JMBR: A Peer-review Journal of Biomedical Sciences
December 2012, Vol. 11 No.2 pp 107-110

BLOOD GLUCOSE LEVEL IN RATS FED ON CASSAVA (MANIHOT UTILISSIMA) COMPONENTS

BALOGUN C.D. and *EBOMOYI M.I.

ABSTRACT

The effect of consumption of the different cassava (manihot utilissima) components on the blood glucose level of Wistar rats was studied. Male rats (n=28) with weights between 165g 260g were equally and randomly assigned into a control group and three experimental groups of n=7 per group. The cassava components used were the cassava fiber (popo gari), grated, roasted cassava tuber (gari) and cassava starch. The rats in the experimental groups were given the normal rat chow with inclusion of 50% cassava components thoroughly mixed with the feeds on a 20g feed/day basis for 8 weeks. The control group received equal amount (20g) of normal rat chow daily without the inclusion of any cassava components for the same period. All the rats were given water ad libitum. The rats were sacrificed by anaesthetizing them using chloroform after the 8 weeks of the experiment. Blood samples were collected by cardiac puncture into fluoride oxalate for the estimation of blood glucose levels. There was a significant increase in weight, from 254±10.6g to 304±17.1g at the end of the study for animals in the control group which was significantly decreased in the experimental group fed with 50% inclusion of cassava fiber in their diet, from 274±12.1g to 234±4.0g after the study. However, there was no significant difference in the weight of animals in the other experimental groups at the end of the study. The blood glucose levels in the experimental groups were significantly increased when compared to that of the control group. The blood glucose levels in the control and experimental groups (with inclusion of 50% popo gari, gari and starch in their diet) were 115.5±3.1mg/dl, 137.5±11.0 mg/dl, 151.4±11.2mg/dl and 167.9 ±16.3mg/dl respectively. The findings indicate that rats in the experimental groups showed decreased weights and increased blood glucose levels. Therefore, inclusion of 50% cassava components in diet may have adverse effect on weight and blood glucose.

Introduction

Cassava (manihot utilissima) is a major food crop in Nigeria (Ogbe et. al., 2007) providing major source of calories to perhaps 200-300 million people (FAO, 2001). It has in recent years been transformed from famine reserve commodity and rural staple crop to a cash crop in Africa (Egesi et. al., 2007). It is rich in carbohydrate but grossly deficient in protein, fat and some minerals and vitamins (Tonukari, 2004). Different methods have been adopted to reduce cyanogenic glucosides, which constitute a major limitation to the use of cassava in both human and animal foods. The sub-lethal level of hydrocyanide production on ingestion has been implicated in the development of metabolic diseases in both man and animals when cassava-based

KEY WORDS: *blood glucose, manihot utilissima*

*Department of Physiology, School of Basic Medical Sciences, College of Medical Sciences, University of Benin, **Benin City, Nigeria.***
Correspondence:
E-mail: maureenebomoyi@ymail.com;
Tel: +234 8023396807; +234 8059239875

diets are consumed over a long period of time (Kamalu, 1991).

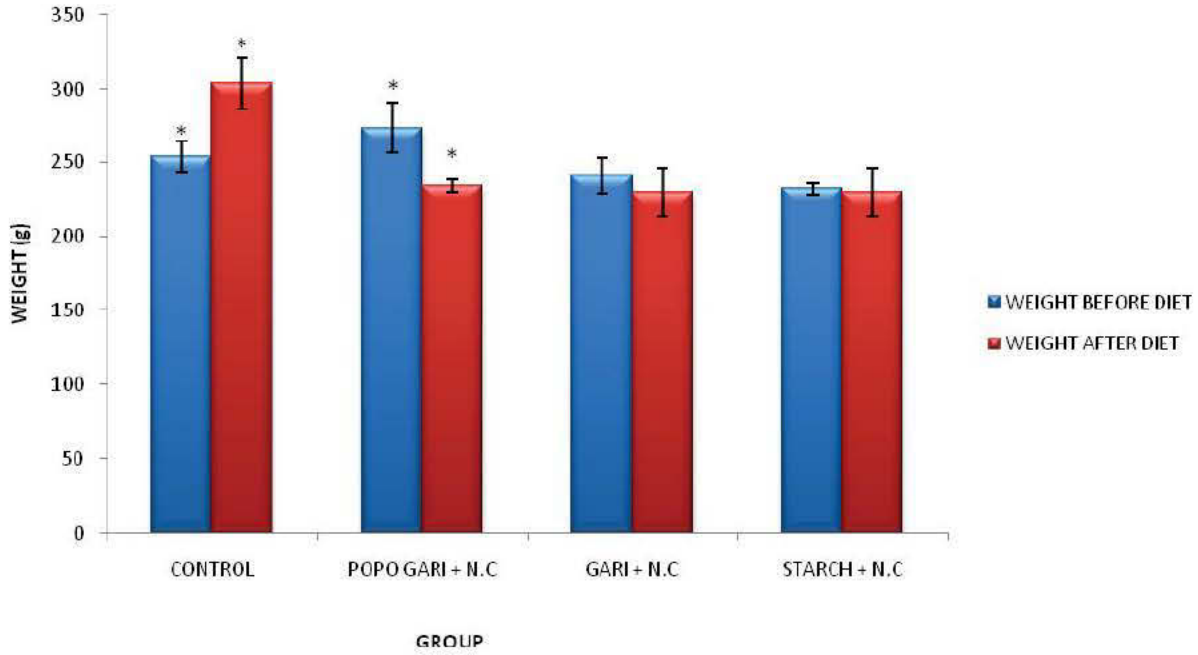
Materials and methods

The effect of consumption of the different cassava components on the blood glucose level of Wistar rats was studied using male rats (n=28) with weights between 165g-260g. They were randomly assigned into a control group and three experimental groups of n=7 per group. The cassava components used were cassava fiber (popo gari); grated, roasted cassava tuber (gari) and cassava starch.

Results

At the end of the study, there was a significant increase in weight for animals in the control group, which was significantly decreased in the experimental group fed with 50% inclusion of cassava fiber in their daily diet. However, there was no significant difference in the weight of animals in the other experimental groups after the study. The blood glucose levels in the experimental groups were significantly increased when compared to that of the control group. The findings indicate that rats in the experimental groups showed decreased weights and increased blood glucose levels. Therefore, inclusion of 50% cassava components in diet may have adverse effect on weight and blood glucose.

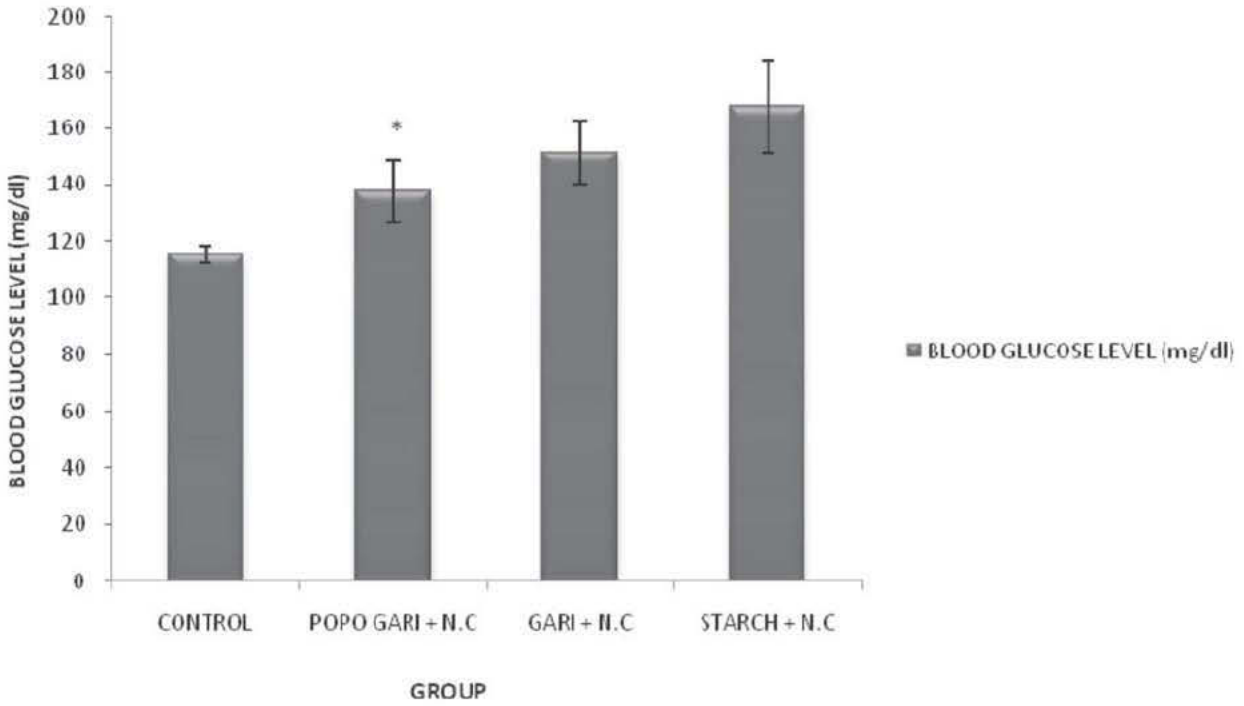
Figure 1: The weights (g) of the control and experimental animals in the different groups at the start and at the end of the study.



*mean value statistically significant at $p<0.05$;

N.C means Normal Chow

Figure 2: Blood Glucose Levels (mg/dl) in mean ± SEM of the control and experimental animals in the different groups at the end of the study.



*mean difference significant at $p<0.05$;

N.C means normal chow

Discussion

The weight of animals in the control group increased due to the balanced diet which they were given, while the decreased body weight of the experimental group with inclusion of 50% cassava fiber can be ascribed to the high content of crude fiber in the meal. More than 10% crude fibers in experimental animal diet caused growth depression (Omole and Onwudike, 1982) which usually increases the basal metabolic rate in the animals. There was increased blood glucose levels in the experimental groups as against the normal rat blood glucose level of 50-109mg/dl (Krinke, 2000). The onset of diabetes in rats is judged as blood glucose being higher than the expanded normal upper level (Wang et. al., 2010). This increase can be ascribed to the damage of the pancreas by cyanogenic glycosides (Geevarghese, 1987), leading to the development of glucose intolerance. Also, cassava root is very rich in carbohydrate which must have caused the increase in blood glucose since the carbohydrate content of the diet of groups with 50% inclusion of popo gar, gari or cassava starch in their diet was increased. This indicated that hypoinsulinaemia developed (Kamalu, 1991), and resulted in an increase in blood glucose level in the groups fed different cassava components.

Conclusion

Inclusion of 50% cassava components in diet may adversely cause alteration in body weight and also increase blood glucose levels. These may be ascribed to the presence of cyanide, deficiency of protein

and fat or the increase in carbohydrate content of the diet.

References

1. Egesi, C., Okogbenin, E., Mbanaso, E. and Fregene, M. (2007). Induced mutations and marker-aided breeding for the improvement of root quality traits in cassava. In: NRCRI, Umudike Annual Report: p22-23.

2. Food and Agriculture Organisation (FAO). (2001). Strategic Environmental Assessment: An Assessment of the impact of cassava production and processing on the environment and biodiversity Volume 5.Rome. Italy. 45-46.

3. Kamalu, B. P. (1991). The effect of a nutritionally-balanced cassava (Manihot esculenta Crantz) diet on endocrine function using the dog as a model. Br. J. Nutr. 65, 365-372.

4. Krinke, G. (2000). The laboratory rat (Handbook of experimental Animals) Toronto Academic press. 4-5.

5. Ogbe, F.O., Emehute, J. K. U. and Legg, J. (2007). Screening of cassava varieties for whitefly populations. In: NRCRI, Umudike Annual Report: p30-33.

6. Tonukari, J. N. (2004). Cassava and future of starch. Elect. J. Biotech. 7(1), 1-8.