JEN Journal of Exercise and Nutrition
2018, 1 (4) OPEN ACCESS

The Effects of Probiotic Supplementation in Active Men and Women

Research Brief

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Abstract

Introduction: There is evidence in rodents as well as obese adults that probiotic supplementation can promote a decrease in fat mass. For instance, Bifidobacterium animalis ssp. lactis 420 (B420) has been shown to decrease abdominal fat mass. Therefore, our laboratory determined the effects of probiotic supplementation on body composition in a group of active men and women in a double-blind, placebo-controlled two-arm investigation.

Methods: Twenty subjects participated in this investigation (6 male, 14 female). All were actively participating in aerobic and/or resistance training for a period of at least one year. Subjects were randomly assigned to a group that received either a placebo (maltodextrin) or an encapsulated probiotic (one capsule) containing 5 billion Bifidobacterium BR03 and 5 billion Streptococcus thermophilus FP4 (Probiotical, Novara, Italy). Subjects consumed one capsule daily during the 6-week treatment period. Furthermore, subjects were instructed to not alter their diet or training regimen during this time. Body composition was assessed via dual-energy x-ray absorptiometry (DXA) (Hologic Horizon W, *Danbury CT USA*). Data are presented as the mean ± SD. An ANOVA was used to assess differences between groups.

Results: The physical characteristics of the placebo and probiotic groups were as follows: Placebo – Age 25±4 years, Height 168±7 centimeters; Probiotic – Age 30±8 years, Height 166±8 centimeters. Six weeks of probiotic supplementation had no effect ($p > 0.05$ for all) on body weight, lean body mass, fat mass, bone mineral content, body fat percentage or trunk fat mass.

Conclusions: Six weeks of daily supplementation with a probiotic containing 5 billion Bifidobacterium BR03 and 5 billion Streptococcus thermophilus FP4 in active men and women has no effect on body composition.

Key Words: body composition, gut, microbiome, prebiotic, fat mass, obesity, abdominal fat

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Introduction

The intestinal microbiome plays a fundamental role in the regulation of energy metabolism and immune function [1]. Probiotic supplementation is one method through which people may alter microbiome composition. Several controlled trials in endurance athletes have suggested that probiotic supplementation limits oxidative stress, immunosuppression, and increases in gut barrier permeability that accompany intense physical training, which could provide an indirect ergogenic benefit over the long-term [2].

Recently, Jager et al demonstrated in a double-blind, randomized, placebo-controlled trial that supplementation with five billion colony forming units (CFU) of *Streptococcus (S.) thermophilus* FP4 (DSM 18616) and 5 billion CFU of *Bifidobacterium (B.) breve* BR03 (DSM 16604) for 21 days accelerated strength recovery following a bout of muscle-damaging exercise in resistance-trained men [3]. Probiotic supplementation was associated with a reduction in the proinflammatory cytokine, interleukin-6 (IL-6), before and up to 48-hours following the exercise session, suggesting that the effects on performance recovery might be mediated by a reduction in inflammation [4].

Current evidence suggests that several strains of lactic acid bacteria, including *Lactobacillus (L.) gasseri* SBT 2055, *L. rhamnosus* ATCC 53103, and the combination of *L. rhamnosus* ATCC 53102 and *B. lactis* Bb12, are effective at reducing fat mass in humans [5]. Additionally, other strains of *B. breve* have shown anti-obesity effects in both humans [6] and mice [7].

To our knowledge, no study has investigated the effects of probiotic supplementation on body composition in lean, active adults. Therefore, and due to previous research suggesting that a combination of *B. breve* BR03 and *S. thermophilus* FP4 may benefit exercise recovery, we determined the effects of probiotic supplementation with these strains on the body composition of active men and women in a double-blind, placebo-controlled, two-arm investigation.

Methods

Participants

Twenty subjects participated in this investigation (6 male, 14 female). All were actively participating in aerobic and/or resistance training for a period of at least one year. Each participant signed an Informed Consent form prior to participation. The university's Institutional Review Board approved the investigation.

Protocol

Subjects were randomly assigned to a group that received either a placebo (maltodextrin) or an encapsulated probiotic (one capsule) containing 5 billion CFU *B. breve* BR03 and 5 billion CFU *S. thermophilus* FP4 (Probiotical, Novara, Italy). Subjects were instructed to consume one capsule daily during the six-week treatment period. Furthermore, subjects were instructed to not alter their diet or training regimen during this time. Body composition was assessed via dual-energy x-ray absorptiometry (DXA) (Hologic Horizon W, *Danbury CT USA*).

Statistical Analysis

Data are presented as the mean ± SD. An ANOVA was used to assess differences between groups.

Results

The physical characteristics of the placebo and probiotic groups were as follows: Placebo – Age 25±4 years, Height 168±7 centimeters; Probiotic – Age 30±8 years, Height 166±8 centimeters. Six weeks of probiotic supplementation had no significant effect on body weight, lean body mass, fat mass, trunk fat mass, bone mineral content, or body fat percentage (Table 1).

Table 1 – Body Composition

	Placebo Pre	Placebo Post	Probiotic Pre	Probiotic Post	*p* value
Body Weight (kg)	69.0±15.8	69.2±15.1	66.9±12.0	67.5±12.4	0.9777
Lean Body Mass (kg)	48.8±10.8	48.8±11.3	44.4±9.0	45.2±9.3	0.6696
Fat Mass (kg)	17.5±7.6	17.7±6.3	19.9±6.9	19.7±7.1	0.8019
Trunk Fat Mass (kg)	7.1±4.1	7.3±3.9	8.9±3.7	8.6±3.8	0.9994
Bone Mineral Content (kg)	2.6±0.6	2.7±0.6	2.5±0.4	2.6±0.3	0.9453
Body Fat Percentage (%)	25.2±6.2	25.7±5.8	29.6±7.5	29.0±7.7	0.3636

Data are expressed as the mean ± SD. N = 10 for both groups. The placebo group had four males and six females; the probiotic group had two males and eight females. There were no significant differences within or between groups. Legend: kg - kilograms

Discussion

The significance of this investigation is that it is the first to examine the effects of probiotic supplementation in exercise-trained men and women. We observed no significant effect of probiotic supplementation on the body composition of active adults. We used a probiotic and dosing scheme previously shown to accelerate recovery from exercise-induced muscle damage [3]. This involved daily supplementation with 5 billion CFU *B. breve* BR03 and 5 billion CFU *S. thermophilus* FP4.

Our results should not be taken as evidence for a lack of effect of probiotic supplementation on body composition in healthy, active adults. The effects of probiotics are strain-specific [8]. It is possible that other strains of bacteria that have shown benefits for altering body composition in obesity could have an effect [5]. For example, Minami et al randomly assigned overweight adults to supplement with 50 billion CFU of *B. breve* B-3 (or placebo for 12 weeks [6]. Probiotic supplementation resulted in significantly greater fat loss than placebo (0.7 vs 0.1 kg, respectively) without affecting other parameters of body composition.

However, obesity is associated with an altered microbiome composition and reduced microbial diversity [9]. Systematic reviews of probiotic supplementation in adults have suggested that probiotic supplementation is more likely to alter the microbiome composition of dysregulated microbiomes compared to healthy ones [10,11]. Therefore, our null findings could be the result of an inability for the probiotic supplement to modify our healthy participants' microbiomes. However, a previous study has reported that *B. breve* BR03 is capable of colonizing the gut of healthy humans [12]. In conclusion, six weeks of daily supplementation with a probiotic providing 5 billion CFU *Bifidobacterium breve*

BR03 and 5 billion CFU *Streptococcus thermophilus* FP4 has no effect on body composition in active men and women .

Media-Friendly Summary

Although there's evidence that overweight folks may benefit from probiotic supplementation (i.e., they lose fat mass); the same isn't true for active individuals – at least in this limited pilot trial. Because exercise-trained individuals in general have a myriad of healthy behaviors, the addition of probiotic supplements may likely have no effect on trained individuals.

Acknowledgements

We would like to thank Dr. Ralf Jager and Probiotical (Novara, Italy) for the provision of the probiotic and placebo.

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