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Editorial

Current dietary trends in the management of diabetes

Type 2 diabetes is a chronic progressive disease that requires lifestyle changes, especially in the areas of nutrition and physical activity. The dietary structure, levels of physical activity and other diet-related non-communicable disease patterns like obesity and hypertension are changing rapidly throughout the developing world. Today, the prevalence of type 2 diabetes parallels the increase in obesity observed around the world, the rapidly rising ageing population living an increasingly sedentary lifestyle, and consuming, in relation to their energy expenditure, foods too high in calories, fat and refined carbohydrates[1].

The largest number of diabetic subjects are in India[2]. In addition, the clinical profile of an average Indian with type 2 diabetes is different from that of a Caucasian with type 2 diabetes[3]. At diagnosis, Indian patients are a decade younger, shorter, considerably thinner (particularly in the limbs) but more centrally obese than the caucasian patients[4]. Despite being lean, Indians are more insulin resistant and hyperinsulinaemic[5]. Obesity and physical inactivity constitute part of the risk for type 2 diabetes because of their propensity to induce insulin resistance. Thus, there is renewed interest in the prevention of insulin resistance and type 2 diabetes through lifestyle interventions. The key lifestyle interventions are physical activity and a nutritional plan with reduced caloric intake[6].

Though we have learned much about the dietary treatment of diabetes during the past several decades most patients with diabetes still have difficulty in understanding and adhering to the nutritional component of their treatment. This in turn, compromises the level of control they are able to achieve. Possible reasons why nutrition therapy is difficult for patients includes the following: nutrition recommendations for diabetes have changed over time, often in contradictory ways; there is little international consensus on dietary guidelines as food patterns differ so widely, and finally adherence to any diet that differs from that of the general population is difficult. In our society, food has many purposes besides meeting nutritional needs.

Nutrition therapy for diabetes focuses on goals and strategies for the treatment and prevention of diabetes and on achieving optimal metabolic outcomes related to glycaemia, lipid profiles, and blood pressure levels[7]. Although many studies have focused on the role of single nutrients, foods, or food groups in disease prevention or promotion, emerging research suggests health benefits from certain food patterns that include a mixture of foods containing multiple nutrients and non-nutrients[8].

The earliest known recommendation for treatment of diabetes included references to what we now consider to be carbohydrate (CHO) containing foods. Even then, the debate was whether a high CHO or low CHO diet was most beneficial for some one with diabetes. Prior to the discovery of insulin in 1921, the primary treatment for diabetes was an extremely low energy, low CHO diet[7]. Although the American Diabetes Association (ADA) guidelines somewhat liberalized CHO intake in 1950s, the focus continued to be primarily on restriction of CHO until the 1970s[9].

Since 1958 late Prof. Viswanathan and colleagues noted that diets higher in carbohydrate, rich in complex carbohydrates, dietary fibre and relatively low in fat benefited diabetic individuals[10]. He thus evolved the concept of high-carbohydrate and high-fibre (HCHF) diet[11]. Since then many short and long-term studies have shown that the HCHF diet when used in conjunction with small doses of oral hypoglycaemic agents, helps to achieve rapid control of diabetes, and the effect of such a diet on blood glucose level was sustained for several years[12]. Similar studies had also shown an improvement in the serum cholesterol and triglycerides levels[11]. This diet also improved the peripheral insulin sensitivity and lowered the dietary glycaemic indices[12]. The patients' acceptance and

adherence to the diet was excellent. The HCHF diet is thus considered ideal for countries like India where the diet is cereal-based[12].

The focus towards restriction of dietary fats, particularly saturated fatty acids (SFA), and cholesterol, received increasing emphasis through the 1980s and into the 1990s due to the increased risk for cardiovascular disease in individuals with diabetes. This led to a further liberalization of CHO intake. Recently the role of monounsaturated fatty acids (MUFA) has come into focus and several studies suggest that the use of high carbohydrates high fibre diets and low carbohydrate high MUFA diets to produce similar beneficial effects[9].

Traditional Asian diets are cereal-based, rich in fibre and low in saturated fat, cholesterol and meat, but as societies move up the socio-economic scale, changes take place in both dietary structures and patterns[13]. In both developed and the developing countries, energy intake has progressively increased during the last decade, with a trend towards greater consumption of animal as compared to vegetable sources in the diet[13]. A large shift from consumption of coarse grains such as sorghum, barley, rye, maize and millet to more refined cereals, like polished rice and wheat is seen especially among the urban population and higher income groups[14]. These changes could result in a significant decrease in the overall fibre content of the diet.

Dietary advice is no longer a list of instructions dictating what people with diabetes should or should not eat. But to determine how current-eating habits can best be modified in order to meet the clinical objectives. Dietary change is achieved by a series of small stepwise changes rather than a major disruption. The extent and pace of change is hence a balance between what is desirable and what is acceptable. Dietary education is an ongoing interactive process of follow up, adjustment and support not a standard package delivered in a single session[15]. Additional factors like individual circumstances, and cultural and ethnic preferences should be considered and the person with diabetes should also be involved in the decision making process. General recommendations are made for including whole grains, fruits, vegetables, and low fat milk, whereas the intake of saturated fat is restricted. High fibre rich foods are highly recommended for diabetic patients as they have low caloric value and low glycaemic index (GI)[6].

The most effective dietary management for type 2 diabetes is calorie restriction for weight reduction, since most subjects with this type of diabetes are metabolically obese. In the UK prospective diabetes study (UKPDS), the greatest reduction in HbA1c of nearly 2 per cent occurred during the first 3 months with intensive diet and 5 per cent weight loss[16]. The initial glucose response was related more to decrease in energy intake than to weight loss and the decrease in body weight was a secondary response[16]. Estimates of energy requirement should be based on body weight, age and activity level[17].

Most Indian diets are predominantly cereal based and thus higher carbohydrate intakes have become usual for people with diabetes unlike diabetic subjects in western countries. It is recommended that 60-65% of total energy requirement can be derived from carbohydrate of the desirable kind[18]. When referring to carbohydrates, terms such as sugars, starch and fibre are preferred, whereas earlier terms such as simple and complex carbohydrates are not well defined and are better avoided[19].

Historically, it was assumed that sucrose consumption aggravated hyperglycaemia, but many studies have shown that sucrose does not result in a greater rise in plasma glucose than iso-calorie amount of other carbohydrate sources such as bread, rice or potatoes[20]. While sucrose and other refined sugars can be substituted for other carbohydrates in the meal plan, caution is still needed. In common with certain starchy foods, saturated fats, and alcohol, energy from refined sugars is considered to be “empty calories”.

GI takes into account the plasma glucose responses to a food stuff compared to an equivalent amount of sucrose or white bread. Lower GI values indicate a smaller rise in glucose. Another measure discussed in this regard is the glycaemic load (GL), which is the amount of carbohydrate multiplied by its GI[22]. The GL takes into account both the glycaemic index and the total carbohydrate load.

The practical application of GI and GL concepts in the meal planning becomes useful only when comparing different foodstuffs within the same food group. Just as different types of fat affects blood lipid values differently, different types of carbohydrate also affect blood glucose levels. These concepts should allow the development of a scientifically based carbohydrate exchange list for use in the management of diabetes, obesity and cardiovascular diseases[23]. However, more work needs to be done on GL of Indian diets.

Extensive studies have been done on the effects of dietary fibre, both soluble and insoluble, on lipid and carbohydrate metabolism in people with diabetes mellitus[24]. Fibre present in vegetables, fruits, legumes and fenugreek seeds is soluble in nature and more effective in controlling blood sugar and serum lipids. Improved insulin sensitivity is postulated to be the mechanism by which soluble fibre improves hyperglycaemia[17]. Intake of 25g of dietary fibre per 1000 cal is considered optimum for a person with diabetes[18].

Type 2 diabetes mellitus and associated cardiovascular diseases have reached global epidemic proportions[25]. Asians in general and Indians in particular are more prone for diabetes and coronary artery disease[26]. Fat intake rises sharply with urbanization or rise in socio-economic class. Bulk of the additional fat comes from the visible cooking fat; high intake of saturated fat can increase endogenous cholesterol formation leading to increases in plasma low density lipoprotein (LDL) cholesterol. Using lean meats, skimmed milk and avoiding butter, cream, oils such as hydrogenated fat, and coconut oil could help in reducing intake of saturated fats[27]. It is therefore recommended that the intake of SFA and trans-unsaturated fatty acids be limited to no more than 10 per cent of total energy intake, and the total amount of dietary cholesterol to <300mg/dl in order to achieve optimal LDL cholesterol levels (<100 mg/dl)[7].

Diets rich in cis-MUFA have beneficial effects on serum lipids and glycaemic control. In addition, such diets may increase compliance for some individuals who are used to a high fat diet[9]. Since the body can synthesize long chain n-3 polyunsaturated fatty acids (PUFA) (the beneficial component of fish oil) from alpha-linolenic acid (ALNA, n-3) present in plant foods and vegetable oils (especially rapeseed, mustard oil), the latter can be substituted for fish[28].

A high ratio of omega-6 to omega-3 exceeding 5:1 is now known to favour atherogenesis[29]. It is currently recommended that the intake of PUFA should be <10% of total energy, based upon the potential adverse consequences of increased lipid oxidation and reduced levels of high density lipoprotein (HDL) associated with high intakes[30]. Conjugated linoleic acid (CLAs) are a group of naturally occurring fatty acids found predominantly in milk and animal fat that have gained ample attention for their numerous reported health benefits such as anti-carcinogenic, anti-atherogenic functions. It is now speculated that CLA could serve as novel therapeutic approach for the prevention of treatment of type 2 diabetes and metabolic syndrome[25].

The rising prevalence of diabetes will put increasing pressure on dietetic resources in developing countries which are already over stretched[15]. The diet for diabetes is the nutrition regimen developed to meet physical, metabolic, and lifestyle requirements of an individual[31]. For patients with type 2 diabetes, reduction of total energy intake and increase in physical activity consistent with the patient's physical capabilities should be recommended in order to reduce body fat, decrease insulin resistance, and improve glycaemic and lipid control[9]. Most dietary guidelines emphasize target intakes of specific macronutrients. But many individuals find it difficult to make dietary changes based on such numerical criteria. Recommending an overall pattern of dietary intake focusing on appropriate food choices meal wise might be easy for the common man to interpret or translate into diets. Dietary recommendations for the management of diabetes should focus more on the quality and quantity of carbohydrates and fat in the diet in addition to balancing total energy intake with expenditure. Thus, with a balanced diet with optimum nutrition, the diabetic individuals need no additional supplements for vitamins and minerals. Appropriate nutrition measures will help in reducing the risk of not only diabetes but also

hypertension, dyslipidaemia, central body obesity and hyperinsulinaemia, all of which are part of the insulin resistance syndrome or metabolic syndrome.

V. Sudha, G. Radhika & V. Mohan*

M.V.Diabetes Specialities Centre &
Madras Diabetes Research Foundation
4, Conran Smith Road,
Gopalapuram,
Chennai 600086, India
**For Correspondence*:
e-mail: mvdsc@vsnl.com

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