Prevalence of microvascular complications among diabetic patients

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SUMMARY

Objectives: To assess the prevalence of microvascular complications among indoor diabetic patients.

Place and duration of study: The study was conducted during the year 2002 from May through December in the Department of Diabetology and Endocrinology, Hayatabad Medical Complex, Peshawar.

Methods: Two hundred known diabetic patients (both type 1 and type 2), admitted with different clinical problems were included in the study. Relevant information of all patients was recorded with the help of a pre-designed proforma. They were investigated for retinopathy, nephropathy and neuropathy.

Results: Retinopathy was detected in 55% cases, nephropathy in 67% cases while 68.5% patients had the problem of neuropathy. The ratio of above complications was found to be higher in hypertensive subjects (p<0.05).

Conclusion: The study suggested that the prevalence of microvascular complications was common in our admitted diabetic patients and hypertension was a commonly associated condition among them.

Key words: microvascular complications, diabetes

INTRODUCTION

Diabetes Mellitus (DM) is a common non-communicable disorder of the developing countries. In this disease, the affected person fails to properly utilize almost all the dietary components for his metabolic needs. The patient becomes weak and complication of almost every system ensues. It produces cardiovascular damage, stroke and peripheral vascular disease while infants born of pregnant women frequently have birth defects. Chronic and progressive nature of the disorder, which is associated with obesity, hypertension, advancing age and inadequate screening, leads to deposition of harmful substances in the vascular endothelium ultimately causing development of microangiopathies or microvascular complications. These complications include retinopathy, nephropathy and peripheral neuropathy, which produce early death and increased morbidity and health care costs. These complications vary in prevalence in different populations depending on various factors such as genetic predisposition, ethnicity, type of diabetes, associated predisposing factors and even definition of the respective complications. In view of the non-availability of such data in our local population, the presence of these complications was assessed among diabetic patients.

MATERIALS AND METHODS

Two hundred already diagnosed diabetic patients, admitted with different clinical problems in Endocrinology unit of Hayatabad Medical Complex were studied during a seven-month period. Patients with type 1 or type 2 DM, having age between 14 and 75 years with any diabetes duration were included in the study. Exclusion criteria were serious illness, unconsciousness, serious psychiatric disorder, language/communication problem and repeat admission. Patients with bilateral cataracts were excluded only for retinopathy. Age, sex, diabetes duration, family history, type and treatment of diabetes, height, weight, blood pressure, current symptomatology and history of any previously associated medical conditions were noted. Hypertension was defined as patients already taking anti-hypertensive drugs or having a blood pressure of >130/80 mm Hg. Body mass index (BMI) was calculated by weight (in kilograms) divided by the square of height (in meters). Retinopathy, assessed by direct ophthalmoscopy, was defined as the presence of at least one microaneurysm or hemorrhage or exudate in either of the eye. Evidence of peripheral sensory neuropathy was obtained on the basis of at least one objective sign including absence of both ankle reflexes and impairment of lower limb touch and pain sensation on any side with or without symptoms. Presence of nephropathy was decided by using 24-hour
albinuria of ≥30mg\textsuperscript{13}. Daily casual plasma glucose and serum urea and creatinine on the day of admission were determined for assessment of glycemic control and renal function. Relevant data was collected on a pre-designed proforma and analysis done.

RESULTS

Male / female ratio was 1:2. Mean age was 48.3±13.3 (14-75) years. Type1 / type2 ratio was 1:5. Mean height and weight were 1.57±0.09 (1.40-1.81) meters and 65.2±13.4 (27-100) kg respectively. Mean BMI levels were 21.3±5.6 (12.3-31.6) kg/m\textsuperscript{2} for type 1 and 27.3±4.7 (15.1-42.9) kg/m\textsuperscript{2} for type 2. Mean diabetes duration was 8.5±5.6 (0.1-32) years. 107 (53.5\%) patients were found as hypertensive of which 31\% were already using anti-hypertensive drugs. Retinopathy was detected in 55\% cases, nephropathy was found in 67\% and neuropathy was found in 68.5\% cases. Number of patients affected with only one of the above complications was 34 (17\%). Proportion of patients having any two complications was 33\% while all the three complications occurred in 35\% cases. Only 15\% patients were free of any complication (Table 1).

<table>
<thead>
<tr>
<th>Patient group</th>
<th>Number</th>
<th>% age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retinopathy</td>
<td>102</td>
<td>55</td>
</tr>
<tr>
<td>Nephropathy</td>
<td>134</td>
<td>67</td>
</tr>
<tr>
<td>Neuropathy</td>
<td>137</td>
<td>68.5</td>
</tr>
<tr>
<td>All three complication</td>
<td>70</td>
<td>35</td>
</tr>
<tr>
<td>Any two complications</td>
<td>66</td>
<td>33</td>
</tr>
<tr>
<td>Only one complication</td>
<td>34</td>
<td>17</td>
</tr>
<tr>
<td>No complication</td>
<td>30</td>
<td>15</td>
</tr>
</tbody>
</table>

*out of 185 patients, after excluding 15 patients with bilateral cataracts.

Hypertensive and non-hypertensive patients were compared for retinopathy, nephropathy and neuropathy. Patients with hypertension had more complications with statistical significance as compared to those without hypertension (P < 0.01 for retinopathy and < 0.05 in case of nephropathy and neuropathy (Table 2).

![Table 1: Various combinations of retinopathy, nephropathy and neuropathy in diabetic patients](image)

Table 2: Microvascular complications in diabetic patients with and without hypertension

<table>
<thead>
<tr>
<th>Condition</th>
<th>Retinopathy</th>
<th>Nephropathy</th>
<th>Neuropathy</th>
</tr>
</thead>
<tbody>
<tr>
<td>With hypertension</td>
<td>58%</td>
<td>75%</td>
<td>77%</td>
</tr>
<tr>
<td>Without hypertension</td>
<td>43%</td>
<td>58%</td>
<td>59%</td>
</tr>
<tr>
<td>p-value</td>
<td>&lt;0.01</td>
<td>&lt;0.05</td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>

DISCUSSION

DM is growing worldwide like an epidemic and our population is not an exception. Being inhabitants of a developing country, we are at increased risk of contracting this disease\textsuperscript{14}. Increasing prevalence of diabetes, lack of proper education about the nature and course of the disease and general apathy of the patients towards necessary control are the main factors paving way for an early onset of microvascular complications. In a pilot study conducted in Karachi on 3000 diabetic patients, it was shown that 780 (26\%) of the patients were affected with retinopathy\textsuperscript{15}. In contrast, our study demonstrated 51\% of the patients with retinopathy showing double the rate of above-mentioned study. Similarly, Ramachandra studied 3010 type 2 diabetic patients noted a prevalence of 23.7\% retinopathy, 19.7\% nephropathy, 27.5\% peripheral neuropathy and 38\% hypertension. Duration of diabetes, poor glycemic control and hypertension were shown significantly associated with the complications in his study\textsuperscript{17}. In contrast our study has demonstrated significantly high frequency of each complication.

Both in type 1 and type 2 DM it has become increasingly clear that multiple risk factors may be as important as hyperglycemia. A study, comprising two extreme groups, i.e. patients with early onset (microangiopathy within 5 years duration) and those with late protection (without microangiopathy even after 14 years) showed that the former group had higher prevalence of associated conditions like hypertension, hyperlipidemia, poor glycemic control, obesity, smoking and cardiovascular disease indicating their positive correlation with development of microvascular complications\textsuperscript{17}. The more these factors are constellated; greater is the possibility of acquiring complication. Our study included more patients with older age, longer diabetes duration, poor glycemic control (mean plasma glucose= 333 mg/dl) and hypertension. Moreover these patients are noticed with a lower level of school education and awareness who present themselves to health care system at a time when their diabetes has already progressed to advanced stage and complications have shown their presence. This is another reason that our study has given a relatively higher frequency for each complication as compared to studies reported before\textsuperscript{18}.

Hypertension is a highly co-morbid condition in diabetic patients. In a study conducted in Punjab, 53.8\% of patients with diabetes had hypertension as compared to 17.3\% in non-diabetic counterparts\textsuperscript{19}. Almost the same proportion of hypertension (52\%) prevailed in our study population in which upper limit of blood pressure for diagnosis was taken as 130/80 instead of 140/90 in the
former. The intention is to increase the level of awareness about blood pressure because it has been proved that maintaining blood pressure below that level leads to a fall in incidence of complications\textsuperscript{10}. From the present study it appears that hypertension is very common in this population and also the combination of hypertension and diabetes has significantly increased the likelihood of all the three complications (Table 2).

It is reasonable to believe that in our diabetic patients like others\textsuperscript{6}, inadequate screening is another factor leading to unacceptably high prevalence of microvascular complications. While it is fortunate that most of the patients with retinopathy and nephropathy did not reach advanced stages of proliferative and end-stage renal disease which are the principal causes of blindness and death in such of patients, it was noted that diabetic foot syndrome is a common presentation. This condition, commonly due to combination of neuropathy, peripheral vascular disease and infection, causes considerable morbidity and threat to amputation. Concurrent presence of retinopathy, nephropathy and neuropathy in various combinations (Table 1) that is observed with reasonably high frequency in this study is another matter of concern. From this study it was observed that neuropathy is generally the first complication to appear, nephropathy and retinopathy soon entering into the race. This combination may leave the patient in a highly morbid condition.

CONCLUSION

A considerably high percentage of microvascular complications was discovered in our diabetic patients with hypertension being a common comorbidity. Although the findings are apparently disappointing, they may not reflect our diabetic population as a whole since the subjects selected were indoor hospitalized patients with a higher index of suspicion for the presence of complications. Nevertheless, it remains a fact that these patients would be at high risk of developing morbid complications if, at least, the important issues of early screening and timely control of glycemia and blood pressure are not addressed.

REFERENCES