Study of relation of diastolic dysfunction with the duration of diabetes and age of the patient

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Abstract:

Introduction: In overt heart failure, diastolic dysfunction often co-exists with systolic dysfunction as a consequence of ischemic heart disease, but diastolic dysfunction is frequently reported in diabetes mellitus without signs and symptoms of heart disease and is possibly due to diabetic cardiomyopathy.

Material and methods: 100 patients of Diabetes Mellitus (Both type 1 and type 2) presenting to Padmashree Dr. D. Y. Patil Hospital and Research centre, Pimpri, Pune-18 were selected. 50 age and sex matched healthy non-diabetic controls were taken from friends and relatives of the patient.

Results: On age wise distribution of patients in the diabetic group, 6 out of 9 diabetics from 20-30 years of age showed incidence of LVDD, among them 5 had Grade I LVDD (83%). Out of 54 patients in the age group of 51-70 years 51 had LVDD, among them 38 had Grade II LVDD (75%), 8 had Grade III LVDD (15%), 3 had Grade IV LVDD (6%). As the age increased the duration of diabetes also increased so was the severity of LVDD. In patient above the age of 71 years 100% had LVDD, among them 27% had Grade I LVDD and 73% had Grade III and Grade IV LVDD.

Conclusion: The Severity of LVDD increased with age in Diabetic group as also in control group. However, diabetics within the age of 30 years also had LVDD.

Keywords: Cardiovascular disorders, diabetes mellitus, diastolic dysfunction

Introduction:

In overt heart failure, diastolic dysfunction often co-exists with systolic dysfunction as a consequence of ischemic heart disease, but diastolic dysfunction is frequently reported in diabetes mellitus without signs and symptoms of heart disease and is possibly due to diabetic cardiomyopathy. With this background present study was planned to study relation of diastolic dysfunction with the duration of diabetes and age of the patient. Left ventricular diastolic function (LVDF) is affected earlier than systolic function in the development of congestive cardiac failure. 12 newly diagnosed patients of type II DM who were asymptomatic and had no hypertension, demonstrated normal systolic functions and impaired diastolic function when studied with MRI parameters”. Treatment and prognosis of diastolic cardiac failure is different than systolic cardiac failure. Left ventricular diastolic dysfunction may represent the first stage of diabetic cardiomyopathy, thus an early examination of left ventricular diastolic function may help detect this condition in patients with diabetes, thereby allowing early intervention for a more favorable outcome.
Material and methods:

100 patients of Diabetes Mellitus (Both type 1 and type 2) presenting to Padmashree Dr. D. Y. Patil Hospital and Research centre, Pimpri, Pune-18 were selected. 50 age and sex matched healthy non-diabetic controls were taken from friends and relatives of the patient.

Inclusion criteria:

Diabetic Group:
1) Newly diagnosed patients of Diabetes mellitus when their-
   Random Capillary Blood Glucose > 200 mg/dl
2) Known cases of diabetes mellitus on treatment.
3) Isolated diabetic patients and diabetics with other co-morbid conditions like HTN, IHD, CAD.

Controls:
Age and sex matched healthy non diabetic controls from family and friends of patients were included after written and informed consent.

Exclusion criteria:
Patients and controls with age less than 18 years.

Observations:
Table 1: Incidence of LVDD in both diabetic and control groups considering age

<table>
<thead>
<tr>
<th>Age</th>
<th>Total number of Diabetics</th>
<th>Diabetics with LVDD</th>
<th>Total number of Controls</th>
<th>Controls with LVDD</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-30 years</td>
<td>9</td>
<td>6 (67%)</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>31-40 years</td>
<td>10</td>
<td>5 (50%)</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>41-50 years</td>
<td>16</td>
<td>6 (38%)</td>
<td>12</td>
<td>0</td>
</tr>
<tr>
<td>51-60 years</td>
<td>26</td>
<td>23 (88%)</td>
<td>12</td>
<td>0</td>
</tr>
<tr>
<td>61-70 years</td>
<td>28</td>
<td>28 (100%)</td>
<td>14</td>
<td>5 (36%)</td>
</tr>
<tr>
<td>71-80 years</td>
<td>11</td>
<td>11 (100%)</td>
<td>5</td>
<td>4 (80%)</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>79</td>
<td>50</td>
<td>9</td>
</tr>
</tbody>
</table>

In this study it was found that, elderly patients in both the study groups had higher incidence of LVDD. 6 out of 9 diabetics (67%) from 20–30 years age group showed incidence of LVDD which was significant. 51 out of 54 (94%) patients from the age of 51 - 70 years showed LVDD. In the controls all the 9 individuals who had LVDD were from the age group of 61 - 80 years. The distribution of LVDD in both the study groups according to age is depicted in the chart below.
Table 2: Relation of age in diabetics with grading of LVDD

<table>
<thead>
<tr>
<th>Age in years (years)</th>
<th>Total no. of patients (age wise)</th>
<th>Total Patients with LVDD</th>
<th>Grade I</th>
<th>Grade II</th>
<th>Grade III</th>
<th>Grade IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-30</td>
<td>9</td>
<td>5 (83%)</td>
<td>1(17%)</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>31-40</td>
<td>10</td>
<td>3 (60%)</td>
<td>2(40%)</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>41-50</td>
<td>16</td>
<td>1 (17%)</td>
<td>1(17%)</td>
<td>2(33%)</td>
<td>2(33%)</td>
<td></td>
</tr>
<tr>
<td>51-60</td>
<td>26</td>
<td>14 (61%)</td>
<td>8(35%)</td>
<td>1(4%)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>61-70</td>
<td>28</td>
<td>24 (86%)</td>
<td>0</td>
<td>2(7%)</td>
<td>2(7%)</td>
<td></td>
</tr>
<tr>
<td>71-80</td>
<td>11</td>
<td>3 (28%)</td>
<td>0</td>
<td>4(36%)</td>
<td>4(36%)</td>
<td></td>
</tr>
</tbody>
</table>

On age wise distribution of patients in the diabetic group, 6 out of 9 diabetics from 20-30 years of age showed incidence of LVDD, among them 5 had Grade I LVDD (83%). Out of 54 patients in the age group of 51-70 years 51 had LVDD, among them 38 had Grade II LVDD (75%), 8 had Grade III LVDD (61%) and 2 had Grade IV LVDD (4%). As the age increased the duration of diabetes also increased so was the severity of LVDD. In patients above the age of 71 years 100% had LVDD, among them 27% had Grade I LVDD and 73% had Grade III and Grade IV LVDD. In this study it was found that, Grade I LVDD (Abnormal Relaxation) is the most common pattern of diastolic dysfunction.

Discussion:
The present study is designed to find the incidence of left ventricular diastolic filling in patients with diabetes mellitus as compared to age and sex matched healthy non-diabetic controls. In this study it was found that elderly patients in diabetic group and controls had higher incidence of LVDD. 6 out of 9 diabetics (67%) from 20-30 years age group showed incidence of LVDD. 51 out of 54 (94%) patients from the age of 51-70 years showed LVDD. In the control all the 9 individuals who had LVDD were from the age group of 61-80 years. Although 94% of the elderly patients had evidence of left ventricular diastolic dysfunction, 67% patients from the age of 20-30 years had LVDD which signifies that diastolic dysfunction can also occur in young adults.

Fisher et al (2002) studied prevalence of LVDD in general population. Study material consisted of 1274 individuals between 25 to 75 years. They reported the prevalence of diastolic abnormalities varied according to age, from 2.8% in individuals aged 25-35 years to 15.8% among those older than 65 years (p < 0.01). Jung Hyun Noh, Joon Hyung Doh et al (2010) studied 65 type 2 diabetes patients with mean age of 51 [26 to 76] years without evidence of hypertension, heart disease, or renal disease. Diastolic function was evaluated by Doppler echocardiographic studies. They found Fifteen patients (23.1%) with LV diastolic dysfunction. Patients with LV diastolic dysfunction were older than those without diastolic dysfunction (60.0 ± 2.5 vs. 50.5 ± 1.9 years; P < 0.01). Rajesh Rajput et al (2002) studied 30 diabetic patients for evidence of LV diastolic dysfunction and compared them with 30 age and sex matched healthy controls. Diabetic Patients had an average age of 42 ±
4.78 years while Controls had an average age of 39.6 ± 6.27 years. They found maximum percentage of patients with diastolic dysfunction (43%) were within the age of 41-50 years.  

Hisashi Masugata et al (2008) studied LVDD in normotensive diabetic patients in various age strata and found increased incidence of LVDD as age increases. Their study reported, duration of type 2 diabetes was significantly longer in patients in their 50s (7.0 ± 2.5 years), 60s (8.0 ± 3.2 years), and 70s (10.4 ± 3.2 years) than in patients in their 40s (3.3 ± 1.9 years) (p < 0.001) which implies the fact that as age increases the duration of diabetes increases and both can lead to increased incidence of LVDD.

**Conclusion:**
The Severity of LVDD increased with age in Diabetic group as also in control group. However, diabetics within the age of 30 years also had LVDD.

**References:**
3. Defromo RA, pathogenesis of type 2 diabetes mellitus, diabetesrev. s1997; 177.