

## **Pengaruh Kacang Bambara (*Vigna subterranea*) terhadap Miometrium dan Fungsi Reproduksi Mencit Betina dengan Diet Rendah Protein**

### **ABSTRAK**

Latar Belakang: Malnutrisi pada ibu hamil menyebabkan komplikasi kehamilan dan persalinan yang juga mempengaruhi keturunannya. Suplementasi protein nabati dapat menjadi solusi untuk mengatasi malnutrisi. Kacang bambara (KB) mempunyai kandungan asam amino esensial yang tinggi sehingga dapat mengurangi dampak negatif dari diet rendah protein pada mencit betina dewasa. Diet rendah protein berdampak pada jumlah dan kepadatan serabut otot serta menurunkan berat dan ukuran ketebalan miometrium. Penelitian kami mengevaluasi efek suplementasi KB pada miometrium dan fungsi reproduksi pada mencit betina yang diberi diet rendah protein.

Metode: Sebanyak 50 ekor mencit betina dibagi ke dalam 5 kelompok: diet protein normal (K), diet rendah protein (RP) dan diet rendah protein dengan suplementasi 100 g (RPB100), 200 g (RPB200), dan 300 g (RPB300) KB. Setelah 2 bulan perlakuan, lima ekor mencit pada setiap kelompok dikorbankan dan dilakukan pengukuran kekuatan kontraksi miometrium dengan kimograf, ketebalan lapisan miometrium dan vaskuler secara histopatologi, ekspresi mRNA menggunakan RT-PCR, sedangkan protein COX-1 dan COX-2 dengan Western Blot. Lima ekor mencit per kelompok dikawinkan, untuk analisis lama waktu kawin ke bunting, lama kebuntingan dan jumlah keturunannya. Kandungan nutrisi KB dianalisis menggunakan high-resolution mass spectrometry (HRMS).

Hasil: Suplementasi KB pada mencit betina dengan diet rendah protein dapat menghambat ekspresi mRNA dan protein COX-1 dan COX-2, kekuatan kontraksi miometrium lebih kuat dan ketebalan lapisan miometrium dan vaskuler lebih tebal dibandingkan kelompok kontrol. Suplementasi KB ternyata menyebabkan waktu kawin ke bunting lebih lama, lama kebuntingan lebih singkat dan jumlah keturunan lebih sedikit. Hasil pemeriksaan HRMS menemukan adanya phthalate yang diduga dapat menyebabkan gangguan fungsi reproduksi. Ekspresi mRNA dan protein COX-1 dan COX-2 berkorelasi negatif dengan kekuatan kontraksi miometrium dan berkorelasi positif dengan ketebalan lapisan dan vaskuler miometrium.

Kesimpulan: Kacang bambara berpotensi sebagai sumber protein yang dapat meningkatkan kontraksi miometrium melalui penghambatan ekspresi mRNA serta protein COX-1 dan COX-2.

Kata Kunci: COX-1, COX-2, Kontraksi Uterus, Diet Rendah Protein, Kacang Bambara.

***The Effects of Bambara Groundnuts (*Vigna subterranea*) on the Uterine Muscles and Reproductive Function of the Female Mice with Low Protein Diet***

**ABSTRACTS**

*Introduction: Malnutrition in pregnant women causes complications in pregnancy and childbirth which affect their offspring as well. Plant-based protein supplementation can be a solution to overcome the malnutrition. Bambara Groundnuts (BG) have a high content of essential amino acids that can reduce the negative impact of low protein diet in adult female mice. Low protein diet affects the number and density of muscle fibers and reduces muscle weight and the size of the uterus. Our study investigated the effects of BG supplementation on uterine muscle and reproductive function in female mice fed a low-protein diet.*

*Methods: A total of 50 mice were divided into five groups: normal protein diet (K), low protein diet (RP), and low protein diet supplemented with BG 100 g (RPB100), 200 g (RPB200), and 300 g (RPB300). After 2 months of intervention, five mice in each group were sacrificed and the strength of uterine muscle contractions was measured using kymographs. The thickness of the myometrium layer was analyzed histopathologically, and mRNA expression was measured using RT-PCR, while COX-1 and COX-2 proteins were assessed using Western Blot. Five mice per group were mated, and the time from mating to pregnancy, gestation period, and the number of offsprings born to each group were recorded. Bambara groundnuts nutrients were analyzed using high resolution mass spectrometry (HRMS).*

*Results: Bambara groundnut supplementation in female mice on a low-protein diet inhibited the expression of COX-1 and COX-2 mRNA and proteins, increased the strength of myometrial contractions, and increased the thickness of the myometrium and vascular layers. However, BG supplementation apparently lengthened the time from mating to pregnancy, reduced the length of pregnancy, and decreased the number of offsprings. The results of the HRMS examination found the presence of phthalates which are thought to cause reproductive dysfunction. The expression of COX-1 and COX-2 mRNA and proteins was negatively correlated with the strength of myometrial contraction and positively correlated with the thickness of the myometrial layer and vasculature.*

*Conclusion: Bambara groundnuts have the potential to be a source of protein that can increase uterine muscle contractions by inhibiting the expression of COX-1 and COX-2 mRNA and proteins.*

*Keywords: bambara groundnuts, COX-1, COX-2, low protein diet, myometrium contraction.*