

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

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**ABSTRACT**

Protein deficiency caused by protein inadequacy in adult individuals can affect the histological structure of heart, such as atrophy, hypertrophy, and interstitial fibrosis. Bambara groundnut (*Vigna subterranea*) contains protein and several amino acids that have the potential to overcome protein deficiency. Therefore, the research is conducted to study the effect of protein deficiency and the administration of bambara groundnut on the histological structure of female Swiss-Webster mice (*Mus musculus* L.) heart. The histological slides of heart from female mice with control (14% protein), protein deficiency (10% protein), and protein deficiency with the administration of 100 g (11.289% protein), 200 g (12.578% protein), and 300 g (13.867% protein) bambara groundnut were prepared using paraffin method with 6  $\mu$ m thickness, and stained with Hematoxylin-Eosin and Mallory Acid Fuchsin. Some parameters analyzed in this research are the histological structure of the left ventricle, heart index, left ventricular internal diameter (LVID), left ventricular posterior wall thickness (LVPW), and the left ventricle's cardiomyocyte weight. The histological structure of the heart which has been scored was analyzed with Kruskal Wallis non-parametric test to determine the damage significance ( $p < 0.05$ ). The quantitative parameters were analyzed with one-way ANOVA and Duncan test. The research result shows that there was a significant difference ( $p < 0.05$ ) between groups in atrophy, hypertrophy, necrosis, and fibrosis parameters. Besides that, the biometric parameters, LVID, LVPW, and cardiomyocyte weight were not significantly different ( $p > 0.05$ ) between groups. Based on these results, it could be concluded that the 10% protein deficiency caused slight alteration of the histological structure of the heart. Moreover, the administration of bambara groundnut decreased atrophy, hypertrophy, and fibrosis, and didn't effect to necrosis, leukocyte infiltration, and hemorrhage.

**KEY WORDS:** protein deficiency, heart, bambara groundnut, mice, histological structure.

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

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**INTISARI**

Defisiensi protein yang disebabkan oleh ketidakcukupan asupan protein pada individu dewasa dapat mempengaruhi struktur histologis jantung seperti atrofi, hipertrofi, maupun fibrosis interstisial. Kacang bambara (*Vigna subterranea*) diketahui mengandung protein dan sejumlah asam amino yang berpotensi dalam menanggulangi defisiensi protein. Oleh karena itu, dilakukan penelitian yang bertujuan untuk mempelajari pengaruh defisiensi protein dan pemberian kacang bambara terhadap struktur histologis jantung mencit betina (*Mus musculus* L.) galur Swiss-Webster usia dewasa (3 bulan). Organ jantung mencit betina yang telah diberi perlakuan pakan kontrol (protein 14%), defisiensi protein (protein 10%), serta defisiensi protein dengan pemberian kacang bambara sebanyak 100 g (protein 11,289%), 200 g (protein 12,578%), dan 300 g (protein 13,867%) dibuat preparat histologis menggunakan metode parafin dengan ketebalan irisan 6  $\mu\text{m}$  serta diwarnai dengan *Hematoxylin-Eosin* dan *Mallory Acid Fuchsin*. Adapun parameter yang dianalisis pada penelitian ini meliputi struktur histologis ventrikel kiri, indeks jantung, diameter internal ventrikel kiri (LVID), tebal dinding ventrikel kiri (LVPW), dan lebar kardiomiosit ventrikel kiri. Struktur histologis otot jantung yang telah diskoring dianalisis menggunakan uji non parametrik Kruskal Wallis untuk menentukan signifikansi kerusakan ( $p < 0,05$ ). Parameter kuantitatif dianalisis menggunakan *One-Way ANOVA* dan uji letak beda nyata Duncan 5%. Hasil penelitian menunjukkan ada perbedaan yang signifikan ( $p < 0,05$ ) antar kelompok perlakuan pada parameter atrofi, hipertrofi, nekrosis, dan fibrosis. Parameter biometrik, LVID, LVPW, dan lebar kardiomiosit tidak menunjukkan perbedaan yang signifikan ( $p > 0,05$ ) antara kelompok perlakuan. Berdasarkan penelitian ini, diperoleh kesimpulan bahwa defisiensi protein 10% menyebabkan perubahan dengan tingkat kerusakan ringan pada struktur histologis jantung mencit. Adapun pemberian kacang bambara dapat menurunkan atrofi, hipertrofi, dan fibrosis, serta tidak berpengaruh terhadap nekrosis, infiltrasi leukosit, dan hemoragi.

**KATA KUNCI:** defisiensi protein, jantung, kacang bambara, mencit, struktur histologis.