Effect of zinc supplementation on Diabetic Osteopenia: evaluation of bone serum biomarkers in STZ-induced animal model

Bortolin,R.H.¹, Arcaro,C.A.; Garcia,S.A.E.; Dessordi,R.; Tales,T.; Oliveira,G.; Bonjovanni,M.C.; Batista,A.A.S; Bidurin,F; Miranda,C.E.S.; Ramos, A.P.P.; Rezende, A.A.¹; Rezende, L.A.; UNAERP, SP, Brazil; ¹UFRN, RN, Brazil.

Diabetic osteopenia is a chronic complication associated to type 1 diabetes and animal models have been extensively used in diabetes research. Zinc supplementation is important on bone metabolism and mineralization. We have evaluated bone serum biomarkers in animal models induced by Streptozocin (STZ) over 90 days. Wistar male rats (180-220g) were distributed in three groups: Control (C; N=8), Diabetic (D; N=11, STZ-induced model; 40mg/Kg b.w) and Diabetic Supplemented (DS; N=11) with zinc ion (ZnCO₃-500mg/day), calcium, phosphorous and Vitamin E (2.5/2.5/20 times the values of AIN-93 basal diet for rodent respectively). Animals were considered diabetics by capillary glucose ≥ 250 mg/dL associated to polyphagia, polydipsia e polyuria. Calcium, phosphorous, magnesium, creatinine, albumin, glucose and activities of Alkaline Phosphatase (ALP) and tartrate-resistant acid phosphatase (TRAP) were determined. No difference was observed in serum phosphorous, magnesium, creatinine and albumin concentrations. Calcium showed increased on D group (14.25±2.59 U/L) compared to control group (12.05±0.43) (p<0,01) suggesting a bone calcium loss to blood, characteristic of diabetic osteopenia. ALP and TRAP activities were increased on D group (908.5±663U/L; 5.67±2.08U/L) compared to DS (508.5±420.9U/L; 6.88±7.69U/L) and control groups (124.3±27.9U/L; 2.53±1.32U/L) (p<0,01 and p<0,001 respectively) suggesting an unbalance on bone metabolism in favor of bone resorption and a responsive effect to supplementation with mineral and antioxidants. The alterations observed in these biomarkers suggest a possible protective effect of supplementation with minerals and antioxidants on bone metabolism and could be an alternative preventive treatment against diabetic osteopenia.

Key words: Zinc supplementation; diabetic osteopenia; animal model