

Bincy Biju
L2
LSU Health Sciences Center, New Orleans, LA

Dr. Lauri O. Byerley, PhD, RDN, LDN, FAND, Department of Physiology

Fecal Short-Chain Fatty Acids in Protein-Supplementing Bodybuilders

BACKGROUND: The gut microbiota has been extensively studied to understand its effect on diet consumption and its correlation with the production of short-chain fatty acids (SCFA). There are three SCFAs: acetate, butyrate, and propionate, and these play a significant role in an individual's overall health. They maintain the gut barrier integrity and serve as an energy source for colonocytes. They are also involved in regulating the immune system and contribute to glucose and lipid metabolism. Past studies suggest that protein supplementation, combined with fiber intake and resistance training, may influence the composition of gut microbes involved in the production of SCFA. While the significance of SCFA on gut health and various health benefits are known, limited studies have been done to compare their levels in the fecal samples of bodybuilders in relation to protein supplementation.

OBJECTIVES: The purpose of this study was to compare the levels of short-chain fatty acids in the fecal samples of bodybuilders based on their self-reported protein supplement use.

METHODS: A total of 39 fecal samples were collected from bodybuilders, out of which twenty-six participants were males and thirteen participants were females. Based on their use of protein supplements, participants were categorized into two groups: protein supplement (PS) and non-protein supplement (No PS). Each participant completed a 24-h food recall (ASA24) to obtain the nutrient data. Short-chain fatty acids were detected in fecal samples by GC/MS.

RESULTS: There was a significant difference in protein intake between the No PS group (117.6 ± 11.8 g) and the PS group (169.3 ± 17.6 g). Similarly, fiber intake was significantly higher in the PS group (27.3 ± 3.1 g) compared to the No PS group (18.9 ± 2.1 g). However, no significant differences were noted in age ($p = 0.84$), weight ($p = 0.79$), or height ($p = 0.72$) between the two groups. While short-chain fatty acid (SCFA) levels did not differ significantly among the groups, acetate concentration was significantly lower ($p = 0.02$) in the PS group (573524 ± 47) compared to No PS (791957 ± 74). Differences in butyrate concentration ($p = 0.83$), which was 2.5-fold higher than acetate or propionate, and propionate ($p = 0.22$) were not statistically significant.

CONCLUSION: Undigested dietary fibers and other carbon chains, such as acetate, and deaminated amino acids, serve as sources for SCFA production. Previous studies have shown that a high-fiber diet increases butyrate levels, whereas a high-protein diet alters the proportions of SCFAs. In this study, despite the PS group's higher fiber and protein intake, fecal acetate levels were significantly lower compared to the No PS group. This reduction may result from its consumption by butyrate-producing bacteria through cross-feeding, where acetate is used. Future studies are needed to identify the factors driving the lower acetate levels.