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The Pattern of Dietary Habits and Glycemic Control of Diabetics in Eastern Nigeria

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Abstract: The pattern of dietary habits and how this affected glycemic control in diabetics in Eastern Nigeria was investigated. In this study, about 48% of the diabetic patients' diets used plantain as the only carbohydrate source while 52.4% took diets that included various sources of carbohydrate but at reduced levels. There was no significant difference ($p>0.05$) between the glycemic control of both groups as judged by their glycated hemoglobin levels. However, subjects using multiple carbohydrate sources had significantly higher BMI ($p<0.05$) than those on plantain. We conclude that multiple food sources, if well regulated, would control diabetes and find better acceptance among diabetics than a single carbohydrate source.

Key words: Diet, glycemic control, Type 2 diabetics

Introduction

Diabetes mellitus is one of the most prevalent epidemics of the 21st century (Mann, 2002). It is a disease condition whose consequences are considerable as well as life long (American Diabetes Association [ADA], 2004). Many specific interventions can be carried out in the management and perhaps prevention of diabetes and one of the integral components is medical nutrition (Franz *et al*., 2002; ADA, 2002). Whether for management or prevention of diabetes and its complications, the purpose of nutrition recommendations is the underlying concern for optimal nutrition through healthy food choices and an active lifestyle (Franz *et al*., 2002). Staple diets in Eastern Nigeria consist of a wide variety of foods such as cassava (made into garri which is the most common), yam, sweet potatoes, corn starch, plantain, wateryam, cocoyam, grains and a whole lot of vegetables, fruits, meat and fish. Most diabetic patients in this area are constrained to take mostly plantain as the major and quite often the only carbohydrate source to the exclusion of other carbohydrate sources to help them to control their blood sugar levels. The problem with the prescription of plantain as the only carbohydrate source is that it is restrictive and most patients react negatively. This usually results in low compliance and poor glycemic control. Although many studies have focused on the role of the single nutrient food or food groups in disease prevention, emerging research suggests there are health benefits from food patterns that include mixtures of foods containing multiple nutrients and non-nutrients (Kant *et al*., 2000; Hu *et al*., 2002; Anderson *et al*., 2000; US Department of Agriculture, 2000; Liu *et al*., 2000). A wider choice in carbohydrates is preferred by most diabetics.

This study investigated the effect of dietary patterns of diabetics in Eastern Nigeria on some indices of diabetic control.

Materials and Methods

Subject selection and sample collection: Eighty-two patients (males and females) of Nigerian origin with confirmed type 2 diabetes mellitus attending the University of Calabar Teaching Hospital Diabetic clinic were used as test subjects. All subjects were 30 years or older. Sixty-eight age- and sex-matched non-diabetic subjects were used as controls. The purpose and nature of the research were explained to all participants and they gave their consent. A standard questionnaire on medical history and feeding habits was administered to each subject. Blood samples were aseptically collected into fluoride-oxalate and EDTA bottles for blood sugar and glycated hemoglobin estimation respectively.

Estimation of glucose: Glucose was analyzed using glucose oxidase kits from Randox, United Kingdom. The blood samples were collected into fluoride-oxalate bottles and were centrifuged at 2000rpm for 5 minutes and plasma was collected. 10µl of the plasma was added to 1000µl of glucose oxidase reagent and incubated at 37°C for 10 minutes. Also 10µl of the standard was added to 1000µl of oxidase reagent and incubated at 37°C 10 minutes. After 10 minutes of incubation, the absorbance of the standard and that of the tests were read with a colorimeter at 546nm against using a reagent blank within 60 minutes.

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Table 1: Comparison of biochemical parameters and dietary patterns of diabetics with non-diabetic controls

Parameter	Diabetics	Non-diabetic controls	p-value	Remark
BMI(kg/m^2)	25.9±5.43	23.6±5.81	<0.01	S
Fasting blood glucose (mmol/l)	7.8±4.49	3.5±0.65	<0.001	S
Glycated hemoglobin (%)	7.6±2.02	4.9±1.58	<0.001	S
N	82	67		

Table 2: Comparison of biochemical parameters and dietary patterns of diabetics with non-diabetic controls

Parameter	Diabetics on plantain as prescribed carbohydrate source	Diabetics on reduced quantities of varied carbohydrate sources	p-value	Remark
BMI(kg/m^2)	24.7±4.91	27.3±5.69	p<0.05	S
Fasting blood glucose (mmol/l)	7.3±4.64	8.1±4.39	p>0.05	NS
Glycated hemoglobin (%)	7.1±2.24	8.0±2.93	p>0.05	NS
N	39	43		
% of Diabetic subjects	46.7	52.4		

Glycated hemoglobin assay: Glycated hemoglobin was analyzed using ion exchange chromatography as described in the DIALAB glycated hemoglobin kit obtained from Gieselshaft, Germany.

Body mass index was also determined for both subject groups.

Results

Both fasting blood sugar and glycated hemoglobin levels confirmed the diabetic status of the subjects (Table 1). The diabetic subjects had expectedly higher fasting blood glucose and glycated hemoglobin ($p< 0.001$) than the non-diabetic controls.

Thirty-nine (46.7%) of the diabetics had plantain as 'prescribed' carbohydrate source. The remaining forty-three (52.4%) were not restricted to any particular carbohydrate source but maintained reduced carbohydrate intake.

There was no significant difference in the glycated hemoglobin and fasting blood sugar levels ($p>0.05$) of patients on prescribed plantain and those on unrestricted carbohydrate source but consuming reduced levels. However, the BMI of those on plantain diet was significantly lower ($p<0.05$) than the mean BMI of those on varied carbohydrate sources (Table 2).

Discussion

From our study, almost half of the diabetic subjects that participated in the study consumed mainly plantain as the main starch with vegetables and beans in various cooked forms. This is quite monotonous and monotonous diets only work in the short-term because sooner or later compliance is compromised by patients. This agrees with a position statement by the American Diabetes Association which advocates a "consistent carbohydrate" diabetes meal plan as a suggested alternative. This meal plan includes more freedom with and greater variety of choices for patients (ADA, 2000). In the long-term, learning to manage a wider sources of carbohydrates in reduced portions is a healthier approach. Paddock (2000) reported that the advantage of meals with wider sources of carbohydrates in reduced portions included improved food intake by patients, less food waste and better understanding of how to best manage diabetes by the patients. The goal is not just to control glycaemia but adopt eating patterns that are sustainable and enjoyable to the patients.

In this study, there was no significant difference in the mean glycemic indices of the group of diabetics on plantain and the other that used different carbohydrates sources. This may be because of the fact that the glycemic effect of carbohydrates is dependent more on the amount of carbohydrate intake than on the source of carbohydrates. This was also reported by Coulston (1990) who observed that there was an insignificant increase in fasting plasma glucose after 16 weeks of alternating between diabetic and regular meal periods. From this data, the only disadvantage observed for those on varied diets is that they had a significantly higher ($p<0.05$) BMI than those on plantain. Observing stricter control on quantity of food intake may eliminate this.

In conclusion, diabetic patients should be encouraged to vary sources of starch in their diet but reduce the amount of starch in their diet.

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