

**STRUKTUR HISTOLOGIS GINJAL MENCIT (*Mus musculus* Linnaeus, 1758) GALUR SWISS-WEBSTER DENGAN PAKAN RENDAH PROTEIN SETELAH PEMBERIAN KACANG BAMBARA (*Vigna subterranea* (L.) Verdc.)**

**Vykra Aulia Firdiana**

**19/441330/BI/10322**

**Pembimbing: Dr. Ardaning Nuriliani, S.Si., M.Kes.**

**INTISARI**

Individu dengan defisiensi protein akan mengalami gangguan struktur dan fungsi organ, khususnya ginjal. Konsumsi protein berbasis nabati sebagai nutrisi pelengkap dapat mengatasi hal tersebut sehingga menghasilkan perbaikan struktur dan fungsi ginjal. Kacang bambara (*Vigna subterranea*) berpotensi menjadi suplemen pelengkap pada kasus defisiensi protein karena kandungan protein yang tinggi. Penelitian ini bertujuan untuk mempelajari efek suplementasi kacang bambara terhadap struktur histologis ginjal mencit (*Mus musculus*) galur Swiss-Webster yang mengalami defisiensi protein. Pada penelitian ini digunakan 20 mencit betina usia 1 bulan dengan berat  $\pm 20$  gram yang dibagi dalam 5 kelompok perlakuan, yaitu kontrol, diet rendah protein 10%, diet rendah protein dengan suplementasi bambara 100 gram/kg pakan, suplementasi bambara 200 gram/kg pakan, dan suplementasi bambara 300 gram/kg pakan. Perlakuan diberikan selama dua bulan dan mencit dikorbankan sehari setelah perlakuan terakhir dengan dislokasi leher. Koleksi 40 organ ginjal (20 kanan dan 20 kiri) dilakukan, lalu difiksasi dengan *Neutral Buffered Formalin* (NBF) 10%. Pemrosesan jaringan ginjal dengan tebal irisan 6  $\mu\text{m}$  dilakukan melalui metode parafin dan pewarnaan Hematoksilin-Eosin dan Masson's Trichrome. Pengamatan dilakukan terhadap jumlah glomerulus, diameter dan luas area glomerulus, indeks organ, serta histopatologis jaringan dengan *ImageJ*. Kerusakan jaringan diukur dengan metode skoring ordinal mengacu pada penelitian Hammad *et al.* (2020). Analisis data dikerjakan melalui *software* SPSS pada tingkat signifikansi  $p \leq 0,05$  menggunakan uji *one way* ANOVA dan *Nested t-test* dengan uji lanjutan *Tukey's test* untuk data kuantitatif dan uji Kruskal Wallis untuk data semi-kuantitatif. Hasil penelitian menunjukkan bahwa perlakuan pakan rendah protein dan pemberian kacang bambara tidak memberikan perbedaan nyata dengan kelompok kontrol pada indeks organ, jumlah glomerulus, dan kerusakan jaringan (pengelupasan sel dan dilatasi). Perbedaan nyata ditemukan pada diameter dan luas area glomerulus dari perlakuan pakan rendah protein 10% dengan kontrol, suplementasi bambara 200 gram dan 300 gram. Perlakuan kacang bambara sebagai nutrisi pelengkap mencegah kerusakan jaringan ginjal dan menghasilkan ukuran glomerulus yang lebih baik dari kondisi defisiensi protein, tetapi penggunaannya tidak direkomendasikan.

**Kata kunci:** Defisiensi protein, kacang bambara, *Mus musculus* galur Swiss-webster, struktur histologis ginjal

**KIDNEY'S HISTOLOGICAL STRUCTURE OF MICE (*Mus musculus* Linnaeus, 1758) SWISS-WEBSTER STRAIN TREATED WITH PROTEIN DEFICIENCY DIET UPON ADMINISTRATION OF BAMBARA GROUNDNUT (*Vigna subterranea* (L.) Verdc.)**

**Vykra Aulia Firdiana**

**19/441330/BI/10322**

**Supervisor: Dr. Ardaning Nuriliani, S.Si., M.Kes.**

**ABSTRACT**

Individuals with malnutrition experience impairment in the organ structure and function, particularly the kidneys. Consumption of plant-based protein as a complementary nutrient can overcome malnutrition resulting in improved kidney structure and function. Bambara groundnut (*Vigna subterranea*) had the potential to be a complementary supplement for protein deficiency because of its high protein content. This study aimed to determine the effect of bambara groundnut supplementation on the kidney's histological structure of mice (*Mus musculus*) Swiss-Webster strain exposed to protein deficiency. In this research, 20 female mice aged 1 months with the weight of  $\pm 20$  grams were used and equally divided into 5 treatment groups, including control, 10% low-protein diet, low protein diet supplemented with bambara groundnut 100 grams/kg of feed, bambara groundnut 200 grams/kg of feed, and bambara groundnut 300 grams/kg of feed. The treatment was given for two months and the mice aged 3 months were sacrificed the day after the last treatment through neck dislocation. A total of 40 kidneys (20 right and 20 left) were collected, then fixed with 10% Neutral Buffered Formalin (NBF). The kidney tissue processing with a slice thickness of 6  $\mu\text{m}$  was carried out using the paraffin method and stained with Hematoxylin-Eosin and Masson's Trichrome. Observations were made on the number of glomeruli, diameter and area of the glomerulus, organ index, and also tissue histopathology with ImageJ. Tissue damage is measured using the ordinal scoring method based on the research of Hammad et al. (2020). Data analysis was performed through SPSS software at a significance level of  $p \leq 0.05$  using the one way ANOVA test and the Nested t-test with the Tukey's test post-hoc for quantitative data and the Kruskal Wallis test for semi-quantitative data. The results showed that the low-protein diet and bambara groundnut supplementation treatment did not significantly differ from the control group in organ index, number of glomeruli, and tissue damage (cell sloughing and dilatation). Significant differences were found in the diameter and glomerular area of the 10% low-protein feed treatment with the control, 200 grams and 300 grams of bambara supplementation. Administration of bambara groundnut as a complementary nutrient results in less damage to kidney tissue and better glomerular size from protein deficiency conditions, but its use is not recommended.

**Keywords:** Protein deficiency, bambara groundnut, Swiss-webster strain *Mus musculus*, kidney's histological structure