Diet and diabetes: theory and practice for care providers

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Introduction

Diabetes, particularly type 2 diabetes is one of the fastest growing public health problems in the world. It has been estimated that the number of diabetes sufferers in the world will double from the current value of about 190 million to 325 million during the next 25 years.[1]

The amount and type of food consumed is a fundamental determinant of human health. Diet is one of the major factors now linked to a wide range of diseases including diabetes. Diet constitutes a crucial aspect of the overall management of diabetes which may involve diet alone, diet with oral hypoglycaemic drugs or diet with insulin. Diet is individualised depending on age, weight, occupation, etc.

The dietary guidelines as used in this review are sets of advisory statements that give quick dietary advice for the management of the diabetic population in order to promote overall nutritional well-being, glycaemic control, and prevent or ameliorate diabetes-related complications.

Objectives of dietary treatment of diabetes

The aims of dietary treatment of diabetes are:

- To achieve optimal blood glucose concentrations.
- To achieve optimal blood lipid concentrations.
- To provide appropriate energy for reasonable weight, normal growth and development, including during pregnancy and lactation.
- To prevent, delay, and treat diabetes-related complications.
- To improve health through balanced nutrition.

Anthropometry and daily calorie intake

The World Health Organization (WHO) has accepted a classification[2] of weight status according to body mass index (BMI) and defines overweight as a BMI ≥25 kg/m^2 and obesity as BMI ≥30 (see Table 1). These BMI values are independent of age and gender. For regional obesity, WHO also favours the use of waist circumference (WC) alone rather than waist:hip ratio (WHR) to assess abdominal fat, because it is a simpler measure and closely correlates with disease risk.[2]

Table 1 The WHO classification of weight status

WHO classification	BMI (kg/m^2)
Underweight	<18.5
Normal range	18.5 – 24.9
Class I overweight	25.0 – 29.9
Class IIa obese	30.0 – 34.9
Class IIb obese	35.0 – 39.9
Class III obese	≥40.00

A recent evaluation of the pattern of diabetes in Rivers State, Nigeria, under the auspices of the local Diabetes Association revealed that the type 1 diabetic patients were relatively underweight at diagnosis with a mean BMI±SD of 18.3±2.3 and the type 2 patients were relatively overweight, especially the females (BMI 27.7±5.8, see Table 2).

The usually recommended daily intake for the non-obese diabetic patient is between 1500 and 2500 kcalories per day, the average allowance being 2000 kcalories per day.[3] The recommendation for the overweight diabetic patient is between 800 and 1500 kcalories per day, while the underweight (including growing children and adolescents) should be allowed at least 2500 kcalories/day and above.[3]

Peculiar tropical problems with dietary prescriptions

Some socio-economic factors distinguish the problems of dietary management of diabetes in a tropical developing country from the experience in the industrialised world. Illiteracy rates can be as high as 75–85% among Nigerian diabetic patients,[4,5] hence they depend on their relatives to read the conventional diet sheets.

Among the few who are educated, the level of medical literacy is low.[5] There is a lack of registered/practising dieticians at the primary and secondary healthcare levels, coupled with an absence of national standardised measures and dietary formulae. Attempts to adhere to the conventional food measurements in order to comply with prescriptions of the so-called 'diabetic diet' usually result in unnecessary restrictions, overindulgence, or monotonous consumption of certain food items, e.g. unripe plantain and/or beans. This is a consequence of

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Table 2 Demographic and glycaemic parameters of newly diagnosed diabetic patients (n = means±SD)

Parameter	Type 1 diabetes	Type 2 diabetes	Other specific types	Gestational diabetes
Age groups (yrs) 0–9	4 (0.5%)	–	–	–
10–19	13 (1.6%)	7 (0.8%)	7 (0.8%)	–
20–29	8 (1.0%)	23 (2.8%)	3 (0.4%)	7 (0.8%)
30–39	–	116 (2.8%)	–	8 (1.0%)
40–49	–	240 (29.0%)	–	–
50–59	–	206 (24.8%)	–	–
60–69	–	150 (18.1%)	–	–
70–79	–	38 (4.6%)	–	–
80+	–	–	–	–
Total number (%)	25 (3%)	780 (94%)	10 (1.2%)	15 (1.8%)
Mean age ±SD (at diagnosis)	20±7.0	48±13.0	21.0±7.6	32±5.0
Gender ratio (M:F)	1:1	1:1.4	2.3:1	All female
BMI ±SD	18.3±2.3	27.4±5.5	17.5±3.1	27.8±5.3
BMI (males)	17.5±2.0	24.9±4.3	16.9±2.1	–
BMI (females)	19.1±2.8	27.7±5.8	18.1±2.6	27.8±5.3
Age (males)	14.0±5.0	47±13.0	19.0±6.1	–
Age (females)	24.0±8.0	48±14.0	23.0±7.2	As above

illiteracy, poverty, and cultural misconceptions about the role of diet in the management of diabetes.[4] This is usually the most problematic aspect of diabetes care.

In view of the above, the authors recommend 'rule of thumb' dietary guidelines based on practical experience. These could be useful to healthcare givers at the primary or secondary levels.

General dietary guidelines

Modern dietary management of diabetes essentially involves modifications of the quality and quantity of food to be taken by the diabetic patient. The following guidelines are applicable to diabetes irrespective of type, weight status, age, gender, or occupation.

1. Most of the carbohydrate consumed should be in the form of starch (polysaccharides) such as maize, rice, beans, bread, potatoes, yam, cassava, 'foofoo', semovita, plantain, 'amala', garri, pap, etc.
2. All refined sugars such as glucose, sucrose, and their products (soft drinks, malt drinks, sweets, toffees, etc.) and honey should be avoided except during severe illness or episodes of hypoglycaemia. These foods contain sugar in a simple form, which is easily absorbed causing rapid rise in blood sugar.
3. Non-nutritive sweeteners, e.g. Canderel, saccharine, Nutrasweet, aspartame are suitable sugar substitutes for diabetic subjects.
4. Animal fat such as butter, lard, egg yolk, pork, and other foods high in saturated fatty acids and cholesterol should be reduced to a minimum and replaced with polyunsaturated fats[6] such as vegetable oils.
5. Salt should be reduced whether hypertensive or not.
6. Protein (fish, meat, beans, crab, crayfish, soyabean, chicken, etc.) and salt are restricted for those with diabetic nephropathy.
7. The items allowed for free consumption include:[8]
   (a) water, green leafy vegetables, tomatoes, onions, cucumber, aubergine, peppers, vegetable salad without cream.
   (b) Any brand of tea, coffee or drinks that contain very low or no calories.
8. Cigarette smoking should be avoided by diabetic patients. Alcohol should be taken only in moderation.
9. For patients too ill to eat solid food, a fluid or semi-solid diet should be substituted (pap, soya bean, custard, etc.).
10. Patients treated with insulin or certain oral hypoglycaemic agents, e.g. sulphonylureas, must be advised to eat regularly and often to prevent hypoglycaemia – three meals a day plus suitable snacks in between, e.g. fresh fruit or two unsweetened biscuits.
11. Small meals spaced over the day rather than one or two big meals, are helpful in avoiding post-prandial peaks in blood sugar.
12. The diet should be varied to avoid monotony and provide a wider range of nutrients for healthy living.

Anthropometrics and dietary recommendations

The broad principle of daily energy recommendation is based on maintaining the ideal body weight for the height of each individual.[6] The dietary regimen is individualised and should be tailored to nutritional needs, abilities, dietary habits, likes and dislikes, or idiosyncrasies of each patient. However, faulty dietary habits should be corrected.

Underweight (BMI<18.5 kg/m^2)
The goal here is to gain or regain weight. To gain weight the patient must take in more calories than needed to meet the body's physical activity requirements. Emphasis should be on a balanced diet, keeping to his or her favourite foods, regular meals, and increasing the 'serving size' (otherwise called portion control)[7] to about twice what the patient is already consuming. Weight gain or regain is gradual and the patient should be regularly reviewed (at 2 to 4-week intervals) and further increase in 'serving size' made when deemed necessary. Insulin (an anabolic hormone) and the sulphonylureas enhance weight gain and their use should be considered in underweight diabetic patients.

Overweight (BMI>25 kg/m^2)
The aim here is to reduce weight while optimising drug therapy. Overweight/obesity occurs when energy intake has exceeded energy expenditure over a long period of time, thus weight reduction must be gradual over a period of time – the target should be about 1.0–1.5 kg loss every 1 to 2 weeks.

We have observed obesity 'unawareness' among our diabetic patients (mainly type 2 diabetics) and this point must be stressed during patient education.

In limiting the number of calories consumed per day, the patient does not need to abstain from his/her favourite foods; what is needed is to know how much to cut back on the 'serving size' (portion control).[7] The target initially is to cut down to half the previous serving size per meal with a monthly review and subsequent reductions when deemed necessary. The 'serving size' reduction should affect particularly the complex carbohydrates, which constitute the main staple foods in the tropics (see point 1 in the general dietary guidelines above).

Many of our type 2 dietary patients find portion control an important aspect of the solution to losing weight. By monitoring the serving size of the foods and combining it with regular exercise and drugs (especially metformin), patients can enjoy a wider variety of meals including their favourite foods and ethnic dishes, and still lose weight. Portion control can also help overcome the biggest challenge, which is maintaining the new healthy weight. When overweight diabetic patients shed some weight by trimming down 'serving sizes' and calories, insulin sensitivity improves, thereby optimising drug therapy.

A 'rule of thumb' here is that through 'systematic self-management education' offered by the healthcare team, diabetic patients can 'eye-ball' their foods to determine portion size. Effective education however involves reinforcement and patience but it is usually rewarding.

Normal weight (BMI 18.5–24.9 kg/m^2)
The fundamental principle behind maintenance of body weight is the energy balance. This group should be encouraged to maintain their current weight by:

- maintaining current 'serving sizes'
- eating about the same amount of food each day
- eating at about the same times each day
- taking their drugs at the same times each day
- exercising at the same times each day.

These patients should also endeavour to choose their daily foods from starches, vegetables, fruits, and protein, while limiting the amount of fats.

Conclusions

Diet is an important aspect in the management of a diabetic patient. Unfortunately many health facilities in the tropics do not have the services of a dietician. It is hoped that the dietetic manpower needs of tropical countries will be met in the near future. Until then, the diabetic healthcare provider and the patient should understand the basic dietary needs of the patient using a 'rule of thumb' approach. Where a dietician is available, regular visits to both the physician and the dietician should be the mainstay of management.

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