



## The effect of pre- and probiotic supplementation on inflammatory markers in postmenopausal women

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Chronic inflammation is linked with several deleterious diseases, including cardiovascular disease, obesity, diabetes mellitus, irritable bowel disease, and osteoporosis<sup>(1,2)</sup>. Post-menopausal women are at a heightened risk of developing these diseases due to the remission of oestrogen, further amplifying a pro-inflammatory state<sup>(3,4)</sup>. This study aimed to critically examine the combined effect of pre- and probiotic supplementation (synbiotics) and exercise in the form of  $\geq 7,000$  steps per day on inflammatory markers hs-CRP, IL-1 $\beta$ , IL-6, IL-8, IL-10, INF- $\gamma$  and TNF- $\alpha$  in sedentary post-menopausal women. Eighty-seven healthy post-menopausal women were allocated to receive either a synbiotic supplement or placebo for 12 weeks. Participants' demographics and physical activity levels were determined using questionnaires, and their diet was assessed using self-reported 3-day diet records. Body composition measures of height, weight and BMI were measured at baseline, while total body mass, lean body mass, total fat mass and total body fat percentage at baseline and week 12 using dual-energy X-ray absorptiometry. Fasted venous blood samples were collected to analyse inflammatory status before and after the intervention. Statistical analysis was performed using SPSS version 24, where outcome variables with multiple time points, were analysed using repeated measures ANOVA with the model, including time (baseline vs 12 weeks), intervention group (placebo vs synbiotic), and their interaction as fixed effects. The results showed no significant differences between the intervention group's demographics, physical activity levels, and dietary intake ( $p > 0.05$ ). The 12-week study duration (time) was found to have had a statistically significant effect on lowering hs-CRP ( $p < 0.018$ ), IL-8 ( $p < 0.001$ ), IFN- $\gamma$  ( $p < 0.001$ ), TNF- $\alpha$  ( $p < 0.001$ ) and increasing IL-6 ( $p < 0.001$ ) and IL-10 ( $p < 0.001$ ) in both groups. However, the observed decrease in IL-1 $\beta$  ( $p < 0.348$ ) over time was not significant. The intervention type (synbiotic or placebo) significantly impacted IL-10 ( $p < 0.003$ ). No significant interactions between time and group were observed across all other inflammatory markers ( $p > 0.05$ ). The study duration increased total lean body mass ( $p < 0.015$ ) and decreased total body fat percentage ( $p < 0.022$ ) in both the placebo and synbiotic groups. At the same time, the intervention type (synbiotic or placebo) had no effect on total lean body mass, total fat mass, total body mass and percentage body fat in both groups ( $p > 0.05$ ). The current study showed no notable differences between the placebo and synbiotic groups suggesting synbiotic supplementation is likely ineffective at reducing chronic inflammation in overweight, sedentary post-menopausal women living in New Zealand. However, future studies are needed to confirm these findings. Additionally, studies should investigate the effects of exercise and synbiotic supplementation separately in this population.

**Keywords:** Synbiotics; post-menopausal; inflammation; cytokines

### Ethics Declaration

Yes

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### References

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