

**Original Research Article****Clinical Profile of Patients with Heart Failure and Type 2 Diabetes Mellitus Admitted In IGIMS**

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**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 (HbA<sub>1c</sub>), 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.<sup>1</sup>

Among all the endocrinal metabolic diseases, Diabetes mellitus is the most common disorder seen. India is facing an epidemic of diabetes.<sup>2</sup> 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<sup>3</sup>. International Diabetes Federation has projected that 578 millions individual will have diabetes by year 2030.<sup>4</sup>

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<sup>5</sup>.

In patients with DM, the prevalence of HF is between 9% and 22%, which is 4 times higher than the general population<sup>7</sup>, and the prevalence is even higher in patients with DM who are  $\geq 60$  years old.<sup>8</sup>

Poor glycemic control is associated with greater risk for the development of HF; for each 1% increase in HaemoglobinA1C (HbA<sub>1c</sub>), the risk of incident HF increase by 8% to 36%.<sup>9</sup>

DM commonly causes structural heart disease and HF via myocardial ischaemia/infarction.<sup>10</sup> 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.<sup>11</sup>

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<sup>12</sup>, 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<sup>13</sup>.

Among patients with heart failure and a reduced ejection fraction, those who received the SGLT<sub>2</sub> 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.<sup>14</sup>

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  $\geq 30$  years
3. Patients willing to give informed consent for study.

### Exclusion Criteria

1. Age  $\leq 30$  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.<sup>15</sup> 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.<sup>16</sup> 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.

**Table- 4** HbA1c relation with Diastolic dysfunction

HbA1c Level	Grade 1 diastolic dysfunction	Grade 2 diastolic dysfunction	Grade 3 diastolic dysfunction	Grade 4 diastolic dysfunction	Normal diastolic dysfunction
5%-6%	4	2	1	1	3
6.1%-7%	15	5	2	2	17
7.1%-8%	9	6	3	2	10
8.1%-9%	8	3	0	1	2
>9%	2	1	0	1	0
Total	38	17	6	7	32

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
	No of Pts	No of Pts	No of Pts	No of Pts
5%-6%	4	3	10	2
6.1%-7%	4	11	16	5
7.1%-8%	2	4	13	9
8.1%-9%	1	2	4	4
>9%	1	1	2	2
Total	12	21	45	22

While majority of patients were in NYHA class 3 and 4 across all patients with various level of HbA1c, it was not statistically significant and

association between HbA1c with NYHA class was positive and moderate.

**Table- 6:** HbA1c relation with E/é ratio

HbA1c Level	<8	8 – 15	>15
	No of Pts	No of Pts	No of Pts
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

In our study we want to know about relationship between HbA1c and E/é ratio. 55% had E/é ratio >15, 26% had E/é ratio between 8-15 and 19 had E/é ratio <8.

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. P value was <0.05 and association was positive.

**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/e', we found that 55% had E/e' ratio >15, 26% had E/e' ratio between 8-15 and 19% had E/e' <8. P value was <0.05 so the association of HbA1c with E/e' ratio was significant and it was found that as HbA1c value goes up E/e' 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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