

Effect of chia seed (*Salvia hispanica L.*) consumption on adiposity parameters in rats exposed to cafeteria diet

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The prevalence of obesity and related chronic diseases are growing worldwide⁽¹⁾. Lifestyle and environmental factors play a crucial role on the development of obesity⁽²⁾. Chia seed is an important source of alpha-linolenic acid⁽³⁾ and many other compounds⁽⁴⁾ that may exert positive effects on health. The aim of this study was to examine the possible protective effects of chia seed on cafeteria-diet induced obesity in rats and to determine PPAR α / γ , SREBP1c, UCP2 and FADS2 gene expressions in the adipose tissue.

Three-week-old male Wistar rats (n = 28) were monitored for 15 weeks in four groups (n = 7/group): CON group (control diet), CONC group (control diet containing 20% chia seed), CAF group (control diet and cafeteria diet) and the CAFC group (control diet containing 20% chia seeds and cafeteria diet). Body weight, food and water intake were recorded daily. At the end of the study period, all rats were euthanized and plasma and tissue samples were collected. Body water, protein and fat ratios were determined in animal carcasses. The concentrations of glucose, total cholesterol, triglyceride, haemoglobin A1c, insulin, leptin, C peptide, and adiponectin were examined in plasma. SREBP1c, UCP2, PPAR α , PPAR γ and FADS2 gene expression levels were determined in adipose tissue. Repeated Measures ANOVA, one-way ANOVA, Shapiro-Wilk and Student t-Test were used for statistical analysis. Results are shown as mean \pm standard error and $p < 0.05$ was considered statistically significant.

Total dietary energy intake (kcal/day) from highest to lowest was as follows among the groups: CAFC, CAF, CONC and CON, respectively ($p < 0.001$). CON (375.89 \pm 27.92 g) had the lowest body weight whereas CAF (613.07 \pm 46.73 g) had the highest at the end of the study. The highest weight gain was observed in CAF and the least in CON. Total white adipose tissue weight was the highest in CAF whereas it was the lowest in CON ($p < 0.05$). Among the plasma parameters, only the difference in leptin levels between the groups was significantly different (CAF: 6.26 \pm 1.78 and CON: 1.20 \pm 0.26 ng/mL; $p < 0.05$). Groups exhibited statistically different relative gene expression levels of SREBP-1c, UCP2, PPAR α and FADS2 in adipose tissue ($p < 0.05$). SREBP-1c relative gene expression was significantly higher in CAFC in comparison to CAF (3.96 \pm 0.62 and 0.50 \pm 0.14; $p < 0.001$).

Fast foods and high-energy-dense foods have adverse effects on the development of obesity. This study showed that, chia seed can exert slightly differential effects on adiposity related parameters when given with an obesogenic diet in rats.

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