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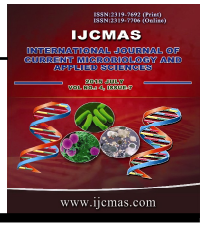

Original Research Article

Preliminary Assessment of the Glycemic Response of Domestic Rabbit Fed with Ripe and Unripe Plantain Fruit *(Musa paradisiaca*)

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Keywords

Plantain, Glycemic response, Musaceae, Rabbits, Glucose

A B S T R A C T

Preliminary glycemic response in domestic rabbit was studied using plantain at various levels of development. The investigation involves nine domestic rabbits separated into three experimental groups. After seven days feeding, the rabbits were fasted for 18 hours. Blood samples were collected from the tips of the rabbits' tails at fasting and after, at different time interval of post feeding. Blood glucose levels were determined using accu-chek glucometer and test strips. The unripe plantain showed the least glucose level of 4.4, 5.6, 4.9, 4.6 and 4.2 mmol/dL at 0, 30, 60, 90 and 120 minutes post feeding respectively, compared with the ripe plantain which showed glucose levels of 5.0, 6.4, 6.1, 5.5 and 5.3 mmol/dL at 0, 30, 60, 90 and 120 minutes post feeding respectively. The control also showed a glycemic response of 6.0, 6.8, 6.4, 6.3, and 6.2 mmol/dL at 0, 30, 60, 90 and 120 minutes post feeding respectively. The result showed that unripe plantain has a lower glycemic response than the ripe plantain.

Introduction

Plantains (*Musa paradisiaca*) are a member of the banana family *Musaceae*. The fruits of plantain are starchy but low in sugar. This plant is grown most widely under tropical climatic condition. It is rich in potassium, vitamins A and C, and contains high dietary fibre, and other nutrients with water content of ~65. It cconstitutes a major source of carbohydrates for millions of people in Africa, and other parts of the tropics (FAO, 1989).

Glycemia is the concentration of glucose in the blood and is considered one of the most important controlled variables in the internal milieu of animals (homeostasis), as it was first proposed by French Physiologist Claude Bernard (News Medical, 2014). The glycemic index (GI) is the numerical system of measuring how much of a rise in the circulating blood sugar a carbohydrate intake can trigger. The higher the glycemic index value, the greater the blood sugar response. So, a low GI food will cause a small rise, while a higher GI food will trigger a dramatic spike (David, 2008). The glycemic index is usually a range from 0 to 100 that indicates how rapidly a particular

food raises blood sugar level (Marina, 2013). Glycemic load (GL) on the other hand, gives an account of how rapidly a particular carbohydrate turns into sugar without giving account of how much of a carbohydrate is in a serving of a particular food. The knowledge of both GI and GL helps to understand the effect of food on the blood sugar (David, 2008).

The body functions well when the blood glucose is kept relatively constant. If the blood sugar drops too low, lethargy and/or increased hunger occur. If it goes too high, brain signals the pancreas to secrete insulin, which will bring the blood sugar down usually by converting the excess sugar to stored fat. The greater the rate of increase in blood sugar, the more the chances of insulin secretion, and the blood sugar may be driven too low. Therefore, eating food that causes rapid glycemic response result to an initial elevation of energy due to rise in blood glucose, but this is followed by a cycle of increased fat storage, lethargy and more hunger. Animals with high blood glucose (i.e. blood sugar)**,** either because of insulin production inadequacy or because of the body's cells do not respond properly to insulin or both, often results to a disease condition refers to as diabetes.

The main symptoms of diabetes are; polydipsia (increased thirst), polyphagia (increased hunger) and polyuria (increased frequency of urination). In addition, patients may complain of tiredness, weight loss, loss of muscle bulk and constant hungry (WHO, 1999).

This study is a preliminary investigation of the glycemic response in rabbits by determining the glycemic index the effect of plantain on development in Rabbits using layers mesh as the standard (control).

Material and Methods

Sample preparation

Two samples of plantain (*Musa paradisiaca*) at various stages of development i.e. ripe stage and unripe stage were used for this work. The samples (plantains) used for this investigation were divided into three. The first group was the unripe plantain while the second group was the ripe plantain and the third group was the control (layer's mesh).

The plantains were cleaned, sliced, dried and ground. Each sample was carefully labeled as unripe, ripe and control. The animals were fed with the ground flour of plantain (ripe and unripe) separately and the layer's mesh (control) for seven days.

Experimental design

The rabbits were grouped into three groups. Groups 1 and 2 were the experimental animals and group was the control animals as stated earlier. The groups 1 and 2 were fed with the unripe and ripe plantain respectively for seven days to get them accustomed to the food metabolically, with preliminary monitor of the blood glucose levels for each rat. After the seven days feeding, their blood glucose was determined before fasting. The rabbits were fasted for 18 hours after the seven days feeding period, and their fasting blood sugars (glucose) were determined with the accu-chek glucometer and test strips (active). The groupings and feedings were as below:

- Group 1: was fed with unripe plantain flour for seven days.
- Group 2: was fed with ripe plantain flour for seven days.
- Group 3: was fed with layer's mesh for seven days.

After 18 hours fasting, each group was allowed access to their respective diet for 1 hour (60 minutes) and the diets were withdrawn. Blood glucose level of all the members of each group was determined with the accu-chek glucometer at 0, 30, 60, 90 and 120 minutes respectively after the diets withdrawal.

Blood collection and analysis

The blood samples used in the experiment were collected from the tips of the rabbits' tails. The blood glucose level was determined using glucometer (accu-chek "active" glucometer) and test strip (active).

Results and Discussion

Before the rabbits were fed, the blood glucose levels of each individual was tested and recorded. After seven days feeding with the test samples and control, their blood glucose was determined again. The animals were the fasted for 18 hours and their blood glucose further determined. Then, a 60 minutes post fasting feeding was done and their blood glucose observed at 0, 30, 60, 90 and 120 minutes post feeding respectively and their respective blood glucose recorded. The results are presented in tables 1, 2 and 3.

The blood glucose analysis for the animals showed different blood glucose levels at various times and conditions after feeding the animals. The animals fed with unripe plantain experienced reduced blood glucose (Table 1) when compared with those fed with the ripe plantain (Table 2) and the control (layer's mesh) after seven days feeding (Table 3). All the animals had a reduced blood sugar after 18 hours fasting but, the animals fed with unripe plantain had the lowest.

This study showed that unripe plantain has the tendency to reduced or slow glycemic response. Although there is a high increase at the 30 minutes test, the increase is a tolerable one as it falls within the range of safety.

Table.1 Blood glucose level for unripe plantain

Time (minutes)	Glucose level (mmol/dl	Glucose level (mmol/dl
0	4.4 ±0.21	4.2 ±0.26
30	5.6 ±0.20	101.00 ±0.20
60	4.9 ±0.26	88.33 ±0.26
90	4.6 ±0.26	83.67 ±0.26
120	4.2 ±0.26	75.67 ±0.26

Table.2 Blood glucose level for ripe plantain

Time (minutes)	Glucose level (mmol/dl)	Glucose level (mmol/dl)
0	5.0 ±0.12	90.00 ±0.12
30	6.4 ±0.21	114.67 ±0.21
60	6.1 ±0.10	109.67 ±0.10
90	5.5 ±0.15	98.33 ±0.15
120	5.3 ±0.12	95.00 ±0.12

Table.3 Blood glucose level for the control (layer's mesh)

Time (minutes)	Glucose level (mmol/dl	Glucose level (mmol/dl
0	6.0 ± 0,26	108.00 ± 0.26
30	6.0 ± 0,26	119.67 ±0.25
60	6.4 ±0.25	115.67 ±0.25
90	6.3 ±0.20	113.33 ±0.20
120	6.2 ±0.15	111.00 ±0.15

Unripe plantain showed has low glycemic response and thus, should be made part of normal or regular diet especially, the diabetics as this will help control their blood sugar level. Further research will be carried out on a broader population to determine the statistical level of significance of the preliminary findings.

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