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Cytokines and adipokines in db / db mice after sweetener consumption

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Abstract

Type 2 Diabetes Mellitus is a chronic diseases with very high morbidity and mortality worldwide; associated with obesity and hypertension and representing at least 90% of all cases of diabetes. It is characterized by insulin resistance in peripheral tissues and a deterioration in its secretion by the pancreatic β -cell. The control and treatment of these patients is a low-carbohydrate diet, for which non-nutritive sweeteners such as sucralose and stevia are being used, maintaining the sweet taste. It is known that these sweeteners are harmless, but the results so far are still controversial. To identify alterations in the secretion of cytokines and adipokines in db/db mice with consumption of sweeteners. We conducted a randomized, controlled study, with 24 eight week-old male db/db mice. They were divided into 4 groups: a) Control (CL), b) Sucrose (SUC), c) Sucralose (SUCL) and c) Stevia (ST). The animals were fed a normal diet and water *ad libitum*. The sweeteners were administered for 8 weeks diluted in purified water at 41.66 mg/mL of Sucrose and 4.16 mg/mL of Sucralose or Stevia. Blood glucose was quantified daily; water consumption with and without sweetener, food, and BMI, were quantified weekly. The concentration of IL-4, IL-5, IL-6, IL-10, IL-12, IL-17, INF- γ , TGF- β and TNF- α , insulin, adiponectin, resistin and peptide-C in plasma were determined by luminometry. Glucose was found increased at the end of 8 weeks in the SUC group, compared to CL. They consumed more food, water with and without sweetener in the SUC group ($p < 0.001$), compared with the controls. BMI was higher in the SUC group, compared with the ST group ($p < 0.019$). ST decreased the secretion of IL-4, IL-5, IL-6, IL-10, IL-12, IL-17, INF- γ and TNF- α , adiponectin and insulin ($p < 0.001$), but it increased TGF- β , without modifications in resistin ($p < 0.051$). On the other hand, SUC decreased the secretion of IL-4, IL-5, IL-10, IL-12, INF- γ , TNF- α , adiponectin, insulin and C-peptide ($p < 0.028$), but increased IL-6, IL-17 and resistin ($p < 0.001$), without modifications in TGF- β . Sucralose is a non-nutritive sweetener that caused an increase in the BMI of db/db mice, this because it increased the consumption of food. It also modified the secretion of adipokines; while Stevia decreased the secretion of pro-inflammatory cytokines such as IL-4, IL-5, IL-6, IL-10, IL-12, IL-17, INF- γ and TNF- α . Our results suggest that sweetener consumption may alter the inflammatory profile and the production of adipokines in subjects with type 2 diabetes mellitus.

Conflict of Interest

There is no conflict of interest