STRONG CHILDREN'S RESEARCH CENTER

Summer 2019 Research Scholar

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ABSTRACT

Title: Predictors of Urine Calcium Excretion in Youth with Type 1 Diabetes

Background: Type 1 diabetes (T1D) is an autoimmune disease that destroys pancreatic insulin-producing β-cells, resulting in impaired glucose metabolism. Recent research into the impact on the skeletal system has revealed an association between T1D and impaired bone formation. It has been hypothesized that this may be a result of increased urinary calcium loss.

Objective: To identify predictors of urine calcium excretion in T1D and to determine if urine calcium excretion is associated with glycemic control.

Methods: Individuals who have had T1D for at least one year, were between the ages of 5-20, and had no other chronic medical conditions were recruited for this study. Each participant completed a 24-hour urine collection. Calcium intake was recorded from diet recall on the day of the collection, blood samples were drawn, and a physical activity questionnaire was completed. Standard descriptive statistics and multiple linear regression models were analyzed using STATA 14.

Results: A total of 96 participants completed the study. The mean (± SD) hemoglobin A1c (A1c) on the day of the study visit was 8.4 ± 1.5%. The majority (75.8%) had high A1c levels (>7.5%). 61.5% of participants engaged in sufficient daily physical activity. The dietary calcium intake of 54.2% of participants was not sufficient. With regards to vitamin D status, 30.2% had sufficient levels, 52.1% were insufficient, and 17.7% were deficient. The mean 24-hour urine calcium level was 2.22 ± 0.13 mg/kg with 8 (8.3%) individuals with hypercalciuria. Individuals with high A1c levels did not differ in physical activity sufficiency, calcium intake sufficiency, vitamin D status, or hypercalciuria. On univariate analysis, urine glucose, but not A1c, was significantly correlated with urine calcium (Pearson's r= 0.223, p = 0.03). After adjusting for factors known to be associated with urine calcium excretion, both urine glucose and A1c were significantly associated with urine calcium. The addition of A1c and urine glucose to multi-variable models explained 6.9% and 13.3%, respectively, of the remaining variability in urine calcium excretion.

Conclusion: Urine calcium excretion was more strongly associated with short-term glycemic control (urine glucose) than long-term glycemic control (A1c). Future studies are needed to investigate the effect of urine calcium excretion on bone health in T1D and to determine if reducing glycosuria lowers urinary calcium loss in people with T1D.