Hypoglycemic effects of analog rice based from arrowroot (Marantha arundinacea L.) and cowpea (Vigna unguiculata L.) on blood sugar level and pancreas histopathology of diabetic rat

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Biography

Mariska is a full time researcher in Indofood, one of the biggest FMCG company in Asia Pacific. Nutrition, with an interest in nutrigenomic is her area of expertise. This publication delivered her as the best researcher at Indofood Riset Nugraha (Indofood's Research Grant), and the best graduate from Surya University. Currently she pursues the advancement of nutrition sciences to help reduce stunting cases in Indonesia.

Abstract

Diabetes mellitus is the third largest cause of death in Indonesia and 90% of the cases are diabetes mellitus type 2. Diabetes mellitus type 2 can be prevented and controlled by healthy lifestyle, such as consumption of foods with low glycemic index. Indonesia has high dependence on white rice as staple food, while it is relatively high in glycemic index. One alternative to overcome this problem is analog rice from low glycemic index raw materials such as arrowroot and cowpea. The study was in vivo assay using nested design to examine the hypoglycemic properties of analog rice. The analog rice physical properties analysis results showed that all analog rice formulations were acceptable, therefore selected analog rice were the formulation with the highest and lowest arrowroot levels (A1B1C3 and A4B1C3 formulations). The chemical properties analysis results showed that the rice was high in dietary fiber, which are 17.33% (w/w) and 21.30% (w/w). The glycemic index value of analog rice is 39.40 and 37.12. Analog rice had hypoglycemic effect on rat blood sugar by significantly reducing blood sugar for 21 days, which were 18.97% and 25.50%. Analog rice supplementation for 21 days in rats could also improve the pancreatic beta cell profile.
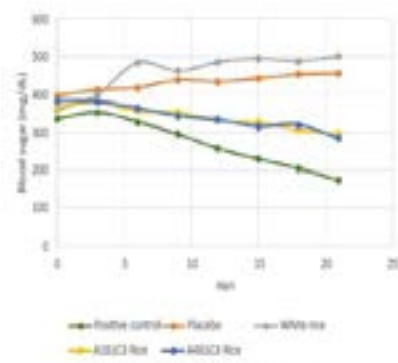
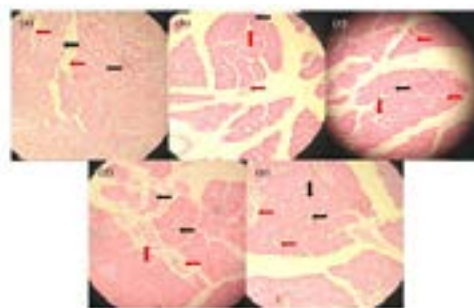Figure 1: Changes in rat blood sugar.

Figure 2: Pancreatic appearance 400 times magnification by hematoxylin-eosin staining in the positive control group (a), Placebo (b), White rice (c), Analogue rice A1B1C3 (d), Analogue rice A4B1C3 (e). Black arrows indicate beta cells and red arrows indicate empty space on the island of Langerhans.
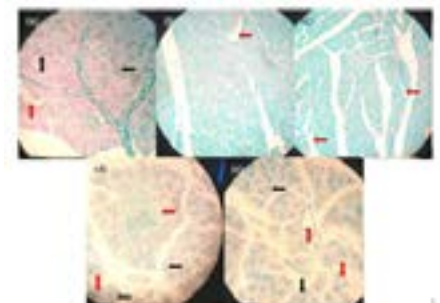

Figure 3: The crossection of the pancreas is enlarged 400 times by immunohistochemical staining in the positive control group (a), Placebo (b), White rice (c), Analog rice A1B1C3 (d), Analog rice A4B1C3 (e). Black arrows indicate beta cells and red arrows indicate empty space on the island of Langerhans.