Plantains: Gluco-friendly usage

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Abstract

Plantains are a staple food for a large proportion of the world's population. Rich sources of carbohydrates, they are considered taboo by most diabetes care providers. For persons living with diabetes, however, they are a preferred food item. This multi country authored article discusses the nutritional and culinary qualities of plantains. It discusses how to consume the fruit in a glucose-safe manner, by reducing the glycaemic load and total caloric load due to a low glycaemic index. Simple ways of modifying plantain preparation and serving are suggested, to help patients take this foodstuff without impacting glucose control.

Keywords: African diabetes, Caribbean diabetes, plantains, bananas, Musa sp paradisiaca, nutritional benefits, glycemic index.

Introduction

Plantains, also known as 'cooking bananas' and 'green bananas' are fruits from the genus Musa sp paradisiaca. These are used as part of cuisine across sub-Saharan Africa, Central and South America, as well as in Caribbean islands and in parts of South Asia.[1]

Nutritional Benefits

Plantains are 65% water and 35% solid in composition. They are lauded for being a source of macronutrients such as carbohydrates, and micronutrients like minerals and vitamins. Plantains contain 32% carbohydrates (including 15% sugars and 2% dietary fibre especially hemicelluloses).[2] The insoluble fibres create a barrier to enzymatic hydrolysis of starchy staples and help to decrease the glycaemic response.[3] The content of proteins (1%) and fat (0.4%) is minimal. Vitamin 'B 6', vitamin C, magnesium and potassium are in abundance.[4] They contain more carbohydrate compared to bananas. Plantains have fewer simple sugars, which reduces their sweetness and glycaemic index. A recent study carried out in streptozotocin-induced diabetic rats confirmed the antihyperglycaemic and hyperlipidaemic actions of plantains rich in alkaloids, flavonoids, saponins and tannins.[5]

Culinary Usage

Plantains can be cooked and eaten in multiple ways, as a stand- alone snack, a main dish, or a side- helping. They can be enjoyed in different ways (Table-1)

Table-1: Methods of preparing plantain for consumption.

Fried
◆ Deep fried squares, e.g., kelewele (Ghana), tostones (Central America)
◆ Deep fried pate/doughnuts, e.g., KaaKo (Ghana)
◆ Chips,e.g., plantain chips
Boiled as a complement to kontomire stew (Ghana)
◆Boiled and mashed, e.g. fufu (Cuba, Ghana)
◆Boiled and blended, e.g., chapo (Peru)
◆Grilled, e.g., ginanggang (Philippines)
Roasted, e.g., boli (Nigeria), Kofi-broke-man (Ghana)
Stuffed with sweet beans, e.g., rellenitos de platano (Guatemala)
As dried flour, e.g., Kerala, India
Raw, if ripened

- boiled, roasted, or fried
- mashed, pounded, or as chips
- unripe, semi-ripe, ripe or over-ripened
- processed into flour
- spicy or non-spicy

Their all-season availability, low cost, and ease of processing makes them an attractive food source. The ubiquitous use of this fruit makes it the tenth most

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important staple food worldwide. Along with bananas, plantains provide more than 25% of the carbohydrate requirement of the population in Africa.[6]

Clinical Data

Musa paradisiaca has been reported to have many beneficial effects in animal models of chronic diseases such as diabetes mellitus, hypertension, atherosclerosis/dyslipidaemia and male subfertility.[7-9] A qualitative study from Ghana reported a wide spectrum of beliefs related to plantain intake in diabetes, while some respondents felt that plantains are beneficial for diabetes care others feel these fruits are detrimental to glucose control.[10] A cross sectional study from Nigeria revealed that 48% of persons with diabetes used plantain as the only source of carbohydrate. However, there was no difference in glycaemic control of this group as compared to those with multiple sources of carbohydrate.[11]

Barrier or Bridge?

Prepared without added fat, sugar or salt, plantains are one of the best starchy vegetable options, according to the American Diabetes Association.[12] However, plantains are considered a barrier to achieving glycaemic control in persons living with diabetes. This is because of their use as fried snacks or stews. Certain diabetes care providers advise their patients to abstain from plantains whilst others highly recommend it. Both of these approaches are inappropriate. Excessive intrusion into preferred meal patterns may lead to dissatisfaction and lack of adherence. At the same time, liberal dietary intake may lead to poor glycaemic control.

Food composition and the glycaemic excursions following a meal are both highly individualised. General recommendations are therefore inadequate, as well as inappropriate. Nutritional recommendations must be tailored to the individual and must keep in mind sociocultural likes and dislikes.[13]

Gluco-Friendly Plantain Usage

Suffice it to say that plantains are high carbohydrate foods. The glycaemic response to food does not only depend on the carbohydrate content of the food, but the preparatory methods, the meal composition, portion size as well as several non-food factors; physical activity, the menstrual cycle in females to name a few. Thus, it becomes imperative to explore "healthy", gluco -friendly ways of consuming plantains. This article discusses this under three headings (Table-2):

1. Reducing the glycaemic load
2. Reducing the glycaemic index
3. Reducing the total caloric load

Table-2: Making plantains gluco-friendly.

Aim	Pre -cooking	During cooking	Post-cooking
Reduce the Glycaemic load	Choose smaller varieties Cut thin slices.	Cook smaller portions	Serve small portions; consider egg size as a general guide for fufu.
	Cut oblique slices to increase surface area		Offset load by moderate intensity physical activity lasting about 30mins immediately prior to the meal.
Reduce the Glycaemic index	Choose unripe plantains	Add legumes/ salad/ white meat/ fish to stew.	Consume after allowing plantain to cool.
	Choose firm-hard textures plantains	Boil rather than grill	Consume after a protein such dish, rather than before it.
	Choose less sweet varieties		Consume as part of a mixed meal with lots of leafy green vegetables.
Reduce the Caloric load	Choose smaller varieties of plantains	Prefer steaming, boiling, grilling or roasting.	Eat slowly.
		Avoid frying, especially deep frying	Avoid other sources of carbohydrate/starch with the meal
			Offset caloric intake by exercising.

Glucose levels and trends are impacted by total calorie intake, total carbohydrate intake, and by quality of carbohydrate consumed (glycaemic index). Simple modifications in the pre-preparation, cooking process, and serving of plantains, as well as post-meal lifestyle, can mitigate the potentially harmful effects of plantains on diabetes control. Buying smaller and less ripe plantains, cutting them in shapes with large surface area, cooking with minimal or no oil, consuming small portions, pairing them with a low-glycaemic-index, fiber-rich food, such as a green salad, along with a protein-rich food, and following up with exercise, (Table-2) all reduce the glycaemic burden of plantains. Pounded plantains of the agnrin variety, at "green" stage of ripeness (stage 1), have been shown to have a low glycaemic index.[14] A local variety of plantains also have a lower glycaemic index, while plantain chips have a lower glycaemic load per standard serving.[15]

Sharing such information with persons living with diabetes, their family members, and the community at large,[16] helps create an empathic patient provider bond. This facilitates improved patient satisfaction as well as better adherence and persistence to therapy.

Summary

Plantains are a good source of nutrients beneficial for health with protective properties against metabolic diseases. They remain the preferred staple food for millions of the culinary intricacies of plantains that can allow them to be consumed safely by a large proportion of persons living with diabetes.

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