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24-HOUR URINARY CALCIUM EVALUATION IN A HEALTHY POPULATION SAMPLE AND IN PATIENTS WITH UROLITHIASIS

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ABSTRACT

A study was designed to evaluate the normal value of 24 hr urinary calcium levels in the city of Yazd. The average urinary excretion of calcium in a sample of 329 persons randomly selected was 232 mg/day, while patients with a history of recurrent urolithiasis excreted 208 mg/day. There is evidence which shows that more important factors than the amount of urinary calcium exist which influence stone formation. On the other hand the urinary excretion of calcium was related to blood pressure. These observations showed that measuring the amount of urinary calcium excretion in patients with urolithiasis provided little or no helpful information for the evaluation of these patients. Nevertheless, this test may be valuable in other diseases such as hypertension.

Key words: Urinary calcium; Urinary stones; Hypercalciuria; Hypertension.

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INTRODUCTION

There is considerable disagreement concerning the level of urinary calcium above which hypercalciuria would be a lithogenic factor. Different surveys have given different levels.[1] These differences have caused some researchers and clinicians to question the relevance of hypercalciuria, and there is a stronger tendency to detect urinary supersaturation rather than only hypercalciuria. Aside from this, the most acceptable amount which can be defined as hypercalciuria is above 300 mg/day or 4 mg/kg/day. Nevertheless, we have found a few patients with urolithiasis that were hypercalciuric (more than 300 mg/day). This raised the assumption that the average level of urinary calcium may be lower in the city of Yazd. Therefore, we conducted a survey in this city to find out the average amount of urinary calcium excretion.

MATERIALS AND METHODS

Our study population was chosen from inhabitants of Yazd who were over 18 years old. Among 400 randomly selected persons, 349 cases accepted our invitation and were assigned as group no. 1. Blood samples were taken for urea, creatinine, Na^+, K^+, uric acid, calcium, phosphorus, and total protein.

24-hour urine samples were collected and creatinine, calcium, uric acid and urine volume were measured. They were examined by a general physician and blood pressure, pulse rate, height and weight were determined. Those with a history of urolithiasis were excluded from this group.

Group no. 2 consisted of patients visited during the same period due to recurrent urinary stones. These patients also underwent the above lab tests.

RESULTS

Group 1 consisted of 151 (46%) males and 178 (54%) females aged 18 to 82 with a total mean age of 38. The second group was made up of 42(84%) males and 8(16%) females aged 19-62 with a total mean age of 36. The mean

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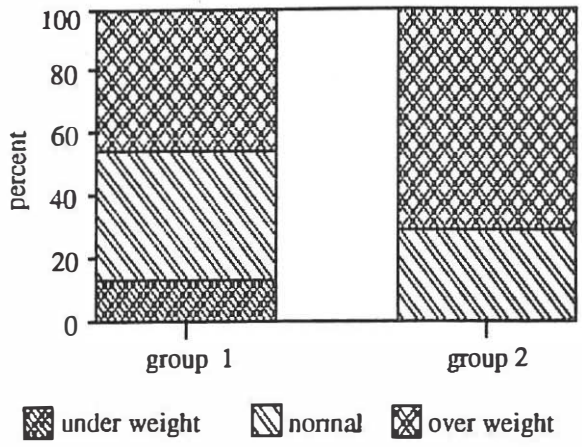


Fig. 1. Comparison of weight in both groups.

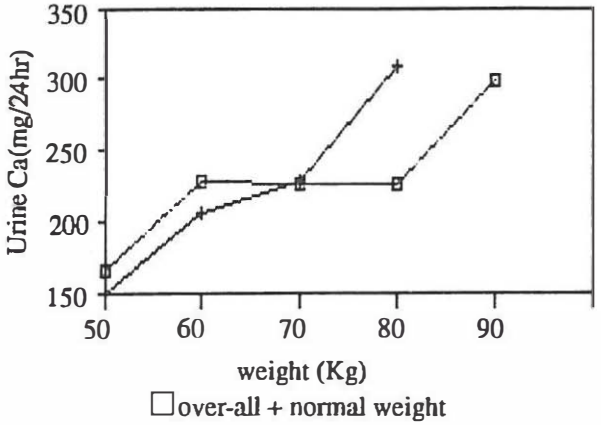


Fig. 2. Relationship between urinary Ca++ and weight (group 1).

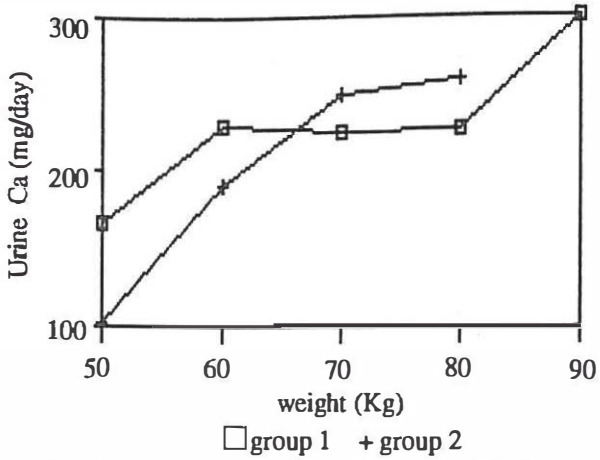


Fig. 3. Relationship between urinary Ca++ and weight in two groups.

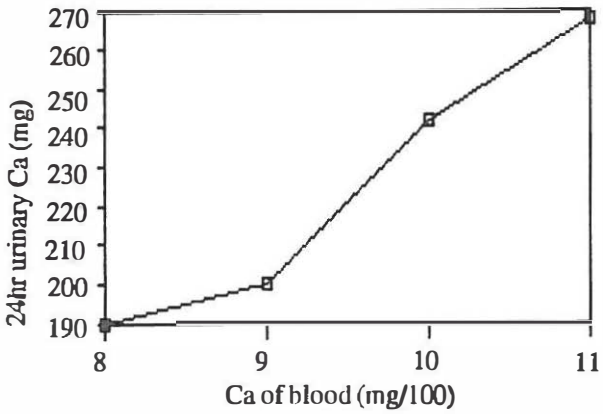


Fig. 4. Relationship between urinary Ca++ and total serum calcium.

weight of group 1 was 66 kg and group 2 was 73 kg. We noticed that only 42% of our population had a normal height and weight ratio and 45% were overweight and 13% underweight (according to the ponderal index; figures<12 and >13 were considered as overweight or underweight). percentage of obesity was much higher in group 2 (Fig. 1).

The mean urinary excretion of calcium for the two groups were as follows:

Group 1: 232±119 mg/24 hr or 3.5±1.9

Group 2: 208±115 mg/24 hr or 3 ±1.7 mg/kg/day

Urinary excretion of more than 300 mg calcium per day was observed in 28% of group 1 and 10% of group 2 subjects.

Levels higher than 400 mg were found in 14 cases of groupno. 1. Afterthis high level of excretion was reconfirmed by repeated testing, these patients underwent ultrasonic evaluation and in only onecasea small 4 mm lower calyceal stone was identified.

The urinary excretion of calcium was not related to sex or age in subjects under 60 years of age. In relation to weight, calcium excretion in the urine showed a positive correlation (Fig.

for obese and normal people. In spite of large differences between the hardness of drinking water in different regions, for group 1 it had no significanteffect on the amount of urine calcium.Group 2 could not be evaluated on this matter due to their dispersed living areas.

A linear relationship existed between blood calcium and urine calcium levels in both groups (Fig. 4).A chemical analysis of the urinary stones of group 2 showed that in 99% of them the major components were calcium salts.

In both groups, especially in group 1, an increase in blood pressure caused an increase in the amount of urinary calcium and thisrelationship was independent of the patient's weight which also affected blood pressure and the amount of urinary excretion of calcium (Fig. 2, 5).

DISCUSSION

The mean amount of urinary calcium in the two groups and the fact that most of the urinary stones were composed

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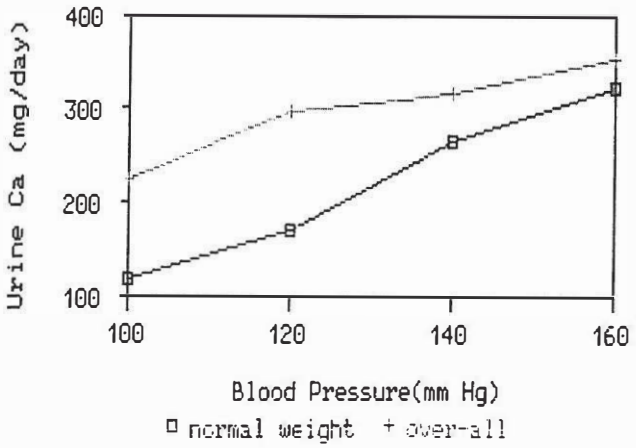


Fig. 5. Relationship between urinary Ca^{++} and blood pressure (group 1).

of calcium salts made us conclude that a 24 hour urinary calcium test could not help us in the evaluation and estimation of stone disease activity.

In addition, this study showed that hypercalciuria of more than 400 mg/day does not necessarily incur urinary stone formation. We think that clinicians should attempt to detect urinary supersaturation with calcium rather than measure the amount of urinary excretion of calcium per se.

Our study showed that weight had an important effect on the amount of urine calcium because not only did obese subjects have a higher incidence of urinary stones (Fig.1), but also a direct relationship existed between weight and urinary excretion of calcium (Fig.2,3).

It is well known that calcium ions can interact with all the factors that under physiological conditions control blood pressure.[2,3] Some authors have evaluated the correlation between diet, serum calcium, urinary excretion of calcium, and blood pressure,[2,3] and the results of our study confirm those reported by others that hypertension increases urinary calcium excretion. Weight was shown to have an effect on blood pressure and urine calcium. This effect on blood pressure was also seen in people with normal weight and height, but a greater effect was noticed in obese subjects.

Referring to the above points, although determination of 24 hour urinary calcium as a part of stone work up seems useless, it might have some importance in other situations such as hypertension.

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REFERENCES

1. Drach GW: Urinary lithiasis. In: Walsh PC, Retik AB, et al (eds), Campbell's Urology. W.B. Saunders Co., Philadelphia, Vol. 1, p. 1144, 1986.
2. Hvarfner A: Calcium metabolism and arterial blood pressure in a healthy population sample and in hypertensive men. Am J Nephrol 6: 14-15, 1986.
3. Cervellin G: Calcium phosphate and blood pressure. Am J Nephrol 6: 16-18, 1986.
4. Gennari C: Renal excretion in human hypertension Am J Nephrol 6: 124-127, 1986.

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