



The Effect of Tapioca Starch Modified with Green Tea and Red Guava Leaf Polyphenol on Rats Blood Glucose and Pancreatic Langerhans Islet



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ABSTRACT

The aim of this research was to determine the effect of tapioca starch modified with green tea and red guava leaf polyphenol on rats blood glucose and pancreatic Langerhans islet. Ration containing tapioca starch modified with 4% green tea and 4% guava leaf extracts were fed to strep-tozotocin induced diabetic Sprague dawley rats. After 35 days of experiment, the blood glucose level and pancreatic Langerhans islets were assayed. The result showed that the tapioca starch modified with 4% green tea and 4% guava leaf extract diets could lower blood sugar levels in diabetic rats and increase the population of beta cells of pancreatic islets.

INTRODUCTION

Tapioca starch is not recommended for diabetics because its digestibility¹ & glycemic index² are high. High consumption of carbohydrates (starch and sugar) are suspected as the cause of high prevalence of diabetes. Therefore, prevention of diabetes mellitus is done mainly by managing the diet. The diet that is recommended for diabetic patient is slowly digestible and absorbed food. Digestibility of the starch could be lowered by modified its with polyphenol³. Green tea and guava leaf are two kind of plant that are potential as a source of polyphenols.

The aim of this research was to examine the effect of tapioca starch modified with green tea and red guava leaf extract polyphenols on blood sugar levels and pancreatic islet.

MATERIAL AND METHOD

Tapioca starch (*Manihot utilisima*) were modified with 4% green tea (*Camellia sinensis*) extract and 4% red guava (*Psidium guajava*) leaf extract. Two month old of male Sprague-Dawley rats with 175-200 g of body weight were used as animal model in this study. The animals were made diabetic with 40 mg/kg b-wt streptozotocin, and randomly divided into six groups of six animals each: 1) Normal rats + native tapioca starch (NN), 2) Normal rats + tapioca starch modified with 4% red guava leaf extract (NJ), 3) Normal rats + tapioca starch modified with 4% green tea extract (NT), 4) Diabetic rats + native tapioca starch (DN), 5) Diabetic rats + tapioca starch modified with 4% red guava leaf extract (DJ), 6) Diabetic rats + tapioca starch modified with 4% green tea extract (DT).

Blood glucose was determined with glucometer every two days. The blood was obtained by tail bleeding. After 35 days of treatment, the animals were sacrificed. Pancreatic tissues were collected for the estimation of Langerhans islet and beta cell.

RESULT AND DISCUSSION

Table 1 shows that both tapioca starches modified with 4% green tea extract and 4% red guava leaf extract significantly lowered the daily blood glucose level in diabetic rats. Feeding the rats with tapioca starch modified with 4% red guava leaf extract and 4% green tea extract did not influence the area of Langerhans islet (Figure 1 & 2) but significantly increased the beta cell population (Figure 3).

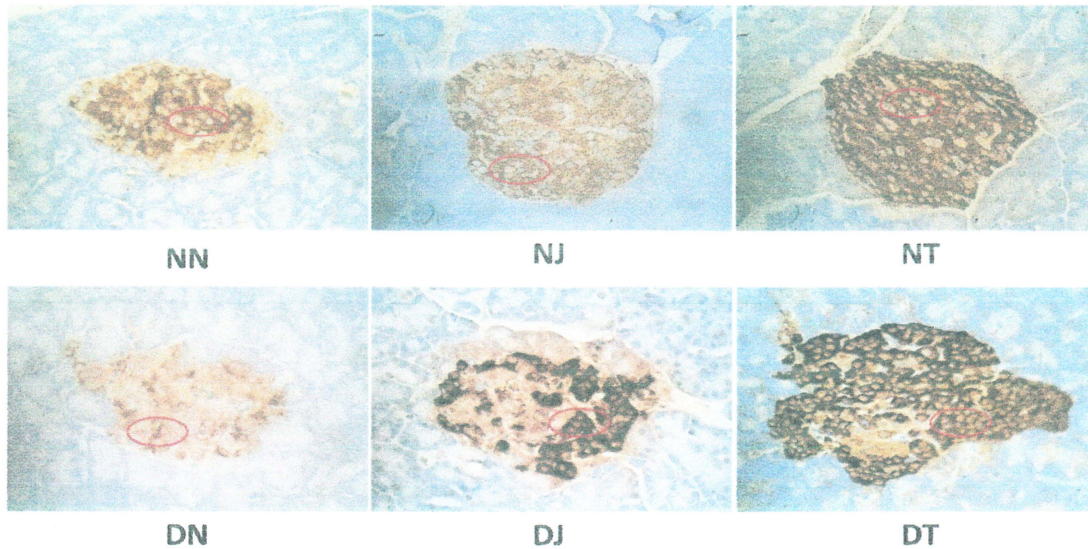


Figure 1. Pancreatic islet and beta cell (= beta cell)

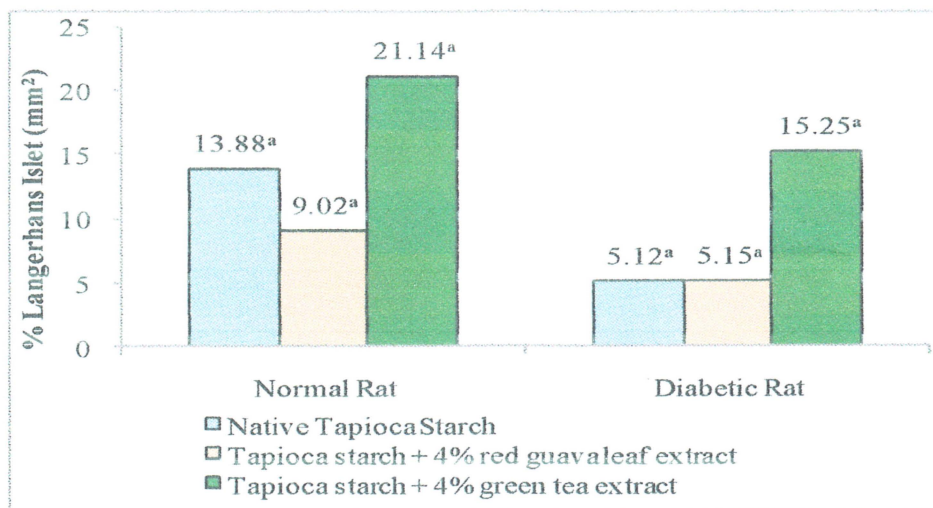


Figure 2. Percentage of Langerhans islet

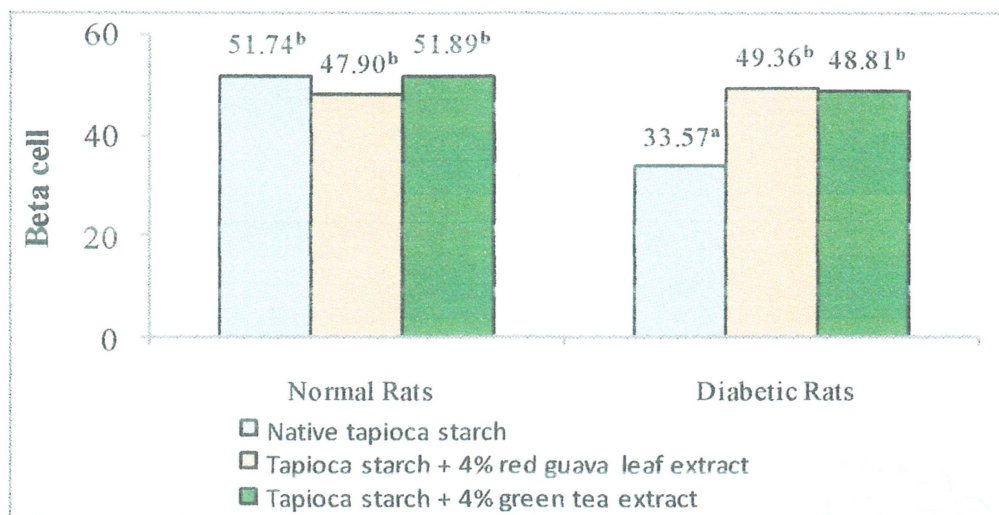


Figure 3. Population of beta cell

Tapioca starch (*Manihot utilisima*) were modified with 4% green tea (*Camellia sinensis*) extract and 4% red guava (*Psidium guajava*) leaf extract. Two month old of male Sprague-Dawley rats with 175-200 g of body weight were used as animal model in this study. The animals were made diabetic with 40 mg/kg b-wt streptozotocin, and randomly divided into six groups of six animals each: 1) Normal rats + native tapioca starch (NN), 2) Normal rats + tapioca starch modified with 4% red guava leaf extract (NJ), 3) Normal rats + tapioca starch modified with 4% green tea extract (NT), 4) Diabetic rats + native tapioca starch (DN), 5) Diabetic rats + tapioca starch modified with 4% red guava leaf extract (DJ), 6) Diabetic rats + tapioca starch modified with 4% green tea extract (DT).

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CONCLUSION

The tapioca starch modified with 4% green tea and 4% guava leaf extract diets could lower blood sugar levels in diabetic rats and increase the population of beta cells of pancreatic islets.

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