

ORIGINAL ARTICLE

Hypercalciuria Incidence in Children, Central Province, Iran

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ABSTRACT

Introduction: Hypercalciuria is defined as a urine calcium/creatinine ratio greater than 0.2, and can be a consequence of various disease states. A number of renal, endocrine and bone diseases can be related too. The aim of the present study was to study hypercalciuria incidence in children in the Central Province of Iran.

Methods: The present study evaluated random urine samples of 700 children, aged 5 to 15 yr old, who were residents of Arak City, central Iran, from different clusters. The clusters were chosen randomly. Sampling in each cluster was conducted by a simple method. The collected urine sample (5

ml) was evaluated for calcium and creatinine. A urine calcium/creatinine ratio greater than 0.2 was considered as hypercalciuria.

Results: Our study identified 109 patients (15.6%) with hypercalciuria. Of the 289 female patients, 57 were identified to have hypercalciuria (19.7%), while of the 411 male subjects, 52 had hypercalciuria (12.7%), which suggests no significant relationship between hypercalciuria and gender.

Conclusion: A high prevalence of hypercalciuria (15.6%) can lead to multiple problems, especially in children, such as issues with growth, renal stones, sodium excretion, because of mineral salt consumption. *JOURNAL OF IRANIAN CLINICAL RESEARCH* 2015;1(2):46-48

INTRODUCTION

A urine calcium/creatinine (Ca/Cr) ratio more than 0.2 is called hypercalciuria (1) and can be a consequence of various diseases such as endocrine, renal, and bone diseases. Urinary excretion of calcium is influenced by dietary intake and hypercalciuria may produce as results of poor balanced diet (2). One of the most important reasons of hypercalciuria is a high salt regimen such as bread, water with high level of minerals and salty foods, which effect urinary calcium excretion. Hypercalciuria appears due to change in calcium transport system. The frequency of hypercalciuria is rising in western countries (3). Significant change in the frequency of hypercalciuria among children with nocturnal enuresis and healthy controls has been reported (1).

Urolithiasis, enuresis, dysuria, nephrocalcinosis hematuria, urinary tract infection and

abdominal pain are clinical signs of hypercalciuria (4). The mechanisms responsible for it, include enhanced gastrointestinal absorption of calcium, increased bone resorption and/or decreased renal reabsorption of calcium (5). Due to a limitation on 24 h urine collection in children, random urine U Ca/Cr mg/mg was used for screening hypercalciuria. The aim of the present study was to determine the incidence of U Ca/Cr ratio in children aged 5–15 years in the Central Province of Iran.

MATERIALS AND METHODS

In this cross-sectional study, we investigated the incidence of hypercalciuria among children aged 5–15 years in the Central Province, Iran. Information such as gender, age and reflux was extracted from the children's files. The mean non-fasting single-spot urine calcium and creatinine ratio of 700 children was estimated.

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Urine samples were obtained from each subject at school, and a single laboratory measured all the urine Ca and Cr levels using Special kits. The 'Selectra Auto Analyser' was used to conduct the measurements. The 'Jaffe' technique was used for urine creatinine, with (precision) CV = 2.3%, while the 'Alcion' technique was used for urine calcium, with (precision) CV = 1.3%. Urinary calcium and creatinine levels were measured and the cases with a urinary calcium/creatinine (mg/mg) ratio more than 0.2 were considered as hypercalciuric.

This study was approved by the Ethics Committees of our university of permission number 89-80-4, 2010.

Statistical analysis

The data were analysed using, SPSS version 11.5 software (Chicago, IL, USA). For comparing the mean urine Ca and Cr between the two sexes, Mann-Whitney test, and for comparing the relative frequency of hypercalciuria between the groups, Kolmogorov-Smirnov test (KS-test) was used to confirm the normal distribution of obtained data. Then, Independent sample t-test was used to compare data between two groups. P-values of less than 0.05 were considered significant. Chi-square, Fisher's exact test and Student's t - test were applied to test for significance at 95% confidence interval.

RESULTS

Seven hundred children aged 5 to 15 years, with a mean age of 10.8 ± 4.2 years, were randomly selected. Of these subjects, 129 children (36.7%) had a diet that included salty foods, six (0.9%) had hematuria, 11 (1.6%) had renal scars, and seven (1%) had reflux, but none had abdomen pain.

The mean urinary calcium and creatinine was 10.1 ± 4.8 and 120.7 ± 85.7 mg/dl, respectively, and the mean Ca/Cr ratio (mg/mg) was 0.127 ± 0.11 . The mean Ca/Cr ratio of males and females was 0.12 ± 0.13 and 0.13 ± 0.10 , respectively. There was no significant difference on the Ca/Cr ratio between the two genders ($P > 0.05$). Of 289 female children, 57 suffered from hypercalciuria (19.7%), while of the 411 male children, 52 presented with hypercalciuria (12.7%); thus no significant relationship between hypercalciuria and gender was observed. Finally, we observed that the overall incidence of hypercalciuria in children aged 5 to 15 years was 15.6%.

DISCUSSION

Our results demonstrated that the incidence of hypercalciuria in children aged 5 to 15 years was 15.6%. In a study conducted among Turkish children (15 days to 15 years old), the prevalence of hypercalciuria was noted at 9.6%. In addition, the Ca/Cr concentration ratio varied based on districts, altitudes and ethnic origins (6). However, hypercalciuria prevalence has been different in Iranian children (7-12). A regimen with high levels of salt, or water with high level of minerals are the most important reason of the disease, which affects urinary calcium excretion, and in turn may be driven by the geographical location, altitude and ethnicity. It may be regulated by nutritional causes.

A high rate of appendectomy among children with idiopathic hypercalciuria has been reported (13). A reduction in bone formation and relatively increased bone resorption in absorptive hypercalciuria is noted (14, 15). Researchers have reported low bone density in children with hypercalciuria and nephrolithiasis (16). The Bone Risk Index was shown to increase with increasing calciuria and urine acidity (17). Hypercalciuria and acidosis, potentially lead to nephrocalcinosis and growth impairment. Sorkhi and Haji Aahmadi reported hypercalciuria using random urine samples with variations in U Ca/Cr ratio from different studies, and they recommended determining this ratio in every geographical area (12). Our results demonstrated a higher prevalence of hypercalciuria than reported previously (6, 10, 12), which may be due to the location of the location, surrounded by desert in the north and mountains in the south.

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