



The Role Of Lifestyle Modification In The Management Of Diabetes Mellitus

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INTRODUCTION

The term diabetes mellitus describes a metabolic disorder of multiple aetiology characterized by chronic hyperglycaemia with disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, insulin action, or both¹. It is unarguably the commonest endocrine condition globally and a major public health concern due to its associated morbidity and mortality as well as the huge yearly expenditure on its management. Diabetes can be majorly classified into Type 1 diabetes, Type 2 diabetes, other specific types and Gestational diabetes. However, type 2 diabetes constitutes about 85 to 95% of all diabetes in high-income countries and may account for an even higher percentage in low- and middle-income countries². Type 2 diabetes is now a common and serious global health problem.

In most countries, diabetes has increased alongside rapid cultural and social changes, ageing populations, increasing urbanization, dietary changes, reduced physical activity and unhealthy lifestyle and behavioural patterns². In particular, the aetiology of type 2 diabetes mellitus appears to involve complex interactions between environmental and genetic factors. Presumably, the disease develops when a diabetogenic lifestyle (i.e. excessive caloric intake, inadequate caloric expenditure, obesity) is superimposed on a susceptible genotype.

Rates of diabetes are increasing worldwide. The International Diabetes Federation (IDF) predicts that the number of adult people living with diabetes will rise from 382 million (8.3%) in 2013 to 592 million (10.1%) by year 2035 globally if the current trend continues unabated³. The largest increases will take place in the region where developing economies is predominant such as Africa³. In human as well as financial terms, the burden of diabetes is enormous, provoking 5.1 million deaths and taking up some 548 billion US dollars in health spending (11% of total health expenditures worldwide) in 2013³. In Nigeria, national prevalence of diabetes was 4.99% in 2013 according to IDF³ as against 2.2% reported in 1997 by Akinkugbe et al.⁴

The Big Question then remains – What exactly is the correlation between a rapidly growing economy and the incidence of Diabetes Mellitus? The answer is the people who make up the economy and how they choose to live their lives in response to the change around them. This leads us to the lifestyle modifications and their association with diabetic predisposition and more importantly- How these causative methods can be revised and re-employed as the tools for its management. A variety of lifestyle changes in people living with diabetes mellitus can make them live like the normal people that they truly are. The goals of management of diabetes include (1) Attainment of individualized glycaemic, blood pressure and lipid goals (2) Achieve and maintain body weight goals (3) Delay or prevent complications of diabetes.⁵ Certain modifications in pre-morbid life and leisure pattern, if adhered to, can make the attainment of these goals rather effortless and enjoyable. This holds true especially in individuals with Type 2 diabetes mellitus. These lifestyle changes cut across choice of food, exercise and also social habits. The article gives an overview of these modifications and discusses the role of its primary components in the management of diabetes mellitus.

OVERVIEW OF LIFESTYLE MODIFICATION

Lifestyle encompasses modifiable social factors that have an impact on health, whether they are negative or positive.⁶ Lifestyle modification includes primary components: diet, exercise, and behavioural

therapy.⁷ These lifestyle interventions and in particular increased physical activity help in the prevention and management of diabetes⁶. Increase physical activity can contribute to lower blood glucose levels and improved insulin resistance.⁶ It is suggested that exercise can substitute pharmacological treatment in prediabetics⁶. Comprehensive lifestyle modification programs typically provide weekly individual or group treatment sessions designed to modify eating and physical activity habits.⁸ This approach is exemplified by the Diabetes Prevention Program (DPP)⁹ and The Look AHEAD (Action for Health in Diabetes) study.^{10,11}

In the DPP, 3324 overweight pre-diabetic participants from 27 clinical centers around the United States were randomly divided into different treatment groups. The first group, called the lifestyle intervention group, received intensive training in diet, physical activity, and behavior modification. By eating less fat and fewer calories and exercising for a total of 150 minutes a week, they aimed to lose 7 percent of their body weight and maintain that loss. The DPP showed that people at risk for developing diabetes can prevent or delay the onset of diabetes by losing a modest amount of weight through diet and exercise. DPP participants in the lifestyle intervention group reduced their risk of developing diabetes by 58 percent during the study.⁹ DPP participants who took the oral diabetes medication metformin also reduced their risk of developing diabetes, but not as much as those in the lifestyle intervention group.⁹

Look AHEAD study is a 13.5-year trial that was initiated following the DPP to ascertain health consequences of lifestyle modification in subjects with type 2 diabetes mellitus.¹⁰ More than 5100 overweight participants with type 2 diabetes were randomly assigned to an intensive lifestyle intervention (ILI) or a diabetes support and education (DSE) group.

The ILI was designed to induce a mean reduction in initial weight of 7% or more and to increase physical activity to at least 175 min/wk and a goal of consuming 1200 to 1800 kcal/day (with 4 heavier participants receiving more calories).¹⁰ At 1 year, participants in the ILI lost 8.6 kg of initial weight in comparison with 0.7 kg in the DSE group (P<0.001).¹¹ The ILI produced significantly greater improvements in haemoglobin A1C (HbA1C), fitness, and numerous measures of cardiovascular disease (CVD) risk than did DSE.¹¹ The ILI group also maintained significantly greater improvements than DSE in HbA1c, fitness, high-density lipoprotein cholesterol, and systolic blood pressure.¹² The trial is scheduled to conclude in 2014, at which time investigators will determine whether the health improvements observed in the ILI participants translate into a significant reduction in CVD morbidity and mortality.

DIET

Diet in a diabetic is a very important aspect of treatment. It has direct and indirect influence on the outcome of the disease. It is always better to work out a dietary plan for every diabetic because of individual variations. This dietary plan should conform to the 2013 American Diabetes Association (ADA) nutrition therapy recommendations for adults with diabetes.¹³ The ADA recommends that persons with diabetes receive individualized medical nutrition therapy as needed to achieve treatment goals, preferably by a registered dietitian/nutritionist familiar with the components of medical nutrition therapy in diabetes.¹³ Every individual including diabetic

subject needs healthy nutritious food to provide energy for daily activities and mount immune responses against diseases. People with diabetic mellitus should take their three-square meals. There should be emphasis on meals taken being balanced. Nothing exempts diabetics from taking carbohydrates or fatty foods, these are good energy suppliers. The goals of the medical nutrition therapy (MNT)¹³ includes: To promote and support healthful eating patterns, emphasizing a variety of nutrient dense foods in appropriate portion sizes, in order to improve overall health and specific treatment target goals; To address individual nutrition needs based on personal and cultural preferences, health literacy and numeracy, access to healthful food choices, willingness and ability to make behavioral changes, as well as barriers to change; To maintain the pleasure of eating by providing positive messages about food choices while limiting food choices only when indicated by scientific evidence; To provide the individual with diabetes with practical tools for day-to-day meal planning rather than focusing on individual macronutrients, micronutrients, or single foods.¹³

Weight loss is recommended for all overweight or obese individuals who have or are at risk for diabetes using either low-carbohydrate, low-fat calorie restricted, or Mediterranean diets which may be effective in the short term (up to 2 years).⁵ For patients on low-carbohydrate diets, monitoring of lipid profiles, renal function, and protein intake (in those with nephropathy) and adjustment of hypoglycaemic therapy is needed.⁵

Structured programs that emphasize lifestyle changes that include moderate weight loss (7% body weight) and regular physical activity (150 min/week), with dietary strategies including reduced calories and reduced intake of dietary fat, can reduce the risk for developing diabetes and are therefore recommended.⁵ Individuals at risk for type 2 diabetes should also be encouraged to achieve the U.S. Department of Agriculture (USDA) recommendation for dietary fiber (14 g fiber/1,000 kcal) and foods containing whole grains (one-half of grain intake). In addition, they should limit their intake of sugar-sweetened beverages (SSBs).⁵

For the management of diabetes, the mix of carbohydrate, protein, and fat may be adjusted to meet the metabolic goals and individual preferences of the person with diabetes.^{5,13} Monitoring carbohydrate, whether by carbohydrate counting, choices, or experience-based estimation, remains a key strategy in achieving glycaemic control. Saturated fat intake should be less than 7% of total calories. Reducing intake of trans fat lowers LDL cholesterol and increases HDL cholesterol; therefore, intake of trans fat should be minimized.^{5,13}

If adults with diabetes choose to use alcohol, they should limit intake to a moderate amount (one drink per day or less for adult women and two drinks per day or less for adult men) and they should take extra precautions to prevent hypoglycaemia. Smoking should be totally discouraged.^{5,13} Routine supplementation with antioxidants, such as vitamins E and C and carotene, is not advised because of lack of evidence of efficacy and concern related to long-term safety. It is recommended that individualized meal planning include optimization of food choices to meet recommended dietary allowance (RDA)/dietary reference intake (DRI) for all micronutrients.^{5,13}

EXERCISE

Exercise is an important part of the diabetes management plan. Regular exercise has been shown to improve blood glucose control, reduce cardiovascular risk factors, contribute to weight loss, and improve well-being. Furthermore, regular exercise may prevent type 2 diabetes in high-risk individuals.^{9,12} The ADA recommend that adults with diabetes should be advised to perform at least 150 min/week of moderate-intensity aerobic physical activity (50–70% of maximum heart rate), spread over at least 3 days/week with no more than two consecutive days without exercise.⁵ In the absence of contraindications, adults with type 2 diabetes should be encouraged to perform resistance training at least twice per week.⁷ Moderate physical activity includes brisk walking and cycling, jogging, swimming or biking. Exercise increases utilization of glucose by muscle cells and also increases insulin sensitivity. During exercise, blood circulation is also improved and this helps to reduce the risk of heart and vascular complications linked to diabetes.⁵

Physicians should no longer routinely screen patients with multiple

cardiovascular risk factors for coronary artery disease (CAD) before recommending a program of physical activity but should use their clinical judgments.¹⁴ Certainly, high-risk patients should be encouraged to start with short periods of low-intensity exercise and increase the intensity and duration slowly.⁵ It has been established that over 90% of cases of cardiac arrest occur in the resting state compared to the less than 10% that occurs during physical activity¹⁵. The risk of an arrest can even be completely avoided if patients can recognize that symptoms such as chest pain, dizziness or skipping of heart beat are warning signs that the heart might not be coping well with the exercise and are indications to stop.

Physicians should assess patients for conditions that might contraindicate certain types of exercise or predispose to injury, such as uncontrolled hypertension, severe autonomic neuropathy, severe peripheral neuropathy or history of foot lesions, and unstable proliferative retinopathy. The patient's age and previous physical activity level should be considered.⁵ Exercise can worsen hyperglycaemia and ketosis;¹⁶ therefore, vigorous activity should be avoided in the presence of ketosis. This is because at these times, insulin activity is greatly reduced, and glucose is continually accumulated. However, it is not necessary to postpone exercise based simply on hyperglycaemia, provided the patient feels well and urine and/or blood ketones are negative.

In individuals taking insulin and/or insulin secretagogues, physical activity can cause hypoglycaemia if medication dose or carbohydrate consumption is not altered.⁸ For individuals on these therapies, added carbohydrate should be ingested if pre-exercise glucose levels are 100 mg/dL (5.6 mmol/L).⁵ Hypoglycaemia is rare in diabetic individuals who are not treated with insulin or insulin secretagogues, and no preventive measures for hypoglycaemia are usually advised in these cases.⁵

BEHAVIOURAL THERAPY

Behavioural therapy refers to a set of principles and techniques for helping individuals with or at high risk of developing diabetes to modify eating, physical activity, and other psychosocial factors that have impact on diabetes. It is important to establish that emotional well-being is part of diabetes care and self-management. Psychological and social problems can impair the individual's^{17,18} or family's ability to carry out diabetes care tasks and therefore compromise health status. Physicians should assess psychosocial status in a timely and efficient manner so that referral for appropriate services can be accomplished.

According to ADA, it is reasonable to include assessment of the patient's psychological and social situation as an ongoing part of the medical management of diabetes.⁵ The following are recommendations by ADA: (1) Psychosocial screening and follow-up of diabetic patients should include, but not limited to, attitudes about the illness, expectations for medical management and outcomes, affect/mood, general and diabetes related quality of life, resource (financial, social, and emotional), and psychiatric history, (2) Screening for psychosocial problems such as depression and diabetes-related distress, anxiety, eating disorders, and cognitive impairment when self-management is poor should be performed.^{5,9}

Cognitive behavioural therapy (CBT) uses questioning techniques to stimulate information gathering.¹⁹ The purpose of the questioning method is for the individual to recognise their current thoughts, sparking the possibilities of alternative thoughts, behaviours and, ultimately, change. Analysis of people's problems is an assessment phase, and leads to a formulation exploring thoughts and images developed into a treatment plan. Measurement tools are used as part of the structure of CBT, such as the Hospital Anxiety and Depression (HAD) scale.²⁰ This is a list of questions pertaining to anxiety and depression scored by the patient to determine a level of mood.

There are several questionnaires specifically formulated for diabetes: the Hypoglycaemia Fear Survey; Diabetes Treatment Satisfaction Questionnaire; Perceived Control of Diabetes Questionnaire; Negative Cognitive Error Questionnaire, and so on.^{21,22} All people with diabetes should have regular, or at least initial, access to CBT services to improve, assess and address thoughts of the long-term self-management of their condition. It is preferable to incorporate psychological assessment and treatment into routine care rather than

waiting for identification of a specific problem or deterioration in psychological status.²²

CONCLUSION

The roles of various lifestyle measures have been statistically proven not only in preventing or delaying the onset of type 2 diabetes but also in the control of cardiovascular risk factors and management of other

complications of diabetes mellitus. Lifestyle modifications can also be easily affordable for all individuals and therefore, it is a priority component of all management plan for prevention and treatment of diabetes.¹⁰ It is perceived that policies towards this direction are front liners in the prevention and management of diabetes mellitus in our environment hence all barriers to successful implementation of lifestyle modification should be removed.

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