Letter

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Premeal Consumption of a Protein-Enriched, Dietary Fiber-Fortified Bar Decreases Total Energy Intake in Healthy Individuals (*Diabetes Metab* J 2019;43:879-92)

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World Health Organization reported that obesity has nearly tripled worldwide since 1975 [1]. The solution for obesity is simply reducing energy intake below energy expenditure, but we cannot easily control eating. That is why various dietary strategies are being studied and debated. Revised 2020 American Diabetes Association nutritional guideline recommends that there is not an ideal percentage of calories from carbohydrate, protein, and fat for weight reduction [2]. Therefore, the best eating pattern should be individualized based on current eating patterns, preferences, and metabolic goals.

I enjoyed reading the interesting paper entitled "Premeal consumption of a protein-enriched, dietary fiber-fortified bar decreases total energy intake in healthy individuals" [3]. This study shows us that premeal supplement combined with a modest amount of protein and dietary fiber decreased total food intake compared to water control. Protein-enriched, dietary fiber-fortified bar (PFB) also decreased postprandial glucose levels. Glucagon-like peptide-1 (GLP-1) was prominently increased after PFB preload compared to both the usual bar and water control, but they discussed the difference of test meal intake was related to peptide YY (PYY) level, not GLP-1 level.

Satiety is a major factor for food intake control but is composed of a very complex mechanism. Satiety is first elicited by the gut distension response to portion size, volume and weight rather than to caloric and energy intake [4]. Among macronutrients, previous studies reported that protein induced much stronger satiety than fat and carbohydrate in same calorie [5,6]. High-protein diets demonstrated a long-term impact on weight loss than iso-calorically dense high-carbohydrate or high-fat diets in clinical trials [7,8]. Amino acids in the gastrointestinal (GI) tract induce the release of cholecystokinin (CCK) and anorexigenic substances such as GLP-1 and PYY [9-12]. Thus, prioritizing protein early in the meal before carbohydrate and fat could decrease total food consumption due to better satiating effect.

This study reviewed previous studies about preload protein supplementation and suggested that they did not reduced total energy intake because of dose-dependent effect of premeal soy protein. To solve the problem, they used a smart combination which is composed of reduced amount of protein and fortified fiber for their premeal supplement.

Fiber is also a satiating component with very low calorie. This study reviewed the effect of fiber on bulk formation, gastric emptying, various hormones like GLP-1 and PYY, and microbiome through fermentation to small-chain fatty acids [3]. This study used dietary fiber. Some studies reported that soluble fibers with high viscosity slow digestion, increase absorption of macronutrients and extend the release of appetite-regulating hormones [13,14]. However, insoluble fibers, which provide bulk to the diet and increase the rate of transit, are less satiating and hunger-suppressing [15]. The character of fiber

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may be another factor that influenced the results.

One study demonstrated sex-specific central processing of hunger and satiety cues [16]. These investigators reported differences in neuronal activity according to sex in response to hunger and satiety even though there is no differences by sex in subjective ratings of hunger and satiety in response to controlled administration of an energy load. Other scientists found that the cortical activity of women in response to food-related stimuli was higher compared to men [17]. Among GI hormones, ghrelin concentrations were significantly higher in females compared to males both in a fasting state and in response to oral glucose and lipid loads [18.19]. Whey protein supplement increased total energy intake in women compared to men [20]. Gastric emptying was slow and plasma glucagon, CCK and GLP-1 increased less in women than men [20]. So, it is questionable whether PFB would show the same effect in both sex.

CONFLICTS OF INTEREST

No potential conflict of interest relevant to this article was reported.

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