(4) Dietary Treatment in Kidney Diseases

Kenzo OSHIMA

Department of Internal Medicine, Nihon University School of Medicine

Recent advances in the study on renal physiology have brought the changes in the principal consideration in dietary treatment. Classic diet has been arranged for the purpose to save the work of the kidney, while the hypothesis of that such diet would reduce the energy in the transport system in tubular cells was denied. Principle of modern dietary treatment should be based on the metabolic point of view, which would be disturbed in many phases in kidney diseases. Analysis of balance study on water, sodium, potassium and nitrogen, and the observation on the effect of diet on it, will offer the basic knowledge for the mode of the dietary treatment in kidney diseases. Furthermore, studies of the influence of fat intake on the serum lipoprotein and renal function will be necessary, particularly in the treatment of nephrotic syndrome.

Methods

Balance studies were carried out according to the following modes, in the cases with acute, chronic glomerulonephritis, chronic renal failure and nephrotic syndrome. In the sodium balance study, 204 mEq. per day of sodium was given during 2 weeks, and it was restricted to 44 mEq. following 2 weeks. In the potassium balance study, 70 mEq. of K was given for first 2 weeks, and it was restricted to 39.2 mEq. for next 2 weeks. GFR was measured by creatinine 24 hours clearance. Low density and high density lipoproteins were measured by ultra centrifuge. In the microscopic observation of the kidney of lanolin fed rabbits, HE and Sudan-III stains were applied.

Results

1) Remarkable positive Na-balance was observed in oliguric phase of acute glomerulonephritis, nephrotic syndrome and chronic renal failure during the sodium intake of 204 mEq. per day, and it tended towards normal balance under the sodium restriction of 44 mEq. per day.

2) Remarkable negative Na-balance was observed in cases with polyuric phase of chronic renal failure and pyelonephritis under restriction of sodium intake, and it tended towards normal balance under the usual diet containing 8-12 g. of NaCl, accompanied with the clinical improvement, increase of serum Na, K, Cl levels and the creatinine clearance.

3) Significant correlation between sodium excretion rate and urine volume was observed in cases with acute, chronic glomerulonephritis, pyelonephritis and chronic renal failure, while no correlation was observed between potassium excretion rate and urine volume.

4) Sodium restriction caused decrease of sodium excretion rate, while potassium excretion rate showed tendency to increase, indicating the possibility of sodium and potassium exchange in tubular cells.

5) Sodium restriction diet resulted in decrease of creatinine clearance, 12.4% on an average.

6) Sodium restriction or protein restriction exerted almost no effect upon acid-base balance in cases with chronic renal failure, while the amplitude of excretion rate of CO_2 , NH_4 , H^+ was limited under the load of ammonium chloride or sodium bicarbonate.

7) Two groups of hyperlipemia were observed in nephrotic syndrome; group A showed remarkable increase of both S_{f0-12} and $S_{f12-400}$ lipoproteins, while group B showed single increase of $S_{f12-200}$ lipoprotein.

8) Fat intake (25 g. butter at once) resulted in a marked decrease of RPF in cases with nephrotic syndrome, measured after 4 hours of ingestion.

9) The histologic findings of the kidney of lanolin fed rabbits, showed remarkable fat deposit and attendance of phagocytes in the interstitial cells, particularly in the zone of cortico-medullary border line.

Conclusion

Above mentioned observations lead to the following conclusion.

a) Strict restriction of sodium intake (usually under 0.5 m Eq. per day) should be kept in oliguric stage of acute glomerulonephritis. Potassium restriction (under 40 m Eq. per day) and protein restriction (under 15 g. per day) are also necessary. Water intake must be kept in 300-500 cc. plus urine volume.

b) Sodium and potassium restriction should be ceased when urine volume become increased, and protein restriction should be also receded.

c) High protein diet in nephrotic syndrome should be indicated, looking the levels of BUN on one hand, and the amount of excreted protein on the other hand, keeping in mind the standard dosage of 0.7 g. per Kg. plus amount of urine protein.

d) Saturated fatty acid and excess intake of carbohydrate are unfavorable to the high lipoproteinemia of nephrotic syndrome, resulting in the decrease of RPF.

e) The possibility of harmful effects of fat diet to the kidney tissue has been shown.

f) Protein restriction in cases with chronic renal failure should be arranged according to the follow up observation of BUN, from 0.7 g. per Kg. as moderate to under 10 g. per day as extreme.