

PENGARUH PEMBERIAN KOMBINASI BUBUK (*Ipomoea batatas* L.) UBI JALAR PUTIH DAN UNGU TERHADAP FUNGSI GINJAL TIKUS DIABETES YANG DIINDUKSI STREPTOZOTOCIN

Kajian *in vivo* Patofisiologis dan Histopatologis Ginjal Tikus (*Rattus norvegicus*) Galur Wistar Diabetik

INTISARI

Stres oksidatif merupakan salah satu penyebab utama timbulnya komplikasi pada penderita diabetes melitus. Stres oksidatif disebabkan karena hiperglikemia yang tidak terkontrol dan kondisi hiperglikemia kronis. Ubi jalar putih (*Ipomoea batatas* L.) telah diketahui memiliki *acidic glycoprotein* yang mempunyai efek hipoglikemik sedangkan ubi jalar ungu mengandung antosianin yang memiliki aktivitas antioksidan. Penelitian ini bertujuan untuk mengkaji pengaruh bubuk ubi jalar putih dan ungu terhadap fungsi ginjal tikus diabetes.

Subyek adalah tikus putih galur Wistar usia 6-7 minggu sebanyak 42 ekor dengan berat 180-230 g. Tikus dibuat diabetes dengan injeksi intraperitoneal streptozotocin 60 mg/kgBB. Tikus dibagi menjadi 7 kelompok: tikus kontrol normal, tikus diabetes, tikus diabetes dengan pemberian bubuk ubi jalar putih 800 mg/kgBB/hr, tikus diabetes dengan pemberian bubuk ubi jalar ungu 800 mg/kgBB/hr, tikus diabetes dengan pemberian kombinasi bubuk ubi jalar putih 400 mg/kgbb/hr dan ungu 400 mg/kgbb/hr, tikus diabetes dengan pemberian kombinasi bubuk ubi jalar putih 600 mg/kgbb/hr dan ungu 200 mg/kgbb/hr dan tikus diabetes dengan pemberian bubuk ubi jalar ungu 800 mg/kgBB/hr, tikus diabetes dengan pemberian kombinasi bubuk ubi jalar putih 200 mg/kgbb/hr dan ungu 600 mg/kgbb/hr. Tikus diabetes diberi perlakuan selama 8 minggu. Darah diambil dari vena orbita sebelum perlakuan, 4 dan 8 minggu setelah perlakuan untuk pemeriksaan kadar glukosa darah, ureum, kreatinin, protein urin. Di akhir penelitian tikus didekapitasi untuk diambil organ ginjal dan dilakukan pemeriksaan dengan HE dan IHC untuk melihat ekspresi RAGE dan TGFβ1.

Hasil penelitian menunjukkan pada kelompok perlakuan kombinasi bubuk ubi jalar (*Ipomoea batatas* L.) putih 400 mg/kgBB/hr dan ungu 400 mg/kgBB/hr

terdapat penurunan kadar glukosa darah ($133,95 \pm 6,88 \text{ mg/dL}$), ureum plasma ($32,01 \pm 2,64 \text{ mg/dL}$), kreatinin plasma ($0,70 \pm 0,09 \text{ mg/dL}$), protein urin ($60,51 \pm 2,72 \text{ mg/dL}$), perbaikan gambaran histologis ginjal dan ekspresi RAGE (0,19) dan TGF- β 1 (0,20) lebih rendah secara bermakna dibandingkan kelompok diabetes ($p < 0,05$).

Berdasarkan hasil penelitian tersebut disimpulkan bahwa pemberian kombinasi bubuk ubi jalar (*Ipomoea batatas* L.) putih dan ungu dapat mencegah komplikasi di ginjal dengan memperbaiki fungsi ginjal.

Kata-kata kunci : hiperglikemia, ubi jalar, fungsi ginjal, ekspresi RAGE dan TGF- β 1

The Effects of the Combination of White and Purple Sweet Potatoes (*Ipomoea batatas* L) on Renal Function Diabetic Rats Induced By Streptozotocin

In vivo Studies of PathoPhysiologic and Histopathologic of Rat Kidneys of Diabetic Wistar Rats (*Rattus norvegicus*) Induced by Streptozotocin

ABSTRACT

Uncontrolled hyperglycemic condition in diabetes mellitus (DM) can produce oxidative stress and is related to the complication in diabetes. Sweet potato (*Ipomoea batatas*L.) is known as low glycemic index, it has been proven to have hipoglycemic effect. White skinned sweet potato has acidic glycoprotein and purple skinned sweet potato has anthocianin which has antihyperglycemic effect. This study was aimed to determine the effect of combination of white and purple skinned sweet potato powder on proteinuria, blood ureum and creatinine levels, renal histopathologic, expression of RAGE and TGF-beta1 in renal diabetic rats.

The subjects consist of 42 male Wistar rats with body weight 150-200 g (7-8 weeks of age). Diabetic rats are induced by a single intraperitoneal injection of streptozotocin 60 mg/kg body weight. The rats were divided into 7 groups: nondiabetic control rats (I), diabetic control rats (II), diabetic-white skinned sweet potato powder 800 mg/kgbw/day-treated rats (III), purple skinned sweet potato powder 800 mg/kgbw/day-treated rats (IV), diabetic-white skinned sweet potato powder 400 mg/kgbw/day and purple skinned sweet potato powder 400 mg/kg bw/day-treated rats (V), diabetic-white skinned sweet potato powder 600 mg/kgbw/day and purple skinned sweet potato powder 200 mg/kgbw/day-treated rats (VI) and diabetic-white skinned sweet potato powder 200 mg/kgbw/day and purple skinned sweet potato powder 600 mg/kgbw/day-treated rats (VI). The subjects were treated for 8 weeks, the blood was taken from retro-orbita venous plexus to determine blood glucose, ureum and creatinine levels. The rats were located in metabolic cages for 24 hours urine collection for determination proteinuria. At the end of treatment the subjects were dicapitated for the renal histopathologic examination.

The results showed that the significant decreased of blood glucose ($133,95 \pm 6,88 \text{ mg/dL}$), ureum ($32,01 \pm 2,64 \text{ mg/dL}$) and creatinine levels ($0,70 \pm 0,09 \text{ mg/dL}$), protein urine ($60,51 \pm 2,72 \text{ mg/dL}$), RA GE (0,19) and TGF-beta1 (0,20) in the group which were treated with combination of white skinned sweet potato powder 400 mg/kgbw/day and purple skinned sweet potato powder 400 mg/kgbw/day. Treatments with combination of white and purple skinned sweet potato powder prevented the complication of DM with reduced protein urine, blood ureum and creatinine levels in diabetic rats, improve the renal structure and decreased the expression of RAGE and TGF-beta1 in renal diabetic rats..

Key words : hyperglycemia, sweet potato, renal function, RAGE and TGF-beta1 expression