

Serum urea and serum creatinine in the evaluation of renal functions in children and adults

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Abstract

The study focused on comparing the biochemical data analysis of serum urea and creatinine levels. Two age groups were selected for the study, children (mean age 5.78 ± 2.50) age and adults (mean age 44.73 ± 14.19). The biochemical data analysis was conducted to compare the first group (27 children with renal impairment against 31 normal controls) and the second group (44 adults with renal dysfunction compared with 32 normal controls). The results of the data analysis shows that serum urea seems to be a better index in children for renal function while serum creatinine gives a more sensitive indication of renal dysfunction in adults due to effect of diet and other factors on renal function in adults while the skeletal mass, affect the s. creatinine in children due to skeletal muscle mass, although this findings is not statistically significant.

اليوريا والكرياتينين في مصل الدم لتقييم وظائف الكلتيين في الاطفال والبالغين

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المخلص

اجريت الدراسة وركزت على التغيرات البايوكيميائية في مصل الدم على مستويات الكرياتينين واليوريا . اخذت عينات من صنفين من المرضى الاطفال معدل العمر (2.50 ± 5.78) والكبار (معدل العمر 44.73 ± 14.19) وقورنت مع اصحاء الاطفال (27 طفل في اعتلال وظيفة الكلى مع 31 طفل طبيعي، الصنف الثاني 44 من الكبار ذوي اعتلال الكلى م ع 32 من الاصحاء من نفس العمر . ووجد ان يوريا المصل افضل مؤشر في الاطفال وكرياتينين المصل افضل مؤشر للكبار والسبب هو تاثير الغذاء على قياس اليوريا في الكبار وتأثير الكرياتينين على النتائج في الصغار لصغر حجم العضلات مع العلم ان هذه المؤشرات ليست مؤشراً احصائيًا. وتبقى يوريا مصل الدم وكرياتينين مصل الدم المؤشر المهم لوظائف الكلتيين .

Introduction

There are large amounts of endogenous toxic product and exogenous toxic that results from the body daily metabolism that circulates in the blood which are wiped out of the body via the kidneys. After the detoxification of most of them by the liver(1,2). The kidneys are the main organ that removes these toxic substances (Ammonia, Urea and Creatinine) (3,4). Serum urea is affected by diet particularly protein diet, while serum creatinine is less affected by protein diet(2,5), this fact favour the serum creatinine over serum urea in evaluating renal function(6,7). While serum creatinine is well related to skeletal mass which means that serum creatinine is in favour of renal function in children(7,8). Creatinine clearance test and introducing a new methods for measurement of renal function e.g. cystatin C and possibly other measurements s. urea, s. creatinine, remain the main control tests needed for evaluation of renal function.

Materials and Methods

This study includes four groups, first group (1) include 27 young

diseased patients which have been compared with normal controls of the same age group, group (2) which consists of 31 normal children, group (5) consists of 44 adult patients compared with 32 controls group (6) and the results are shown in table 1 and table 2, the normal reference range for serum urea is 20-40 mg/dl (3.3 - 7,5 mmol/L), and for serum creatinine is 0.7-1.4 mg/dl (62 -124 micromol/l). The methods used for the measurements for serum urea and creatinine were colorimetric methods (9-11).

The results are in table(1,2)

(2.5 – 5.0 ccs) of blood samples obtained from children and adults patients respectively from anticubital vein left in hat bath of 10 minutes and then centrifuged at 3000 rpm for 15 minutes. The serum obtained kept frozen at minus 20 degree waiting for analysis .

The method used for s. urea estimation is enzymatic method using urease for the formation of ammonia with phenol in the presence of hypochlorite form indophenol which with alkaline hypochlorite produce a blue color compound which is measures spectrophotometrically

Determination of s. creatinine depends on Jaffe reaction in which creatinine form a red color compound with alkaline picrate which is measured spectrophotometrically.

Results

As shown in table 1, 2. Non significance in s. urea compared to that of s. creatinine as in table, although there is a tendency to increase in s. urea compared to that of s. creatinine, while in table 2 there is a tendency to increase in s. creatinine.

Discussion

It is well known that serum creatinine is more sensitive index for renal function than those of serum urea. This is due to the fact that the serum urea level is affected by protein diet mainly (5), while that of serum creatinine is affected by the mass of skeletal muscles and that of adult is not (7,8). The results of this study shows that serum urea is more informative than serum creatinine in evaluating renal functions in children, while serum creatinine is the more sensitive index than S. urea in the evaluation of renal functions because of the effect of dietary protein. Nevertheless both parameters should be included in

evaluating renal functions considering the factors mentioned before(8).

Introducing a new measures for creatinine for evaluation of renal function e.g. measurement of cystatin C and possibly other measures, still need a time for final evaluation.

Serum. urea and s. creatinine and creatinine clearance remain the highly important tests for evaluation of renal function, although each of these tests has its own limited restriction points.

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Table (1): Serum urea, creatinine for children

Parameters	Children cases	Normal controls	P-value
	Mean ± SD	Mean ± SD	
Age	5.78 ± 2.50	5.44 ± 1.56	0.522
Urea	54.15 ± 12.02	22.84 ± 3.94	0.000
creatinine	1.61 ± 0.36	0.77 ± 0.13	0.000

Table (2); Serum urea creatinine for adults

Parameters	Adult cases	Normal controls	P-value
	No (44) Mean ± SD	No (32) Mean ± SD	
Age	44.73 ± 14.19	39.19 ± 9.53	0.59
Urea	72.01 ± 21.74	32.94 ± 4.80	0.000
Creatinine	2.46 ± 0.75	1.15 ± 0.17	0.000