1.0 Introduction

Diabetes mellitus (DM) is a disease or chronic metabolic disorder with various etiologies; it is characterized by high plasma glucose levels with altered metabolism of carbohydrates, lipids and proteins as a result of insufficiency of insulin secretion and function (WHO, 1999). DM has been recognized as a medical exigency causing impaired micro and macro organ function. The changes depend on severity and duration of hyperglycemia (Herzog et al., 2008; Mir et al., 2013). WHO and International diabetes federation (IDF) predicts an increase in the prevalence of diabetes which will reach 2 to 3 times in 2030. A sum of 57 million deaths occurred in the world during 2008; 36 million (63%) were due to non-communicable disease (NCD) mainly cardiovascular diseases, cancer, diabetes and chronic respiratory diseases (Alwan et al., 2010). Type-2 diabetes caused by either unsatisfactory insulin synthesis or an incapability of cells to respond to secreted insulin and leads glucose build-up in the blood.

![Fig.1.1. Global scenario for development of non communicable diseases](http://am2015.aace.com/presentations/Friday/FGS3/DiabetesinIndia)

Uncontrolled DM is usually associated with complications like dyslipidemia, cardiomyopathy, neuropathy and nephropathy. Dyslipidaemia, contributes to the pathogenesis and complications in patients with DM (Lehto et al., 1997). Typically, an atherogenic profile in diabetics includes hyperglyceridemia, decrease levels of HDL and elevated levels of LDL (Purnell et al., 1998; Thorn et al., 2005).
Worldwide 40% of patients reported to develop intense diabetic nephropathy by increased osmolarity of blood due to glucose (NIDDK, 2007; Eleazu et al., 2013). During the progression of DM, decrease in liver weight is due to increased catabolic processes such as, glycogenolysis, lipolysis and proteolysis, which is the outcome of lack of insulin in the liver cells while, the increase in weight of kidney has been reported due to glucose over-utilization and subsequent improvement in glycogen synthesis, lipogenesis and protein synthesis (Meyer et al., 1998). These changes could lead to serious micro-vascular nephrotic complications, which involves a series of metabolic changes in the pathogenesis of diabetic nephropathy (Bakris and Ritz, 2009).

Currently, synthetic drugs possess the numerous side effects for the long-term control of DM. Due to such serious side effect, clinician’s and researcher around the globe are focusing on complementary and alternative medicine that deals with prevention and management of diabetes and its complications due to their effectiveness, less side effects and relatively low costs than synthetic drugs (Murali et al., 2002; Majumdar et al., 2003; Perkeni, 2011; Muhtadi et al., 2015; Balachandran and Govindarajan, 2005).

Banana is most consumed fruit with high nutritional value. According to Ayurveda, banana peel is rich resource of potassium and it does not contain sugar (Alam, 2014). In addition, it is a potential source of pectin and found to exhibit significant hypolipidemia and hypoglycemic activity in rats (The Wealth of India, 2005).

1.1. Epidemiology of Diabetes

DM is a distressing chronic disease and has serious trouble worldwide; the diabetic population is rising incessantly, with an projected 371 million cases in 2012, which is expected to reach 552 million by 2030 (Fradkin, 2012). DM characterized by hyperglycemia owing to be deficient in insulin secretion, which alters metabolism of lipid, carbohydrate and protein (Duckworth, 2001). If, situation persist this condition leads to cardiovascular diseases, kidney failure etc. Type-2 diabetes develops as a result of either unsatisfactory production of insulin or an incapability of cells to reply to insulin secretion and leads to glucose build-up in the blood (Balachandran and Govindarajan, 2005).
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Globally, in 2010 about 285 million people (6.6%) have diabetes and by 2030 is reach up to 438 million (7.8%) (IDF, 2009).

Countries with largest number of peoples suffering from diabetes are India, China and the U.S. (IDF, 2009). Roughly 80% of diabetic population is in developing countries and India and China share the major part (Ramachandrane et al., 2010). World Health Organization (WHO) states that diabetic population in rural and urban areas is 2.7 % and 5.6 % in urban and rural respectively (Mohan and Pradeepa, 2009).

1.2. Mortality

Worldwide, about 57 million deaths happened during 2008 and among that 36 million (63 %) were due to non-communicable disease (NCD), mainly diabetes, cancer, cardiovascular and chronic respiratory diseases (Alwan et al., 2010) and almost 80 % of these deaths (29 million) occurred in low and middle-income countries. NCD deaths are likely to increase by 15% globally involving 2010 and 2020 (to 44 million deaths) and the highest increases will be in South-East Asia, Africa (WHO, 2008).

Table 1.1: Top 10 countries with diabetes patients in 2010 and 2030 (IDF, 2009)

<table>
<thead>
<tr>
<th>Rank</th>
<th>Country/Territory</th>
<th>2010 (millions)</th>
<th>Country/Territory</th>
<th>2030 (millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>India</td>
<td>50.8</td>
<td>India</td>
<td>87.0</td>
</tr>
<tr>
<td>2</td>
<td>China</td>
<td>43.2</td>
<td>China</td>
<td>62.6</td>
</tr>
<tr>
<td>3</td>
<td>U.S.</td>
<td>26.8</td>
<td>U.S.</td>
<td>36.0</td>
</tr>
<tr>
<td>4</td>
<td>Russia</td>
<td>9.6</td>
<td>Russia</td>
<td>13.8</td>
</tr>
<tr>
<td>5</td>
<td>Brazil</td>
<td>7.6</td>
<td>Brazil</td>
<td>12.7</td>
</tr>
<tr>
<td>6</td>
<td>Germany</td>
<td>7.5</td>
<td>Germany</td>
<td>12.0</td>
</tr>
<tr>
<td>7</td>
<td>Pakistan</td>
<td>7.1</td>
<td>Pakistan</td>
<td>11.9</td>
</tr>
<tr>
<td>8</td>
<td>Japan</td>
<td>7.1</td>
<td>Japan</td>
<td>10.4</td>
</tr>
<tr>
<td>9</td>
<td>Indonesia</td>
<td>7.0</td>
<td>Indonesia</td>
<td>10.3</td>
</tr>
<tr>
<td>10</td>
<td>Mexico</td>
<td>6.8</td>
<td>Mexico</td>
<td>8.6</td>
</tr>
</tbody>
</table>

*Antihyperglycemic Effect of Musa Species and Effect of Co-administration of Herbal Drugs in Treatment of Diabetes and its Complication.*
Impaired glucose tolerance and fasting level are risk categories for future development of diabetes and cardiovascular disease (Levitan et al., 2004). In some age groups, DM leads to two-fold increase in the risk of stroke (Boden-Albala et al., 2008). Diabetes is foremost reason of renal collapse in both developed and developing countries. (Icks et al., 2007). Diabetes is also accountable for visual destruction and blindness (Resnikoff et al., 2004). People with diabetes entail at least 2-3 times health-care resources in contrast to people without diabetes and diabetes care may raise the health care budgets by 15% (Zhang et al., 2010). In addition, the risk of tuberculosis is three times higher among people with diabetes (Jeon and Murray, 2008).

1.3. Risk factors

As mentioned previously, common, preventable risk factors underlie most cases of diabetes are strongly associated and causally linked with four particular behaviors: physical inactivity, unhealthy diet, raised cholesterol and the harmful use of alcohol. Due to these activities, 4 key metabolic/physiological changes take place, i.e. raised blood pressure, obesity, hyperglycemia and hyperlipidemia. In terms of attributable deaths, the leading NCD risk factor globally is raised blood pressure (to which 13% of global deaths are attributed), followed by tobacco use (9%), raised blood glucose (6%), physical inactivity (6%), and overweight and obesity (5%) (Global health risks, 2009).

1.3.1. Insufficient physical activity

No or less physical activity is the fourth major risk factor for death. People who are insufficiently physically active have a 20–30% increased risk of diabetes compared to those who engage in at least 30 min of moderate physical activity on most days of week (WHO, 2010).

1.3.2. Harmful use of alcohol

It is a major risk factor for early deaths and disabilities in the world. In 2004, hazardous alcohol drinking were causes for 2.3 million deaths worldwide (WHO, 2009).
1.3.3. Overweight and obesity

Due to overweight and obesity around 2.8 million deaths occur per year worldwide and hence cause adverse metabolic effects on cholesterol, triglycerides and insulin resistance. The risk of ischemic stroke, type-2 diabetes and coronary heart disease also increases with increase in BMI (WHO, 2002).

1.3.4. Raised cholesterol

Raised cholesterol levels increase the risks of heart disease and diabetes (Ezzati et al., 2002). Accumulation of cholesterol on cell surface prevents the binding of insulin with receptor and develops insulin resistance. Globally, a third of ischemic heart disease is attributable to elevated cholesterol (Meyer et al., 2001).
1.4 References:


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