

## A combination of various functional food ingredients as a weight management program: randomized, placebo-controlled, and double-blind human clinical studies

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### ABSTRACT:

**Background:** *Lycium barbarum* increased the postprandial energy expenditure (PPEE). Negative energy balance caused by the systematic procedure (TAI*slim*<sup>®</sup> System), including increasing metabolic rate through physical activity, use of *Lycium barbarum*-containing TAI*slim* (Product A), and decreasing caloric intake by consuming a chewable confection (TAI*slim* SKINNY=Product B), and a meal replacement shake (TAI*slim* SHAKE=Product C), would be successful for weight loss.

**Methods:** We examined TAI*slim* System on anthropometrics, appetite in Study 1 and PPEE in Study 2, both in a randomized, placebo-controlled, double-blind manner. **1)** A total of 67 participants were randomized into 2 groups (placebo or TAI*slim* System). Intake procedures were: Product A, 60 ml (20 kcal) b.i.d. immediately before breakfast and lunch, Product B, 1 chew (20 kcal) t.i.d. between meals and after dinner; Product C, 40.5 g (158 kcal) as breakfast. A calorie-restricted diet with multi-vitamin supplementation and daily exercise was required. Anthropometric parameters were assessed at baseline, 4, 8, and 12 w. **2)** Appetite was measured using a subjective visual analog scale during the initial 3-7 days of intake. **3)** For PPEE evaluation, 12 participants consumed a single bout of TAI*slim* System products or placebo, and took part in 6 study sessions. EE was measured by an indirect calorimeter immediately before (baseline) and at 1, 2, and 4 h post-intake of samples.

**Results:** **1)** Body weight was significantly reduced by  $6.2\pm 0.7\%$ , compared to pre-intervention with TAI*slim* System ( $P<0.01$ ). Waist circumference, total body fat, blood pressure, and fasting blood glucose levels were also significantly reduced by TAI*slim* System, in a range of 3.8-9.9%. TAI*slim* System was significantly more effective than the placebo ( $P<0.05$ ). The placebo group showed -0.1-3.9% reduction from pre-intervention with no significant difference. **2)** TAI*slim*

System also significantly suppressed appetite, by 39%, compared to the baseline and placebo ( $P < 0.05$ ) (11% reduction in the placebo). **3)** PPEE was significantly increased by TAIslim System compared to placebo and baseline levels. Compared to the baseline EE, placebo increased only by  $0.8 \pm 0.9\%$ , but  $7.2 \pm 1.2\%$  with TAIslim System ( $P < 0.01$ ).

**Conclusions:** It is suggested that TAIslim System exhibits significant weight loss and stimulating effects on caloric expenditure, and thus may be a useful and effective weight loss program.

**Keywords:** *Lycium barbarum*, Goji, Fiber, Phenylalanine, N-Acetyl-L-Tyrosine, Tea, Polyphenols, Human clinical trial, Energy expenditure, Resting metabolic rate, Waist circumference, Appetite, Body mass index, TAIslim.