

EFFECTS OF MINAS CHEESE ENRICHED WITH WEIZMANNIA COAGULANS GBI-30 ON OXIDATIVE STRESS AND BIOCHEMICAL PARAMETERS IN A PRÉ-CLINICAL MODEL OF TYPE 2 DIABETES

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The Gut microbiota modulation through probiotic consumption offers a promising approach for treating type 2 diabetes mellitus (T2DM) by reducing factors associated with oxidative stress. Minas cheese represents a stable vehicle for the survival of cultures and the viability of probiotics. This study investigated the effects of a probiotic Minas cheese with *Weizmannia coagulans* GBI-30 on oxidative stress and biochemical parameters in rats streptozotocin-induced T2DM. Thirty-two male Wistar rats were divided into 2 groups: Control (CT, n=8) and T2DM (DM, n=24). The DM group received a high-fat diet for 4 weeks and an intraperitoneal injection of streptozotocin (35mg/kg) after the 3rd week. After 4 weeks, the DM group was divided into 3 groups (n=8/group): DM, T2DM + Minas Frescal Cheese (DMC), and T2DM + Minas Frescal Cheese with probiotics (DMPC). The DMC and DMPC group received 20g/day of cheese for 2 weeks. The probiotic cheese was added 10^8 to 10^9 UFC/day of *Weizmannia coagulans* GBI-30. After 6 weeks, fasting glucose was measured, and the animals were euthanized. Oxidative stress parameter was analyzed in plasma and cardiac tissue by Thiobarbituric acid reactive species) and biochemical markers in serum. (Ethical committee 6165130722). In the 4th week, the DM group showed a significant increase (369.2 ± 55.9 vs. 93.13 ± 10.40 ; $p < 0.0001$) in fasting glycemia compared to CT, demonstrating efficacy in inducing DM2. The DMC group showed a significant reduction in fasting glycemia at week 6 compared to the DM group (342.6 ± 15.94 vs 398.0 ± 42.06 ; $p = 0.0028$). Regarding cheese consumption, no significant difference was found. About biochemical parameters there was a significant increase in triglyceride levels in the DMC (430.2 ± 137.9 vs. 192.6 ± 98.08 ; $p = 0.0023$) and DMPC (345.3 ± 139.7 vs. 192.6 ± 98.08 ; $p = 0.0459$) groups compared to the DM group. A significant decrease in total cholesterol levels was observed in the DMPC group compared to the DMC group (113.0 ± 17.71 vs. 151.0 ± 38.32 ; $p = 0.0081$), while both the DMC (151.0 ± 38.32 vs. 66.14 ± 10.46 ; $p < 0.0001$) and DMPC (113.0 ± 17.71 vs. 66.14 ± 10.46 ; $p = 0.0010$) groups showed an increase compared to the DM group. The DMC group showed a significant increase in calcium (15.01 ± 2.56 vs. 11.96 ± 0.39 ; $p = 0.0010$), magnesium (4.03 ± 0.27 vs. 3.37 ± 0.31 ; $p = 0.0054$), phosphorus (14.33 ± 2.47 vs. 11.53 ± 1.76 ; $p = 0.0226$), uric acid (8.11 ± 4.62 vs. 3.33 ± 1.37 ; $p = 0.0104$), and albumin (4.14 ± 1.00 vs. 3.13 ± 0.15 ; $p = 0.0045$) in serum compared to the DM group. There was also a significant increase in total protein in the DMC (8.30 ± 1.83 vs. 5.64 ± 0.48 ; $p = 0.0002$) and DMPC (7.29 ± 0.76 vs. 5.64 ± 0.48 ; $p = 0.0156$) groups compared to the DM group. Concerning plasma TBARS concentration, there was no significant difference between DMPC and the DM ($p = 0.9935$) and DMC ($p = 0.6025$) groups. In the heart tissue, there was a significant reduction in TBARS in the DMC group (54.88 ± 22.52 vs. 86.94 ± 24.67 ; $p = 0.0422$) compared to the DM group, but there was no significant difference compared to DMPC. Consumption of a probiotic Minas cheese with *Weizmannia coagulans* GBI-30 for 2 weeks in a pre-clinical model of T2DM decreased total cholesterol level. However, it did not affect fasting and postprandial glucose, and oxidative stress damage parameters.

References

1 Food Research International , 142, April 2021, 110208

2 Fermentation,10(1), 8, 2024.

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