ABSTRACT

THE EFFECT OF PROBIOTIC INTAKE ON MALONDIALDEHYDE (MDA) LEVELS IN THE LIVER OF UNDERNUTRITION MODEL OF RATS (*Rattus norvegicus*)

By

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Background: Undernutrition is a global health problem that triggers systemic oxidative stress and organ damage. Malondialdehyde (MDA) is a biomarker of damage from lipid peroxidation. Gut microbiota dysbiosis contributes to this pathophysiology through the *gut-liver* axis. Probiotics potentially modulate the microbiota and reduce oxidative stress. This study aimed to analyze the effect of probiotic intake on liver MDA levels in undernourished rat (*Rattus norvegicus*) models.
Methods: This experimental posttest-only controlled group study used 28 male Sprague-Dawley rats, divided into 4 groups (KN, KNP, KKG, KKGP; n = 6/group). The undernutrition model was induced by 30% feed restriction. Probiotic groups received an oral multi-strain suspension (>$1x10^7$ CFU/g). Liver MDA was measured by the TBARS method. Data were analyzed using Welch's ANOVA and Games-Howell post-hoc tests because variances were not homogeneous ($p < 0.001$).
Results: There was a highly significant difference in *mean* MDA levels among the groups (Welch's, $p < 0.001$). The *mean* MDA of the KKG group (28.7 ± 1.07 nmol/mL) was significantly higher than the KN group (24.3 ± 2.39 nmol/mL) ($p = 0.018$). The *mean* MDA of the KKGP group (21.9 ± 1.00 nmol/mL) was significantly lower than the KKG group ($p < 0.001$). There was no significant difference between the KN and KNP groups ($p = 0.982$).
Conclusions: Probiotic intake significantly reduces liver MDA levels in undernourished rats, supporting its role in reducing hepatic oxidative stress via modulation of the *gut-liver* axis. Probiotics have potential as an adjuvant therapy.

Keywords: Liver, Undernutrition, Malondialdehyde, Probiotics, Oxidative Stress

ABSTRAK

PENGARUH ASUPAN PROBIOTIK TERHADAP KADAR MALONDIALDEHID (MDA) HEPAR TIKUS (*Rattus norvegicus*) MODEL KURANG GIZI

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Latar Belakang: Kurang gizi merupakan masalah kesehatan global yang memicu stres oksidatif sistemik dan kerusakan organ. Malondialdehid (MDA) adalah biomarker kerusakan akibat peroksidasi lipid. Disbiosis mikrobiota usus berkontribusi pada patofisiologi ini melalui sumbu usus-hati. Probiotik berpotensi memodulasi mikrobiota dan mengurangi stres oksidatif. Penelitian ini bertujuan menganalisis pengaruh asupan probiotik terhadap kadar MDA hepar pada tikus (*Rattus norvegicus*) model kurang gizi.
Metode: Penelitian eksperimental *posttest only controlled group* menggunakan 28 tikus jantan Sprague Dawley, dibagi 4 kelompok (KN, KNP, KKG, KKGP; n = 6/kelompok). Model kurang gizi diinduksi dengan restriksi pakan 30%. Kelompok probiotik menerima suspensi *multi-strain* (>1x10^7 CFU/g) oral. MDA hepar diukur dengan TBARS. Data dianalisis menggunakan Uji *Welch's* ANOVA dan *post-hoc Games-Howell* karena varians tidak homogen ($p < 0,001$).
Hasil: Terdapat perbedaan rerata MDA yang sangat signifikan antar kelompok (*Welch's*, $p < 0,001$). Rerata MDA KKG (28,7 ± 1,07 nmol/mL) signifikan lebih tinggi dari KN (24,3 ± 2,39 nmol/mL) ($p = 0,018$). Rerata MDA KKGP (21,9 ± 1,00 nmol/mL) signifikan lebih rendah dari KKG ($p < 0,001$). Tidak ada perbedaan signifikan antara KN dan KNP ($p = 0,982$).
Kesimpulan: Asupan probiotik signifikan menurunkan kadar MDA hepar pada tikus kurang gizi, mendukung perannya mengurangi stres oksidatif hepatik via modulasi sumbu usus hati. Probiotik berpotensi sebagai terapi adjuvan.

Kata Kunci: Hepar, Kurang Gizi, Malondialdehid, Probiotik, Stres Oksidatif