

# URINARY CALCIUM AND INORGANIC PHOSPHORUS EXCRETION IN SOUTH AFRICAN BANTU AND WHITE SUBJECTS

W. M. POLITZER, M.D., *Biochemistry Department, South African Institute for Medical Research, Johannesburg*

In a previous investigation<sup>1</sup> it was shown that the mean serum-calcium levels of the Bantu are lower than those of Whites. It was therefore considered relevant to determine mean calcium and inorganic phosphorus levels in the urine.

In outwardly healthy persons the urinary calcium and inorganic phosphorus excretion are governed by the calcium and phosphorus intake.

Since no comparative studies have been made on local Whites and Bantu, calcium and inorganic phosphorus determinations were carried out on: (1) Bantu whose

staple foodstuff is maize; (2) urban Bantu living on a more varied diet; and (3) local Whites on a mixed diet.

## SUBJECTS AND METHODS

Investigations were carried out on: (1) 50 outwardly healthy urban Bantu living in Johannesburg, chosen at random (26 men working at the SAIMR, Johannesburg, who are fed by the Institution, and 24 female nurses from the non-European and Coronation Hospitals, fed on hospital rations); (2) 30 Bantu patients living under poor conditions (15 men and 15 women in Coronation and

TABLE I. URINARY CALCIUM AND INORGANIC PHOSPHORUS RECORDINGS

Group	No. of subjects	Average volume per 24 hours (ml.)	Calcium (mg./24 hours)		Inorganic phosphorus (mg./24 hours)	
			Mean	SD	Mean	SD
Urban Bantu males	26	1,877	109	74.0	535	226.0
Bantu male patients	15	1,212	41	39.2	330	218.7
Bantu female nurses	24	1,565	86	52	520	164.0
Bantu female patients	15	1,254	51	37.2	382	217.2
White male patients	15	1,832	156	79.1	669	450.0
White female patients	15	1,469	149	93.9	353	234.8

Baragwanath Hospitals); and (3) 30 White patients (15 men and 15 women in the Johannesburg General Hospital). Ages varied between 20 and 76 years. The hospital patients were newly admitted and not suffering from conditions thought to influence calcium and phosphorous metabolism.

In addition to the predominantly maize diet of the poorer Bantu, the urban Bantu had brown bread, meat, milk and vegetables. The White subjects' diet was in accordance with European standards.

Unpreserved 24-hour specimens of urine were obtained.

The calcium was determined by the method of McCrudden,<sup>2</sup> and the inorganic phosphorus by the method of Peters and van Slyke.<sup>3</sup> The majority of estimations were carried out in duplicate.

The normal range for the calcium excretion in the urine was 50 - 150 mg. per 24 hours, or at most 200 mg. per 24 hours;<sup>4</sup> and for inorganic phosphorus excretion, 420 - 900 mg. per 24 hours.<sup>5</sup>

#### RESULTS

Table I shows the urinary calcium and inorganic phosphorus results of this study.

The percentage error varied from 0.3 to 5.0%. Table I reveals considerable variation in results. The inorganic phosphorus results give no valuable information, but the differences in the urinary-calcium values of the 3 groups are significant. The urinary-calcium excretion is highest in White men and women, intermediate in the urban

Bantu, and well below the acceptable range in the Bantu hospital patients. These low urinary-calcium levels should be considered as normal values in the Bantu.

#### DISCUSSION

While a detailed metabolic study could not be undertaken, the findings suggest that the calcium excretion runs parallel with the calcium intake. The intake of calcium in the Bantu living mainly on maize is low compared with that of the urban Bantu and the White, and the excretion corresponds.

#### SUMMARY

1. Urinary calcium and inorganic phosphorus studies were carried out on 50 urban Bantu, 30 Bantu patients, and 30 White patients, whose diets were all different.
2. A significant difference in the calcium excretion of the 3 groups was observed.

I wish to thank the physicians at the Baragwanath, Coronation, Non-European and Johannesburg General Hospitals who kindly assisted in this investigation; Mr. J. J. Brink for his technical assistance; and the Director of the South African Institute for Medical Research for his permission to publish this paper.

#### REFERENCES

1. Walker, A. R. P., Arvidsson, U. B. and Politzer, W. M. (1954): *S. Afr. Med. J.*, **28**, 48.
2. McCrudden, F. H. (1911 - 12): *J. Biol. Chem.*, **10**, 187.
3. Peters, J. P. and Van Slyke, D. D. (1932): *Quantitative Clinical Chemistry*, vol. 2, pp. 861 - 863. London: Baillière, Tindall and Cox.
4. Thompson, R. H. S. and King, E. J. (1957): *Biochemical Disorders in Human Disease*, p. 368. London: Churchill.
5. Cantarow, A. and Trumper, M. (1955): *Clinical Biochemistry*, 5th ed., p. 578. London: Saunders.