INTRODUCTION

Diabetes mellitus is one of the most common endocrine disorders in all populations and all age groups. There is rising prevalence of the disease in the developing countries - which was rarer before - with industrialization, socio-economic development, urbanization and changing life style (Zimmet, 1992; WHO, 1998).

Prevalence of diabetes mellitus was found to vary from zero in a highland population of Papua New Guinea that has retained its traditional life style to 25% in the population of Pima Indians. In some developing countries, the prevalence of diabetes mellitus is lower in men than in women but in others, the sex ratio is reversed. In the United States of America, the ratio are equal for both sexes. Within the same ethnic group, urban residents and migrants to urban areas have higher prevalence of diabetes mellitus than their rural counterparts (Chea and Yeo, 1983; Cruz Vidal et al, 1979; Zimmet et al, 1979).

Non-insulin dependent diabetes mellitus (NIDDM) is more prevalent than insulin dependent diabetes mellitus (IDDM) and constitutes nearly 90% of cases among the diabetics (Foster, 1994). There has been no systematic countrywide epidemiological study and surveillance mechanism for the detection of diabetic cases in Nepal. At present, those individuals who present themselves to the hospitals, health posts or private clinics can only be recorded, rendering it difficult to determine the true prevalence. There is no indexed literature available to date to show the prevalence of NIDDM in Nepal. Thus the present study was conducted to provide preliminary population based data on the magnitude of the problem of NIDDM in Nepal as found in the study may be due to lack of public awareness regarding the problem and poor medical services in the country.
Pregnant women were excluded from the study. The study was approved by the research and ethical committee of the institute.

**Plasma glucose estimation**

Fasting blood samples were drawn at 8.00-9.00 hour by trained medical technicians by venipuncture. Face to face interview regarding morbidity data was conducted by trained enumerators. The age, sex, clinical manifestations and plasma glucose concentration were recorded in a standard proforma. Fasting and 2 hours post load blood samples were collected by venipuncture in vials containing sodium fluoride and potassium oxalate. Plasma was separated by centrifugation and kept frozen (-20°C) until analysis. Plasma glucose concentration was determined by the glucose oxidase/peroxidase method (Glucose GOD/POD kit, E Merck India Ltd, Mumbai) using Vitalab-selectra-2 autoanalyser (Merck, Germany).

The definition of non-insulin dependent diabetes mellitus (NIDDM) was adopted from the World Health Organization definition (1985) with the following modifications. Subjects with a medical history of diabetes, diagnosed previously and getting treatment were considered diabetic irrespective of their present plasma glucose concentration. For subjects without a history of diabetes, one fasting plasma glucose (FPG) level more than 7.8 mM was considered diabetic and FPG levels less than 5.6 mM were considered non-diabetic. Subjects with FPG levels between 5.6 and 7.8 mM received an oral glucose tolerance test (OGTT). Fasting venous blood was drawn from these subjects before giving an oral glucose load (75 g of dextrose monohydrate dissolved in 300 ml water). A second venous blood sample was drawn 2 hours later. Subjects were considered diabetic if FPG was more than 7.8 mM and/or the 2 hour post load plasma glucose was greater than 11.1 mM. Otherwise, subjects were considered non-diabetic. The subjects with FPG less than 7.8 mM but 2 hours after-load blood plasma glucose between 7.8 and 11.1 mM were considered to have impaired glucose tolerance (IGT).

**RESULTS**

A total of 1,840 subjects (1,040 men and 800 women) of different age groups had FPG data. The male: female ratio was 1.3:1. Table 1 shows...
the prevalence of diabetes by age and sex. A total of 116 diabetic cases (30 previous and 86 new) were found among the 1,840 subjects studied. The prevalence rate was 6.3% (1.63% previous and 4.67% new). The prevalence of newly and previously diagnosed diabetes increased significantly with age. The prevalence of NIDDM in males (6.73%) was slightly greater than in females (5.75%).

Among the 1,840 subjects studied, 30 had been previously diagnosed as NIDDM, 68 had FPG greater than 7.8 mM, 1402 had FPG less than 5.6 mM and 340 had FPG between 5.6 and 7.8 mM. Of the 340 eligible subjects for OGTT (FPG between 5.6 and 7.8 mM), 18 (5.29%, approximately 1% of total population screened) cases of diabetes were found and 128 (37.65%, 7% of total population screened) subjects were IGT (Table 2).

**DISCUSSION**

Our study showed a relatively high prevalence of diabetes, which reflects on the health impact of this disease among the urban population of eastern Nepal. We selected an urban population for this study, because (a) the prevalence of diabetes is higher in urban areas in developing countries (Chea and Yeo, 1983; Cruz Vidal et al, 1979), (b) diabetes and diabetes-related complications comprise to a significant proportion of the patients in and around Dharan utilizing BPKIHS health care resources (BPKIHS record, 1996-97) and (c) the utilization of healthcare resources by most of the rural population in hilly and mountainous areas is so meager that a prevalence rate calculation from a hospital based study will not be a true reflection of magnitude of the problem in this population.

The prevalence rate of 6.3% (1.63% previous and 4.67% new) in this study is higher than those found in many countries (WHO Study Group, 1994; Vannasaeng et al, 1986; Chou et al, 1994). This prevalence is lower than that of urban India but higher than that of rural India (WHO Study Group, 1994). This probably supports the proposition that the incidence of diabetes depends upon the level of industrialization and urbanization (Zimmet, 1979).

This study on urban subjects may reflect the rural-urban difference in the prevalence rates of

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**Table 2**

OGTT Positive rate for patients with borderline FPG OF 5.6-7.8 mM.

<table>
<thead>
<tr>
<th>FPG mM (mg/dl)</th>
<th>OGTT tested</th>
<th>Positive OGTT found</th>
<th>Negative OGTT found</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>Diabetic</td>
<td>Rate (%)</td>
</tr>
<tr>
<td>5.55-5.77 (100-104)</td>
<td>100</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>5.83-6.05 (105-109)</td>
<td>46</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6.11-6.33 (110-114)</td>
<td>38</td>
<td>2</td>
<td>5.26</td>
</tr>
<tr>
<td>6.38-6.60 (115-119)</td>
<td>38</td>
<td>2</td>
<td>5.26</td>
</tr>
<tr>
<td>6.66-6.88 (120-124)</td>
<td>56</td>
<td>2</td>
<td>3.57</td>
</tr>
<tr>
<td>6.94-7.16 (125-129)</td>
<td>18</td>
<td>4</td>
<td>22.22</td>
</tr>
<tr>
<td>7.22-7.44 (130-134)</td>
<td>26</td>
<td>4</td>
<td>15.38</td>
</tr>
<tr>
<td>7.49-7.71 (135-139)</td>
<td>18</td>
<td>2</td>
<td>11.11</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>340</strong></td>
<td><strong>18</strong></td>
<td><strong>5.29</strong></td>
</tr>
</tbody>
</table>
diabetes that has been consistently shown in developing countries. In addition, different diagnostic methods and criteria used in those studies may contribute to various estimates of diabetes prevalence. Most previous population-based surveys measured the post-load plasma glucose value for the detection of this disease. In this study, we used fasting blood glucose because it is more reproducible and it is more convenient to draw a fasting blood sample than 2 hours after glucose load, which we performed for those who fell in the range of suspected impaired glucose tolerance (IGT). This study showed a rising prevalence of diabetes with age in both sexes, reaching the highest rate in the fifth and sixth decades of life. We also found a higher prevalence of diabetes in males than in females, as reported also in other population-based studies in Asia (Chea and Yeo, 1983; Vannasaeng et al, 1986; Kiyohara et al, 1996). The possible reasons for the low ratio of previous to new diabetes may be the lack of public awareness and medical services in Nepal. This study being hospital based might be affected by selection bias and the conclusions may not apply to the population at large.

To clarify the above issues, field-based countrywide epidemiological studies are necessary to provide realistic data on the magnitude of the problem of diabetes for health care planners and to provide the etiologic basis in this disease in Nepal.

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REFERENCES


