SCREENING OF TYPE 2 DIABETES MELLITUS IN KANYAKUMARI GOVERNMENT MEDICAL COLLEGE HOSPITAL AMONG GENERAL POPULATION

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ABSTRACT

BACKGROUND
As the diabetes prevalence is increasing worldwide, an impending diabetes "pandemic" has been reported. Complications related with diabetes could be prevented by early diagnosis. This study shows the trends in incidence of diabetes among general population and its association with obesity, hypertension, age and sex.

METHODS
The general population who came to Kanyakumari Government Medical College Hospital (KGMCH) were screened for diabetes and the incidence of newly-diagnosed Diabetes Mellitus (DM) were used for examining the impacts of lifestyle, social and anthropometric features and other risk factors. The target population comprised >30 years old from the general population who came to KGMCH. A standard questionnaire was used for collecting information on sex, blood pressure, weight, height and BMI for each participant. Blood samples were collected for determining RBS and those with RBS >200 mg/dL were further evaluated after 8 hours fasting for the measurement of fasting and postprandial glucose levels.

RESULTS
Diabetes was associated with ageing, male sex, overweight and hypertension. The mean age of the population with high incidence of diabetes is 60±10 years. Males are affected with an average of 30.5% and females 25.13%. 58.15% of newly-diagnosed diabetic males and 59.5% of newly-diagnosed diabetic females were overweight. Among newly-screened hypertensive patients 26.56% of males and 27.2% of females have diabetes. This study suggests that diabetes is a common health problem in this population and showed an increasing trend from April 2013 to March 2016.

CONCLUSION
The study suggests that diabetes and factors associated with its occurrence are common health problems in this region. The high prevalence of DM and considerable rate of newly-diagnosed diabetes signifies the importance of the screening programme in this population.

KEYWORDS
Diabetes Mellitus, Obesity, Body Mass Index, Hypertension.


DOI: 10.18410/jebmh/2016/871

INTRODUCTION: Diabetes mellitus is a chronic illness that contributes greatly to overall morbidity and mortality and has been reported to be increasing in prevalence throughout the world.¹ The global burden of diabetes is related to the increase in obesity, decrease in physical activity and the ageing of the population.²⁻⁴ Diabetes is a chronic disease with an indeterminate latent phase that is often asymptomatic and may go undiagnosed. Therefore, screening and detection play a role in how the onset of disease and incidence are defined. Diabetes is associated with long-term dysfunction and failure of various organs especially the eyes, kidneys, nerves, heart and blood vessels. Individuals with undiagnosed type 2 diabetes are also at significantly higher risk for coronary heart disease, stroke and peripheral vascular disease than the nondiabetic population. They also have a greater likelihood of having obesity, dyslipidaemia and hypertension. Early detection and prompt treatment may reduce the incidence of diabetes and its complications. Generally, screening in asymptomatic populations is appropriate when seven conditions are met:

1. The disease is an important health problem in the population.
2. The natural history of the disease is known.

Financial or Other, Competing Interest: None.
Submission 22-08-2016, Peer Review 05-09-2016, Acceptance 12-09-2016, Published 19-09-2016.
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DOI: 10.18410/jebmh/2016/871
3. There is a preclinical stage during which the disease can be diagnosed.
4. Tests that are available should detect the preclinical stage of the disease; tests should be acceptable and reliable.
5. Treatment after early detection is available.
6. The case finding and treatment costs are reasonable and facilities are available to treat newly-diagnosed cases.
7. Screening will be a systematic ongoing process.

For diabetes, conditions 1 to 4 are met. Conditions 5 to 7 have not been met entirely because there are no randomised clinical trials documenting the effectiveness of screening programs in decreasing mortality and morbidity from diabetes.

**Major risk factors for type 2 diabetes:**
- Family history of diabetes.
- Overweight (BMI ≥ 25 kg/m²).
- Physical inactivity.
- Previous Impaired Glucose Tolerance.
- Hypertension (≥140/90 mmHg).
- HDL cholesterol ≤ 35 mg/dL; Triglyceride level ≥ 250 mg/dL.
- History of Gestational DM.
- Polycystic ovary syndrome.

**MATERIALS AND METHODS:** Study Subjects: The target population comprised >30 years old general population who came to Kanyakumari Government Medical College Hospital (KGMCH) Non-Communicable Disease (NCD) Outpatient Unit. All individuals were screened in the study with a RBS and those with RBS > 200 mg/dL were evaluated further with FBS and PPBS. Table 1.1 shows newly-detected diabetics among general population of KGMCH. A basic questionnaire about anthropometry, sex and blood pressure measurements were done. Fig. 1.1 describes the trends in the incidence of DM among male and female over the period of 3 years from April 2013 to March 2016. Body weight and height were measured and BMI was calculated. Those with BMI > 30 were considered as obese.

**RESULTS:** The general population screened among aged 30 years and older in 2013-14 consisted of 31558 members and in 2014-15 was 31119 members and in 2015-16 was 24137 members. There were 8143 diabetes cases in 2013-14 compared to 8231 cases in 2014-15 and 7279 in 2015-16. Trends in the incidence of newly-screened diabetes among general population of KGMCH from 2013-2016 is seen in Fig. 1.2. Annual incidence trends from 2013 to 2016 are presented in Fig. 1.1 and 1.2. Among the previously-screened at-risk population, there was an increase in incidence from 2013 to 2016 with rates of 258/1000, 264.5/1000 and 301.6/1000, respectively. On examining the incidence in males and females, the males showed an increased incidence when compared to females. Males are affected with an average of 30.5% and females 25.13%. Diabetes mellitus was also associated with obesity and hypertension as shown in tables 1.2 and 1.3. 58.15% of newly-diagnosed diabetic males and 59.5% of newly-diagnosed diabetic females were overweight. Among newly-screened hypertensive patients, 26.56% of males and 27.2% of females have diabetes. The age-stratified percentage showed similar trends of a steady and slow increase across the age groups particularly in the >50 age groups. The mean age of the population with high incidence of diabetes is 60+/−10 years. Table 1.4 shows the percentage of newly-screened diabetics among various age groups.

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### Table 1.1: General Population of KGMCH

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Population Screened</th>
<th>Newly Detected Diabetes Mellitus</th>
<th>Diabetes With Hypertension</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Males</td>
<td>Females</td>
<td>Males</td>
</tr>
<tr>
<td>2013-14</td>
<td>13247</td>
<td>18311</td>
<td>3904</td>
</tr>
<tr>
<td>2014-15</td>
<td>13453</td>
<td>17666</td>
<td>4129</td>
</tr>
<tr>
<td>2015-16</td>
<td>10012</td>
<td>14125</td>
<td>3155</td>
</tr>
</tbody>
</table>

### Table 1.2: Association of Diabetes Mellitus with Obesity

<table>
<thead>
<tr>
<th>BMI</th>
<th>2013-14</th>
<th>2014-15</th>
<th>2015-16</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Males</td>
<td>Females</td>
<td>Males</td>
</tr>
<tr>
<td>&lt;18.5</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>18.5-24.99</td>
<td>10.08%</td>
<td>11.42%</td>
<td>11.46%</td>
</tr>
<tr>
<td>24.99-29.99</td>
<td>59.45%</td>
<td>63.63%</td>
<td>51.56%</td>
</tr>
<tr>
<td>&gt; 30</td>
<td>30.47%</td>
<td>24.95%</td>
<td>36.98%</td>
</tr>
</tbody>
</table>
Table 1.3: Association of Diabetes with Hypertension

<table>
<thead>
<tr>
<th>Year</th>
<th>Newly Detected Hypertensives</th>
<th>Diabetes With Hypertension</th>
<th>Percentage Of Diabetics Among Hypertensive Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Males</td>
<td>Females</td>
<td>Males</td>
</tr>
<tr>
<td>2013-14</td>
<td>6550</td>
<td>4940</td>
<td>2004</td>
</tr>
<tr>
<td>2014-15</td>
<td>6228</td>
<td>4985</td>
<td>1789</td>
</tr>
<tr>
<td>2015-16</td>
<td>6980</td>
<td>4885</td>
<td>1433</td>
</tr>
</tbody>
</table>

Fig. 1.1: Trends in the Incidence of Newly Screened Diabetics among Males & Females

Fig. 1.2: Trends in the Incidence of Newly Screened Diabetics among General Population at KGMCH
TABLE 1.4: Percentage of Newly Screened Diabetics among Various Age Groups

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Males</td>
<td>Females</td>
<td>Males</td>
</tr>
<tr>
<td>30-40 years</td>
<td>0.82%</td>
<td>0.23%</td>
<td>1.43%</td>
</tr>
<tr>
<td>40-50 years</td>
<td>4.61%</td>
<td>3.2%</td>
<td>5.22%</td>
</tr>
<tr>
<td>50-60 years</td>
<td>12%</td>
<td>9.11%</td>
<td>10.72%</td>
</tr>
<tr>
<td>&gt;60 years</td>
<td>11.24%</td>
<td>9.61%</td>
<td>13.32%</td>
</tr>
<tr>
<td>Total</td>
<td>29.4%</td>
<td>23.1%</td>
<td>30.6%</td>
</tr>
</tbody>
</table>

DISCUSSION: The aetiology of diabetes is multifactorial, which includes genetic factors, environmental factors like obesity associated with rising living standards, urban migration, lifestyle changes and so on. Obesity is one of the major risk factors for diabetes. India has a higher prevalence of diabetes when compared to western countries suggesting that diabetes may occur even at a lower body mass index in Indians. Moreover, Indians are genetically predisposed to the development of diabetes. Diabetes mellitus is reaching potentially an epidemic proportion in India. Diabetes is now shown to be associated with a spectrum of complications and occurs at a relatively younger age. The morbidity and mortality due to diabetes and its complications are high and produce a significant healthcare burden to the society. Thus, our population is more prone to development of the complications of diabetes when compared to other population. Therefore, diabetes must be carefully screened and monitored regardless of the patient age.

CONCLUSION: The study suggests that diabetes and the risk factors associated with it are common health problems in this population. The high prevalence of DM and the percentage of newly-diagnosed cases signify the role of screening programmes. The available data do not support universal diabetes screening, but some recent reports suggest that screening programmes targeting individuals with diabetes risk factors is necessary to find new cases. With regard to long-term complications, early detection of diabetic cases would shift the focus of diabetes management towards a more preventive one. Primary prevention through lifestyle modifications play a crucial role in the control of diabetes. The results of this study emphasise the need to increase public awareness and lifestyle modification towards healthy nutrition and increased physical activity.

REFERENCES