Chapter 2

ANTI-DIABETES PLANTS OF SOUTHERN ASSAM WITH SPECIAL REFERENCE TO BIOLOGICAL SCREENING

REVIEW OF LITERATURE
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Diabetes has a significant impact of individual's health and quality of life. Control measures to improve glucose homeostasis needs more significant scientific and medical evaluation. Several plants have been reported to possess efficacy towards curing diabetes; Hariharan et al., (2005), Bailey and Day (1989). In recent years, there have been significant interest in using alternative medicinal system such as medicinal herbs and thus in this regards ethno medicinal information may provide safe, stable, standardized and efficacious medicinal preparations.

Herbal remedies in individually or in combination have been recommended in various systems of medicines to cure various ailments. It is now known that 87% of all categorized human diseases can be cured by drugs of natural product origin particularly medicinal plants. Djomeni et al., (2006) reported the effort of root bark extract of *Ceiba pentandra* (Lin.) in lowering blood glucose level in Streptozotocin induced diabetic rats. Hussain (2002) reported that the water extract of leaves of *Azadirachta indica* significantly reduced the blood glucose level in STZ induced diabetes in rats. This plant has been reported to posses' cardiovascular anti-microbial immunomodulatory, hypoglycemic and number of other effects; Pilliai and Santhakumare (1981), Chottopadhyay (1996). Nimbidin, an active principle isolated from seeds of *Azadirachta indica* was reported to be effective in reducing blood glucose in alloxan diabetic rabbits at a doze of 200mg/kg body weight; Sonia & Srinivasan (1999).

Considering the significance of the study a good number of researches are now engaged in this field and consequently a number of publications are available viz. In Assam Borthakur (1976) worked on lesser known medicinal uses of plants among the tribes of Mikir Hills; Hajra (1977) worked on some important medicinal plants from Kameng district, Arunachal Pradesh; Janin & Shanpru (1977) worked on wild edible plants in bazaar of Meghalaya; Mazumder et al., (1978) worked on folk-lore medicinal plants of Assam Meghalaya; Tiwari et al., (1979) worked on folk-lore medicine of Assam & Arunachal Pradesh; Janin & Dam (1979) worked on some Ethno botanical notes from North Eastern India; Bhattacharjee et al., (1980) worked on folk lore medicine form Kamrup District, Hajra & Baishya (1980) worked pon Mising; Kumar, Y et al., (1980) worked on certain medicinal plants among some Garo people around Balphakrah sanctuary in Meghalaya; Josep and Kharkongor (1980) worked on the Ethno Botanical plants in Khasi & Jaintea Hills of Meghalaya; Jain & Borhakur (1980) worked on Mikirs; Karnik, et al.,(1980) worked on some medicinal plants of Guwahati and Surrounded areas; Rao 1981 worked on medicinal plants used by Khasi And Garo Tribes
of Meghalaya; Rao & Jamir (1982) worked Ethno Botanical Plants of Nagaland; Baurah & Sharma (1984) worked on Boro; Gogoi & Boissya (1984) worked on Herbal Medicine used by the people of Assam against Jaundice; Dutta Choudhury (1999) has carried out Ethno Medico Botanical aspects of Reang tribe of Assam; Dutta Choudhury and Chowdhury (2002) published some new Ethno Medicinal plants from Reang tribes of Assam. However, in all these studies, less emphasis was given on anti-diabetes plants. Baruah et al. (1984) studied on the medicinal plants of Boro Tribes of Assam. Ford (1978) studied the nature of Ethnobotany, Ivorra et al. (1989) studied on natural products as potential anti-diabetes drugs.

Diabetes is the second commonest chronic disease in childhood occurring in 1 in 350 children by age 8. It is crucial to recognize that not all children with diabetes have juvenile or Type I diabetes. In fact according to American Diabetes Association (ADA), 8-45% children with new onset diabetes have a non-immune mediated form, and most of them are Type-II diabetes other less common etiologies diabetes including fibrocal culous pancreatopathy and mitochondrial diabetes.

Type-I diabetes, which we commonly relate with children’s, tend to be more common in Caucasians, with Scandinavian nations. Recording highest prevalence rates, it appears to be less common in India. The incidence of Type-I diabetes has been low-3.8 per 100,000 person-years but the burden of diabetes is great. Only 20.7% patients in the study could achieve Aic<7% and 11.8% had complications, may also had growth
problems. This study highlights some of the complexities of management of Type-I diabetes (Kumar et al., 2008).

Proper diabetes education for a child with type-I diabetes and his/her family is a specialized task, incorporating a set of skills like good communication, compassion, humour and above all a sound understanding of childhood diabetes. Diabetic keto-acidosis a life-threatening complication of children with type-I diabetes that is best prevented. Proper observation of sick day guidelines during periods of intercurrent illness can go a wrong way in preventing catastrophic metabolic emergencies.

The growing concern for our country, marching rapidly towards becoming a vibrant developed economy in the near future, is the rapidity increasing prevalence of pediatric type-2 diabetes an entity almost unknown a decade back. This is off course, a global phenomenon. There has been a 46% increase in the prevalence of diabetes in young Americans from 1990 (6.4 per 1000) to 1998 (9.3 per 1000). The peak age of presentation of type-2 diabetes in children and adolescence in mid to late puberty corresponding with concomitant increase in insulin resistance; girls seem too affected more.

Gestational Diabetes Mellitus (GDM) is carbohydrate intolerance with recognition or onset during pregnancy, irrespective of treatment with diet or insulin Indian women have II-fold increased risk of developing glucose in tolerance during pregnancy compared to Caucasian women. The prevalence of Gestational Diabetes Mellitus GDM in India from hospital based data was 16.55% by World Health Organization (WHO) criteria (2-hour plasma glucose
(PG) post 75g oral glucose tolerance test (OGTT) $\geq 140$ mg/dl while that from population based studies was 3.1% and 4.4% based on Carpenter and Caustan (C&C) and WHO criteria respectively. Recently it was shown that prevalence of GDM across age group of women in urban semi-urban and rural areas was ranging from 10.6%- 35.8% 7.8%- 48.4% and 8.2% to 29.6% respectively, (Swami et al. 2008).

The prevalence of Gestational Diabetes Mellitus is high as compared to the population based study by Zargar et al. (2004), from Kashmir valley. It is low when compared to the study of Sheshiah et al. (2008), which was a hospital based study from screening policy. In the latter WHO 1999 criteria was used for the diagnosis of GDM. In their study the prevalence of GDM was 3.93% by applying ADA criteria of FPG>95mg and 2 hour PPG> 155 gm (using 75g OGTT), whereas by WHO criteria found that in their pregnant population the prevalence was 2.4% by applying the ADA criteria and 7.2% by WHO criteria. The diagnostic pick up rate in their study was three times more with WHO criteria than with ADA criteria. This prevalence was similar to that reported by the latest population based study (universal screening, irrespective of trimester) in urban area. (10.6% to 35.8%) (Sheshiah et al., 2008).

Singha et al., (2008) have evaluated 97 consecutive patients with type 2 diabetes to assessing laboratory aspirin resistance and attempted to assess the impact of various clinical and biochemical parameters and it thirty eight patients 39.1% were found to be less sensitive to the action of aspirin, 7 responders. Only total cholesterol, LDL - cholesterol and triglyceride had
statistically significant impact on aspirin resistance ($p<0.05$). 3 persons out of 1 with some form of Mac vascular diseases had aspirin resistance.

Lebovitz (2008) observed the clinical significance control can reduce the cardiovascular complications in type 2 diabetes. He observed this in three clinical trials (ACCORD, ADVANCE and VADT). All three studies measured micro vascular and points. It is important to initiate intensive glycaemic control early in the course of diabetes. Type 2 diabetes mellitus patients require life style modification plus combination of insulin sensitizers and insulin secretagogues. It target glycaemic control is not achieved then either in cretin mine tics and insular can be added.”

The factor underpinning the development of type -2 diabetes mirror closely the presentation of atherothrombotic risk factors that enhance risk of macro vascular disease, (Scott et al., 2008). It has been postulated that this relationship is so tight as to indicate that diabetes and cardiovascular disease are the same condition with common genetic and environmental antecedents ('The common soil hypothesis') the huge increase in prevalence of type-2 diabetes in the Asia-pacific region in recent years has raised serious concerns regarding the cardiovascular consequence for these population. For example in the U.K, subjects of S Asian origin have a higher prevalence of type-2 diabetes with a relative risk of favors the view that the development of obesity is associated with an insulin resistant phenotype that promotes vascular risk. Our endogenous clock is regulated centrally in the hypothalamus by light exposure and in peripheral tissues to place out
metabolic needs in time with day length and the seasons. Evidence from animals and cellular studies with early data from human studies indicates that disruption of the endogenous clock as can occur with obesity, is associated with a metabolic syndrome phenotype. The adoption of western lifestyle by S Asian subjects may promote disruption circadian rhythms with associated increases in both diabetes and cardiovascular disease.

Insulin after its clinical use in the early 1920 has undergone major advances to become widely accepted to combat all patients with type-1 diabetes and many of type-2 diabetes. 27% Patients of type-2 diabetes use insulin therapy but less than half achieves the goal. So, suboptimal insulin therapy is common. It can be said that premise insulin can be used safely once or twice a day. A common starting doze in type-2 diabetes is 0.15 units/ kg body weight / day, however higher dozes are often required. The evaluation of a patient is always mandatory with increasing/decreasing insulin requirements. Insulin therapy has undergone remarkable developments in the present age. The introduction of insulin analogous, better patient friendly delivery devise has improved compliance and acceptability among diabetes. (Das, 2008).

Sinharoy et al., (2008) reported in their paper titled “A study on clinical and Biochemical Profile of low body weight type 2 Diabetes Mellitus.” Low body weight type 2 diabetes mellitus (T2DM) is a distinct entity in T2DM having different clinical presentation, morbidity mortality patterns as well as biochemical profile when compared with clinical T2DM. This study was
aimed at comparing three subtypes of T2DM—overweight (BMI > 18.5 but < 25) and low body weight or lean type 2 DM (25-lean, 25 normal weight and 25 overweight) were selected. The study revealed that normal C-peptide level with basal hyperglycaemia is an important characteristic of lean T2DM. Lower prevalence of hypercholesterolemia and higher level of triglycerides were found in low body weight T2DM. Lower prevalence of macrovascular and higher prevalence of microvascular complications is also noted.

Animals need to be employed to study hypoglycaemia and anti hypoglycaemia activity. The two important aspects involved in this bioassay study are selection of animal model and management of animal stock. Oral treatment of *Nigella sativa* L. decrease the diabetes-induced disturbances of heart rate and some haematological parameters of Alloxan induced diabetic rabbits. (Meral et al., 2004)

*Momordica charantia* significantly reduces maximum velocity (V max) of D-(+)-glucose uptake by 0.09mM/hr, whereas, Michaelis Menten constant (Km) remains unaltered suggested a noncompetitive type of inhibition, Mahomoodally et al., (2004). Oral administration of *Scoparia dulcis* plant extract (SPEt) (200mg/Kg body weight) for three weeks resulted in a significant reduction in blood glucose and an increase in plasma insulin (Pari and Latha, 2005). Aqueous extract of the leaves of *Nauclea latifolia* posse’s hypoglycemic activity (Gidado et al., 2005). Lower concentration of *Moringa olifera* leaf extract may be used for the regulation of hyperthyroidism, (Tahilian and Kar, 1999).
Despite correlation between brachial-ankle pulse wave velocity (baPWV) and systolic blood pressure (SBP), there was no significant correlation between the mean baPWV and duration of diabetes, body mass index (BMI), waist circumference, waist-hip ratio (WHR), waist to height ratio (WHtR), glycated haemoglobin (HbA1c), LDL, HDL, cholesterol and spot urine albumin creatinine ratio (ACR) at the baseline. The decrement of LDL-cholesterol is correlated with the decrement of the baPWV in the atrovastatin group only (p<0.01), Mukherjee et al., (2008).