

Perubahan Kandungan Asam Lemak Rantai Pendek dan Bakteri *Enterobacteriaceae* pada Feses Remaja Usia 15-19 Tahun yang Mengonsumsi Probiotik Multistrain

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Intisari

Probiotik multistrain *Lactiplantibacillus plantarum* subs. *plantarum* (strain Dad-13 dan FNCC-0250) dan *Lacticaseibacillus paracasei* GMRMP-001 terbukti mampu bersinergi, memiliki sifat antibakteri dan menghasilkan asam lemak rantai pendek (ALRP) pada penelitian menggunakan hewan coba. Tujuan penelitian ini adalah untuk mengetahui pengaruh pemberian probiotik multistrain *L. plantarum* (strain Dad-13 dan FNCC-0250) dan *L. paracasei* GMRMP-001 terhadap ALRP dan *Enterobacteriaceae* feses remaja sehat. Metode yang digunakan adalah *double-blind placebo-controlled randomized controlled trial* (RCT) yang melibatkan 60 partisipan remaja sehat usia 17-25 tahun. Partisipan diacak menjadi 2 kelompok yaitu kelompok probiotik dan kelompok placebo. Penelitian dilakukan selama 30 hari, dimana kelompok probiotik mengonsumsi probiotik multistrain 10^{10} CFU dalam 0,25 g susu skim, kelompok placebo mengonsumsi 0,25 g susu skim. Partisipan melakukan pencatatan konsumsi produk penelitian dan pola makan selama penelitian. Pada hari ke-1 \pm 1 dan hari ke-30 \pm 1 partisipan diminta untuk mengumpulkan sampel feses. Jumlah koloni bakteri dihitung menggunakan metode *total plate count* (TPC), bakteri asam laktat dihitung dengan menumbuhkan pada media *De Man Rogosa and Sharpe Agar* (MRSA) dan *Lactitol LBS vancomycin* (LLV). Jumlah *L. plantarum* dihitung menggunakan media *Lactobacillus plantarum selective medium* (LPSM) dan *violet red bile Agar* (VRBGA) untuk *Enterobacteriaceae*. Jumlah *L. plantarum* dan *L. paracasei* juga dianalisa menggunakan metode *quantitative polymerase chain reaction* (qPCR). Konsentrasi ALRP dianalisa menggunakan *Gas Chromatography* (GC). Hasil penelitian menunjukkan bahwa jumlah koloni hidup kelompok bakteri asam laktat yang ditumbuhkan pada media LLV meningkat signifikan setelah mengonsumsi probiotik. Hal ini juga diikuti dengan peningkatan signifikan *L. plantarum*, dimana peningkatan keduanya berbeda nyata dibandingkan plasebo. Lebih lanjut, *Enterobacteriaceae* mengalami penurunan signifikan pada kelompok probiotik. Dengan metode PCR, jumlah *L. plantarum* dan *L. paracasei* mengalami peningkatan secara signifikan dan berbeda nyata dibandingkan kelompok plasebo. Konsumsi probiotik multistrain juga meningkatkan konsentrasi asam asetat secara signifikan dibandingkan kelompok plasebo. Hasil penelitian menunjukkan bahwa konsumsi probiotik multistrain *L. plantarum* subs. *plantarum* (strain Dad-13 dan FNCC-0250) dan *L. paracasei* GMRMP-001 selama 30 hari mampu menurunkan *Enterobacteriaceae* dan meningkatkan asam asetat.

Keywords: probiotik multistrain, asam lemak rantai pendek, *Enterobacteriaceae*, *Lactobacillus plantarum*, *Lactobacillus paracasei*

*Alterations of Short-Chain Fatty Acid Level and Enterobacteriaceae
In The Faecal of Adolescents Aged 15–19 Years Following Multistrain Probiotic
Consumption*

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Abstract

*The multistrain probiotics *Lactiplantibacillus plantarum* subsp. *plantarum* (strains Dad-13 and FNCC-0250) and *Lacticaseibacillus paracasei* GMRMP-001 have demonstrated synergistic effects, exhibit antibacterial properties, and the ability to produce short-chain fatty acids (SCFAs) in animal study. The aim of this study was to determine the effects of administering the multistrain probiotic, consist of *L. plantarum* (strains Dad-13 and FNCC-0250) and *L. paracasei* GMRMP-001 on the fecal Enterobacteriaceae and SCFA concentrations in healthy adolescents. A double-blind placebo-controlled randomized controlled trial (RCT) was conducted involving 60 healthy adolescent participants aged 17-25 years. Participants were randomly assigned to either a probiotic or placebo group. Over a 30-day intervention period, the probiotic group consumed multistrain probiotics (10^{10} CFU) suspended in 0.25 g of skim milk, while the placebo group consumed 0.25 g of skim milk without the addition of probiotics strain. Participants recorded their daily product intake and dietary pattern throughout the study period. Fecal samples were collected at day 1 ± 1 and day 30 ± 1 . Total bacterial colony counts were assessed using the total plate count (TPC) method. Lactic acid bacteria (LAB) were cultured on de Man, Rogosa and Sharpe Agar (MRS) and Lactitol LBS Vancomycin (LLV) media. *L. plantarum* was enumerated using *L. plantarum* selective medium (LPSM), and Enterobacteriaceae were quantified using violet red bile agar (VRBGA). Quantitative polymerase chain reaction (qPCR) was also used to determine the levels of *L. plantarum* and *L. paracasei*. SCFA concentrations were analyzed using gas chromatography (GC). The results showed a significant increase in the viable LAB group, particularly those grown on LLV media, following probiotic consumption. This was accompanied by a significant increase in *L. plantarum*, with both showing statistically significant differences compared to the placebo group. Furthermore, fecal Enterobacteriaceae showed a significant decrease in the probiotic group. qPCR analysis confirmed a significant increase in both *L. plantarum* and *L. paracasei* compared to the placebo. In addition, acetic acid concentrations were significantly higher in the probiotic group. In conclusion, 30 days of supplementation with a multistrain probiotic *L. plantarum* subs. *plantarum* (strain Dad-13 and FNCC-0250) and *L. paracasei* GMRMP-001 significantly reduced fecal Enterobacteriaceae and increased acetic acid concentration in healthy adolescents.*

Keywords: *multistrain probiotic, short chain fatty acid, Enterobacteriaceae, Lactobacillus plantarum, Lactobacillus paracasei*