

RENAL FUNCTION TESTS IN APPARENTLY HEALTHY SUBJECTS

Pages with reference to book, From 1 To 2

Adequate nutrition is essential for life. Food and "dietary studies give information of value which can be related to specific functions of the body. Biochemical assessment indicates nutrient supply, depending on the dietary intake and storage of nutrients in the body. It is less affected in temporary shortage and has the advantage that it indicates the actual supply of nutrients to the tissues.

The research on "correlation of dietary and nutritional factors to renal function" is necessary to establish a normal range of renal function in apparently healthy males and females of various age and socioeconomic groups and to see whether any significant correlation exists between the dietary intake and renal function.

In a recent survey (Rehman & Naqvi, 1979) renal function was assessed in 200 apparently healthy subjects. The sample was drawn from population structure ascertained by 1971 census. The sample studied was therefore considered to be representative of the total population. It represents various age and socioeconomic groups and is likely to show the effect of the type of food and the differences in the effect of diet on age, sex, height, body weight, growth and physical activity.

Information on dietary intake was gathered from the volunteers by recording one week dietary intake. Nutrient intake was found maximum in both males and females of the age groups 30-39 years.

The kidney must act as a selective filter to remove water and filterable solutes from the blood plasma. The volume of the glomerular filtrate is around 1200 ml/24 hours. The estimation of glomerular filtration rate is of immense importance in the assessment of renal function and the twenty four hour creatinine clearance is widely used to estimate glomerular filtration rate (Chantler and Barratt, 1972). Creatinine clearance showed an increasing trend upto the age of 30-39 years and a decrease was observed with age after maturity. The findings in Pakistan corresponded well with the findings of Davies and Shock (1950), Hansen et al (1970), Siersback - Nielsen (1971), Watkins (1955) and Wesson (1969).

Protein metabolism is reflected in the balance between nitrogen intake and output (Chiarauigrio 1963). Urea and creatinine are the major end products of protein metabolism and their concentration in the blood and body fluids serves as one of the criteria of the state of protein metabolism. The concentration of blood urea nitrogen varies directly with the nitrogen intake (Davidson and Henry, 1969).

Nitrogen and creatinine concentration was found to increase with increasing protein intake. It was also found that the renal extraction of creatinine was dependent upon the serum concentration.

A direct correlation was observed between dietary protein intake and the levels of serum protein and albumin.

Uric acid is the product of degradation of protein bases in the process of catabolism. Serum creatinine concentration represents a dynamic balance between production and disposition (Seegmiller 1963) whereas urinary urate is a product of active tubular excretion (Davidson and Henry, 1969). Lower values were observed in children compared to those for the adult age range and males showed a slightly raised value than females in the studies done in Pakistan. Previous studies of Smyth (1957) and Mikleson (1965) are in accordance with the present findings. The daily urinary excretion of uric acid was found to be influenced by the dietary intake of protein rich food e.g. meat.

Calcium and phosphorus are important not only for bones and teeth but also for normal nerve transmission, muscle contraction, blood chelating and the maintenance of cell membrane (Kenneth 1976). A reciprocal relationship was found between the concentration of calcium and phosphorus.

Higher calcium level is usually associated with low phosphorus level and vice versa as has been shown

by Lenison and McFate (1960) and the study done in Pakistan (Rehman & Naqvi, 1979). Urinary calcium and phosphorus excretion are dependent on serum concentration. Higher the serum concentration, the more is the urinary excretion. It was also found that a direct correlation exists between serum inorganic phosphorus and serum alkaline phosphatase activity (Rehman & Naqvi, 1979).

Sodium and potassium are important in the renal regulation of acid base balance. The balance is maintained on average dietary intake and the concentration of sodium and potassium in children and adult is the same because the total concentration of body fluid is not affected by growth. In Pakistan, blood urea nitrogen, creatinine and uric acid in the apparently healthy subjects were lower than those reported from the west (Rehman & Naqvi, 1979).

References

1. Chantler, C. and Barratt, T.M. (1972) Estimation of glomerular filtration rate from plasma clearance of 51-chromium edetic acid. *Arch. Dis. Child.*, 47:613.
2. Chiarauigrio, E.C., Wolf, A.V. and Prentiss, P.G. (1963) Total protein/protein nitrogen . ratio of human serum A factor consistent with total solids. *Am. J. Clin. Pathol.*, 39:42.
3. Davies, D.F. and Shock, N.W. (1950) Age changes in glomerular filtration rate. Effective renal plasma flow and tubular excretory capacity in adult males. *J. Clin. Invest.*, 29:496.
4. Davidson, I. and Henry, J.B. (1969) *Chemical diagnosis by laboratory method*. 14th edition. W.B. Saunders Company. Philadelphia, London, Toronto.
5. Hansen, T.M., Kampmann, J. and Loursen, H. (1970) Renal excretion of drugs in the elderly. *Lancet*, 1:1170.
6. Kenneth, L.B. (1976) *The Laboratory in clinical medicine*. Halsted, J.A. (ed). W.B. Saunders Company. Philadelphia, London.
7. Levinson, S.A. and McFate, R.P. (1969) *Clinical laboratory diagnosis*. Lea and Febiger. Philadelphia.
8. Rehman, A. and Naqvi, A.J. (1979) Renal function test in apparently healthy Pakistanis. Unpublished data.