a lower risk of worsening heart failure or death from cardiovascular causes and better symptoms scores than those who received placebo regardless of the presence or absence of diabetes.

Although these results should be interpreted with caution and viewed in the context of a subgroup analysis of a secondary endpoint with corresponding statistical limitations, the epidemiology, pathophysiology, prognosis and management of HF patients with DM should be carefully evaluated in an effort to improve their prognosis and outcomes.

Aims and Objectives
1. To evaluate the clinical presentation of patients with heart failure who were also diabetic.
2. To see the prevalence of systolic and diastolic dysfunction in these patient population.
3. To correlate HbA1c level with NYHA class and echocardiographic evaluation of left ventricular diastolic function.

Material and Methods
This observational, non-interventional study includes patients admitted with heart failure and diabetes mellitus who were willing to be enrolled from OPD and Indoor of department of Medicine, Department of Cardiology, and Department of Endocrinology, IGIMS, Patna, Bihar in the period between May 2018 to April 2019.

100 patients coming with signs and symptoms of HF who were diabetic was selected.

Inclusion Criteria
1. Male and female patients with heart failure and established type 2 diabetes mellitus
2. Age ≥ 30 years
3. Patients willing to give informed consent for study.

Exclusion Criteria
1. Age ≤ 30 years
2. Pregnancy
3. Unwilling or unable to comply with protocol

Detailed history was taken and general and cardiovascular examination done to each patient. Laboratory and radiological investigation done. Echocardiography was done in Cardiology and Medicine Department. Imaging studies had shown left ventricular (LV) hypertrophy, thought to be caused by insulin resistance and hyperinsulinemia, is an important characteristic of the diabetic heart.¹ LV hypertrophy causes diastolic dysfunction, which is an early functional manifestation of diabetic cardiomyopathy and is present in 40% to 75% of patient with DM.¹  Data were analysed on Epi Info 7 software.

**Results**
A total of 100 patients coming with signs and symptoms of heart failure, who were also diabetic was selected for study. Among them 64 were male and 36 were female.

**Table-1**

|          | Number | %  |
|----------|--------|----|
| Male     | 64     | 64 |
| Female   | 36     | 36 |
| Total    | 100    |    |

**Table 2** Association between symptoms and sign with sex distribution

| Symptoms & sign | Male | Female |
|-----------------|------|--------|
| SOB             | 64   | 36     |
| Swelling        | 49   | 28     |
| Palpitation     | 14   | 9      |
| PND             | 13   | 7      |
| Chest pain      | 8    | 5      |
| Raised JVP      | 34   | 19     |
| Tachycardia     | 33   | 20     |
| Edema           | 51   | 30     |
| Basal Crepitations | 42 | 21   |
| S3/S4           | 17   | 11     |
| Ascitis         | 4    | 3      |

All patients had SOB, next common symptoms were swelling, followed by palpitation and PND. Commonest sign found in our patients were edema, second most common finding were basal crepitations. Third commonest finding were raised JVP and tachycardia.

All patients were on medications. 100 % on diuretics, 68% on ACEI, 28% on ARB, 52% on Beta blocker, 76% on Digoxin, 65% on Statins, 35% on Aspirin.

**Table-3**: HbA1c relation with LVEF

| HbA1c Level | LVEF <30% | LVEF 30%-39% | LVEF 40%-49% | LVEF >50% |
|-------------|-----------|--------------|--------------|-----------|
|             | No of patients | No of patients | No of patients | No of patients |
| 5%-6%       | 1          | 2            | 1            | 2         |
| 6.1%-7%     | 3          | 6            | 9            | 11        |
| 7.1%-8%     | 4          | 2            | 14           | 20        |
| 8.1%-9%     | 1          | 1            | 6            | 8         |
| >9%         | 1          | 1            | 3            | 4         |
| Total       | 10         | 12           | 33           | 45        |

In our study we correlate the relationship of HbA1c with LVEF. 39 patients with LVEF > 50% had HbA1c between 6.1% to 9%. However, 46 patients with this level of HbA1c had LVEF <50%. P value was >0.5, which was not significant.
Correlation between HbA1c and diastolic dysfunction was sought in this study and found that as HbA1c level goes up there were more chances of diastolic dysfunction. It was highly significant, P value was <0.5, and association was positive.

Table-5: HbA1c relation with NYHA class

| HbA1c Level | Class 1 | Class 2 | Class 3 | Class 4 |
|-------------|---------|---------|---------|---------|
|    5%-6%    |    4    |    2    |    1    |    1    |
|   6.1%-7%   |   15    |    5    |    2    |    2    |
|   7.1%-8%   |    9    |    6    |    3    |    2    |
|   8.1%-9%   |    8    |    3    |    0    |    1    |
|    >9%      |    2    |    1    |    0    |    1    |
|    Total    |   38    |   17    |    6    |    7    |

Table-6: HbA1c relation with E/é ratio

| HbA1c Level | ≤8  | 8-15 | >15  |
|-------------|-----|------|------|
|    5%-6%    |    5|   5   |    7  |
|   6.1%-7%   |   8  |   10  |   26  |
|   7.1%-8%   |   4  |   5   |   14  |
|   8.1%-9%   |   2  |   3   |   5   |
|    >9%      |   0  |   3   |   3   |
|    Total    |   19 |  26   |  55   |

Discussion

The present study was aimed to evaluate the clinical profile of the patients with heart failure and diabetes mellitus. Patient’s history and risk factors was noted. Relevant investigation and echocardiography were done to see the prevalence of systolic and diastolic dysfunction in patient’s population, to correlate HbA1c level with NYHA class at presentation. Also, we correlated HbA1c level with echocardiographic evaluation of left ventricular systolic and diastolic function. Our finding demonstrated that diastolic dysfunction is common in patients with DM. In diabetic patients the existence of Pre-clinical diastolic dysfunction has been well defined and
estimates of prevalence vary from 30% to 60% depending on the Doppler echocardiography criteria that was used to define diastolic dysfunction.

In our study 100 diabetic patients with heart failure were included and among them 64 were male and 36 were female.

Patients most commonly presented with symptoms of breathlessness, followed by swelling, palpitation and PND.

Most common sign was edema. Second most common was basal crepitation, followed by raised JVP, tachycardia and S3/S4 respectively. Some patients also had ascites.

In our study 39 patients with LVEF >50% had HbA1c between 6% -9%. However 46 patients with this level of HbA1c had LVEF <50%. P value was >0.5 which was not significant.

In our study the association between HbA1c and NYHA class was not significant.

In our study we found that as HbA1c level goes up there were more chances of diastolic dysfunction. P value was < 0.5, which is statistically significant.

In our study on correlation between HbA1c and E/é, we found that 55% had E/é ratio >15, 26% had E/é ratio between 8-15 and 19% had E/é <8. P value was <0.05 so the association of HbA1c with E/é ratio was significant and it was found that as HbA1c value goes up E/é ratio also increases.

**Conclusion**

Although DM and HF are each individually associated with considerable morbidity and mortality, they often occur together, which further worsens adverse patients outcomes, quality of life, and cost of care. In our study we correlate the relationship of HbA1c with LVEF, which was not significant. In our study we found that as HbA1c level goes up there were more chances of diastolic dysfunction, which was highly significant. Thus an early and precise characterization of diabetes status to be determined for everyday management of HF patients and, also for future clinical trials.

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Conflict of Interest: None

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