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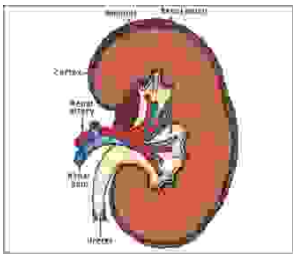
CREATININE & UREA LEVELS IN HEALTHY MALES;
EVALUATION OF BLOOD & URINE



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ABSTRACT... sa_husain@hotmail.com Blood and urinary creatinine and urea levels were determined in healthy male volunteers. **Setting:** University of Agriculture, Faisalabad. **Objectives:** The study was aimed to have a base-line data regarding elimination of protein metabolites, endogenous creatinine and urea in local male population. **Materials & Methods:** Five samples, each of blood and urine from 9 male volunteers, were taken to determine creatinine and urea in them, spectrophotometrically. **Results & Discussion:** Blood and urine samples showed mean ± SD pH values to be 7.2 ± 0.1 and 5.9±0.5, respectively. Whereas mean ± SD creatinine values were found to be 10.72 ± 3,23 µg/ml and 273.32 ± 330.39 µg/ml, respectively; and mean ± SD urea to be 303.1 ± 96.7 µg/ml and 26129 ± 3834 µg/ml, respectively. The renal clearance of creatinine and urea, as determined by glomerular filtration rate, came out to be 0.87 ± 0.51 ml/min/kg and 0.10 ± 0.06 ml/min/kg, respectively. The results revealed normal kidney functions in the subjects as indicated from normal creatinine and urea values for the local population. However, these values being lower than those in the foreign literature .**Conclusion:** Creatinine and urea levels in the body are relatively stable. These remain unchanged unless there is sudden deterioration in the renal function.

Key words: Protein metabolites, endogenous creatinine and urea, GFR, renal clearance, male volunteers

INTRODUCTION

Proteins occupy a vital role in the architecture and functioning of living matter[1] constituting about 17% of the body composition in humans[2]. The dietary and intracellular proteins in the body are metabolized to form amino acids, three of which namely arginine, glycine and methionine yield creatine[3]. Creatine, primarily a high-energy phosphate compound is utilized for muscular contraction[4]. Creatinine is one

of the most extensively researched nutrients in sports performers, being used by athletes as a nutritional supplement to enhance their muscular activities[5] This waste product of protein metabolism resembles an amino acid[4]. It occurs both in blood and urine, completely filtered at the glomerulus, not reabsorbed by the tubules and excreted entirely unchanged in the urine. The renal clearance of creatinine is widely used in clinical practices to give an estimate of glomerular filtration rate (GFR) of kidney function[6]. If kidney function gets impaired due to any reason (removal or damage) creatinine level rises up in the blood[7].

Urea is metabolic end-product of protein rich foods[8]. synthesized in the liver from three amino acids namely ornithine, citrulline and arginine, released in the blood and excreted through the kidneys[9]. The renal clearance of urea is less than the filtration clearance. However, the amount of urea and creatinine in the body is equal to the amount excreted by the kidneys. If kidneys are unable to function, the levels of both will rise in the blood. The information about the renal clearance of these protein metabolites in local population was scanty, so the present study was planned to establish the base line data about the local population.

MATERIALS & METHODS

A total of 9 healthy male volunteers were included in the study and their certain demographic characteristics, i.e. age, weight, height, temperature, blood pressure and pulse rate were recorded. The volunteers had already been briefed about the nature of study and, therefore, their consent for inclusion in the trial was also sought.

The study was performed by taking 5 samples each of blood (plasma) and urine from the volunteers with a time interval of 0, 45, 75, 105 and 135 minutes. The blood and urine samples, as adequately preserved, were then analyzed to examine the creatinine and urea concentrations by validated analytical procedures.

The renal clearance of endogenous creatinine and urea was measured in the plasma and urine samples, spectrophotometrically. The endogenous creatinine renal clearance was measured by Jaffe's Reaction[10]. alkaline picrate reacted with creatinine in the sample producing a golden yellow dye. Whereas, the renal clearance of urea was determined by end-point Berthelot Reaction[11], ammonium ions reacted with a mixture of salicylate hyphochlorite and nitro prusside to yield a blue-green dye indophenol.

The data recorded on the renal clearance of protein metabolites, endogenous creatinine and urea, were tabulated. The statistical calculations were done according to the standard methods and the results given as mean±SD values. The correlations between urine volume, pH and plasma concentrations of endogenous creatinine, urea and their renal clearance were determined by means of Regression/ Correlation analysis[12].

RESULTS

Table I: Mean ± SD values for creatinine and urea with renal clearance in the volunteers

Values	Creatinine conc. µg/ml		Urea conc. µg/ml		Renal Clearance ml/min/kg	
	Plasma	Urine	Plasma	Urine	Creati-nine	Urea
Mean	10.72	273.32	303.1	26129	0.87	.10
±SD	3.23	330.39	96.7	3834	0.51	0.06
Max.	18.7	1791.4	489.5	33843	1.80	0.294
Min.	5.4	10.3	105.1	20175	0.04	0.016

DISCUSSION

The plasma normally carries 0.2 - 0.6 mg of creatinine per 100 ml[2]. It is completely filtered at the glomerulus not reabsorbed by the tubules, and is excreted entirely unchanged in the urine[13].

Hence, creatinine clearance is the amount of blood that is cleared of creatinine per unit time and normal is 120 ml/min/kg. Further creatinine clearance is age-related. There is more creatinine in the urine of children than adults, and men excrete more creatinine than women.

However, blood creatinine declines in old age due to

decreased protein metabolism and is minimally dependant upon the physical activity and protein intake[15]. Where, creatinineuria (excessive excretion of creatinine) occurs in many conditions such as carbohydrate deprivation, diabetes mellitus, hyperthyroidism, fever, malnutrition, pregnancy and after child birth. It is also caused by increased catabolism of muscles and other tissue proteins[8] Creatinine clearance approximates GFR especially when kidney function is in normal range[16]. Therefore, it can be used as a measure of kidney function[17].

Urea is also a waste product of protein metabolism and accounts for 90% of the nitrogen- containing components of urine[10]. However, blood urea nitrogen varies directly with the protein intake and inversely with the rate of excretion of urea[18].

Tubular selective reabsorption of urea varies with the rate of urine flow. In an individual with ordinary diet, 80-90% of urinary nitrogen is in the form of urea. The absolute amount excreted daily is 9-12g of nitrogen or 20-30g of urea. Normally, blood contains 8-15mg of nitrogen per 100 ml and this amount increases rapidly if kidney function is impaired due to any reason[19].

In the present study, the mean±SD value of creatinine in the blood and urine of male volunteers was 10.72±3.23 μg/ml and 273.32±330.39 μg/ml, respectively. Similarly, the mean±SD value of urea in blood and urine of male volunteers was 303.1±96.7 μg/ml and 26129±3834 μg/ml, respectively. Whereas, the mean±SD value of renal clearance for creatinine and urea was 0.87±0.51 ml/min/kg and 0.10±0.06 ml/min/kg, respectively.

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