Protein Pacing and Plant-Based Protein: Predictors of Improved Body Composition in Division III Female Athletes

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Athletes, with their increased training and competitive demands, require more dietary protein for the repair and maintenance of skeletal muscle tissue. The relative recommendations for athletes are 1.2-2.0 g/kg/d. By pacing protein (PP), either absolutely (20-40 g/meal) or relatively (0.25-0.55 g/kg/meal), an athlete can maximize muscle protein synthesis and improve body composition, leading to better performance and overall health. Sources of dietary protein, animal- vs plant-based (ABP & PBP), have also been linked to these outcomes. PBP has been associated with reduced cardiovascular disease risk, whereas ABP, specifically red and processed meat, may increase risk. As not all athletes work with a sports nutritionist, it is critical to investigate their nutrition and indicators of health. **PURPOSE:** To examine associations between dietary intake, PP (relative & absolute), and protein source (ABP & PBP) with total body fat % in Division III female athletes. **METHODS:** Body composition was assessed using dual-energy x-ray absorptiometry. Dietary intakes were estimated with three-day dietary logs and EHSA software. Daily protein intake was divided into three mealtime periods: morning (before 11:30), afternoon (11:30-16:00), and evening (after 16:00). PP was defined as relative (≥ 0.4 g/kg) and absolute (≥ 30 g). Meeting PP cut points during one mealtime period was recorded as "1", and these were summed to create 2 ordinal variables, each with 4 levels, achieving relative or absolute PP at 0, 1, 2, or 3 periods. A stepwise linear regression was used to determine whether dietary intake, PP, and protein source were associated with body fat %. Age (years), body mass (kg), ABP (g/d), PBP (g/d), energy intake (kcal/d), absolute protein, carbohydrate, and fat intake (g/d), and relative (g/kg/d) and absolute PP (g/d) were included in the regression. **RESULTS:** A total of 13 females (mean $\pm$ SD; age 19.69 ± 1.44; height 169.32 ± 5.48; body mass 66.39 ± 8.30) were included in the analysis. Body fat % was first predicted by relative PP and then by PBP ($F_{1,10} = 14.208$, $R^2 = 0.740$, adjusted $R^2 = 0.688$, $p \leq 0.001$). For each mealtime period an athlete achieved relative PP, and for every 1 g of PBP, body fat % decreased by 3.830 % and 0.212 % respectively. **CONCLUSION:** Relative PP and PBP were associated with lower body fat % in Division III female athletes, while ABP was unrelated. **SIGNIFICANCE/NOVELTY:** Utilizing relative PP and increasing PBP may help athletes achieve an optimal body fat %, which can translate to better performance and health outcomes. Greater PBP will also improve diet nutritional quality, contributing to better health, without the need to omit high-quality ABP essential for meeting energy and protein requirements. Our findings demonstrate that relative PP and PBP may improve body fat % in female athletes without requiring ABP removal from their diet.