CHAPTER IV

SUMMARY

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It is generally assumed that the excretion of creatinine in urine is constant for an individual and does not vary with either the plane of nutrition or day to day fluctuations in the diet. It is believed to be related to muscle mass and/or basal metabolism.

The constancy of creatinine excretion has led to the use of the ratio of vitamin to creatinine in urine as an index for the assessment of nutritional status of water soluble vitamins such as thiamin, riboflavin and vitamin C.

During the course of previous studies in this laboratory on the nutritional status of groups such as pre-school children, school boys and pregnant and nursing mothers and on the response of the former two groups to a supplementary meal, two major observations emerged with regard to creatinine. One, that amount excreted was much less than the values reported in the western literature. Two, that this was responsible for the anomalous observations that children showing gross clinical symptoms of vitamin deficiency had a satisfactory vitamin status as judged by the ICNND norms for vitamin to creatinine ratios in the urine.

The ratio of urea excretion to creatinine excretion has been found to vary with the protein status of the individual with variations in dietary protein content and with protein quality when the same is held constant.

The present studies were undertaken in this context on variation s in the excretion of creatinine and other nitrogenous constituents such as urea, ammonia,uric acid and amino nitrogen in relation to age, sex, plane of nutrition and energy metabolism and physiological stress such as pregnancy and lactation and severe malnutrition. Additional studies were carried out on subjects observing fasting for a period of eight days for religious reasons.

Studies on adult men showed the expected variation in creatinine excretion with age and plane of nutrition, but the differences disappeared when the values were considered in relation to other body measurements except in the case of elderly men who showed a decreased excretion.

Total nitrogen in urine varied with nitrogen intake except in the case of military personnel in whom excretion was much less than the expected value, presumably, because of sweat losses.

Urea nitrogen parallel nitrogen excretion and percentage contribution of urea nitrogen to total nitrogen was less than that inferred from reports in the west and some what more in military personnel and the elderly.

Ammonia nitrogen excretion showed a greater variability and often seemed to vary inversly with urea excretion. The two together showed a more consistent pattern.

The other nitrogenous constituents including undetermined nitrogen showed the expected pattern although the values were higher than those in western studies in the case of undetermined nitrogen. The elderly were found to excrete significantly less ammonia, uric acid and undetermined nitrogen as compared to students, but these differences were abolished when the values were considered in relation to total nitrogen except in the case of undetermined nitrogen.

Studies on adult women showed a decreased excretion of total nitrogen, creatinine and undetermined nitrogen in the elderly women an observation similar to that in elderly men. Additional observations were a decrease of creatinine excretion in women with a low plane of nutrition and a decreased nitrogen excretion in pregnancy. The patterns in parturient and lactating women are not clear cut. On the whole, the percentage contribution of various nitrogenous constituents does not seem to be affected in the various conditions.

Studies on male and female children and adolescents belonging to low and high income groups showed that creatinine excretion was found to increase with age and to be more in boys and more in the high income groups. The data on total nitrogen and other nitrogenous constituents presented essentially the same picture.

Urinary creatinine and total nitrogen excretion in malnourished children were lower than in controls and the values continued to be low in children followed-up after recovery from severe malnutrition. A similar pattern was observed in the other nitrogenous constituents studied. The relative contribution of urea, nitrogen and creatinine to total nitrogen was lower in malnourished children, whereas that of ammonia nitrogen and undetermined nitrogen were higher as compared to controls.

Adult men and women observing a total fast for religious reasons showed a decrease in the excretion of creatinine and urea nitrogen with the pregress of fasting, whereas ammonia nitrogen showed the opposite trend.

In animal studies, both protein deficiency and undernutrition resulted in decreased excretion of creatinine, but the differences were abolished when the values were considered in relation to body surface area. Creatinine excretion per kg of body weight was increased in protein deficiency and was associated with a decrease in apparent digestibility.

The studies on carcass composition in rats suggested no increase in moisture with protein deprivation as well as with undernutrition but protein content was reduced only in former condition. Carcass creatinine was not affected.

Protein deficiency was associated with a decrease in the proportionate excretion of urea and ammonia nitrogen and an increase in that of other nitrogenous components.

The suggested relations between basal metabolism and creatinine excretion was not found to hold in the groups studied.

In conclusion, creatinine excretion was found to show not only the expected variation with age and sex but also some variation with the plane of nutrition. However, the differences were minimized when the data were considered in relation to body weight but persisted when considered in relation to height. The values per unit surface area did not show a clear cut picture. In all the groups studied, the values were less than what might be expected ~~than~~ from those reported in the west in terms of any of the above criteria.

These observations are consistent with similar observations in latin America.