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ORIGINAL ARTICLE

The effect of Cystatin C in the Prevention of Transplantation Rejection and the Cause of Kidney Failure

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ABSTRACT

Introduction: Serum cystatin c is not routinely used in the evaluation of renal function and this may be due to high costs, lack of adequate studies on precision, lack of accessibility and reliability. More kidney transplanted patients before creatinine increasing encounter with decreased performance and go toward rejection without certain actions. This study was aimed to evaluate the effect of cystatin C in the prevention of transplantation rejection. **Methods:** In this prospective study, cystatin c and GFR of 49 kidney transplanted patients in the third, eighth and fourteenth day were evaluated. The correlation of cystatin C and transplant rejection was investigated with Spearman correlation. **Results:** In our study, there were statistically significant relationship between serum level of cystatin c in third, eighth and fourteenth day with transplant rejection. Cystatin C indicated that was a more sensitive indicator compared with creatinine on the fourteenth day in the event of loss of GFR below than 60. **Conclusion:** Serum cystatin c as a valuable marker can be an effective predictor marker of renal function decreasing beside creatinine. Due to high cost of measuring kits of serum cystatin c, this marker can be used in high-risk patients with possibility of rejection.

INTRODUCTION

A kidney transplantation is the preferred method of treatment for the majority of chronic kidney disease and is cost-effective comparing with dialysis and allow patients to return natural life. One of the major problems in patients after renal transplantation surgery is acute rejection after kidney transplantation, which is preventable with early detection and diagnosis (1). As well as in a healthy person, no significant changes are observed in serum levels of cystatin C but the mean amount of the difference in a day is 13% which is much higher than creatinine (2). In fact, an ideal marker should be an endogen matter with regular and continues production that were completely filtered by the glomerulus and totally be out from urine and should not be bonded to proteins (3). Measured glomerular filtration rate (GFR) by creatinine due to influences by factors such as age, sex, muscle mass, drugs, food and tubular secretion can be estimated less or more (4). GFR is considered as the best marker of kidney function in kidney transplanted patients and could be affected before an increase in creatinine that this issue is one of the disadvantages of creatinine (5-7). Serum cystatin c is not routinely used in the evaluation of renal function and this may be due to high costs, lack of adequate studies on precision, lack of accessibility and reliability. In some studies about serum cystatin c, results have shown its priority to creatinine, but other studies showed another results (8-10). Certainly the early detection of renal function decreasing can prevent damage in patients, as well as the cost of the complications of kidney transplantation rejection is also reduced.

METHODS AND MATERIALS

In this prospective study, 49 patients with end stage renal disease (ESRD) were under kidney transplantation surgery from October 2015 to May 2016 and clinical data were recorded by questionnaire. The blood of all patients in third, eighth and fourteenth day were measured in terms of cystatin C. The level of serum cystatin C evaluated by ELISA using Bioassay Technology cystatin c kits. ELISA was done using Avernes (manufactured by US) machine.

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Then Cockcroft-Gault formula was used to calculate glomerular filtration rate. Then serum cystatin C compared with glomerular filtration. Critical point of glomerular filtration determined in 60 ml per minute to 73.1 square meters. Collected data was analyzed using MedCalc statistical software v.15.8. In the descriptive analysis, the mean central index and SD (Standard Deviation) dispersion index was used. In order to match patients, patients who received drug regime other than cyclosporine and corticosteroids and mycophenolate mofetil as well as patients with a history of liver, lung and heart problems went excluded from study. Patients who develop surgical complication leading to nephrectomy during the study period were excluded from study. This study is supported by Urmia University of medical sciences with No. ir.umsu.rec.1394.432.

RESULTS

Our study included 49 kidney transplanted patients, including 26 male (53.1%) and 23 female (46.9%), mean age of patients was 41.18 ± 13.31.Mean body mass index and duration of dialysis before transplantation were 24.28 ± 4.56 and 23.12 ± 20.08 kg per square meter in month, respectively.

The causes of kidney failure in our patients were as follows: 1. Hypertension in 24 cases (49%) 2-diabetes in 8 cases (16.3%) 3- glomerulonephritis in 6 cases (12.2%) 4. infectious diseases in 4 cases (8.2%) 5 - VUR in 3 cases (6.1%) 6. polycystic kidney disease in 2 cases (4.1%) 7. congenital atrophy in 1 patient (2%) 8-lupus 1 case (2%). In the third, eighth and fourteenth 23 (46.9%) patients, 19 (38.8%) and 25 (51%) patients had a GFR below 60, respectively. ANOVA statistical analysis showed that the changes were significant in serum cystatin C level in the third, eighth and fourteenth. The sensitivity and specificity of serum cystatin were 65.2% and 96.2% in the third day, respectively and creatinine were 78.3% and 88.5%, respectively.

Mean levels of serum cystatin c and glomerular filtration rate is written in the third, eighth and fourteenth day in below table (Table 1).

Table 1. Mean levels of serum cystatin C and GFR in the third, eighth and fourteenth day

Assessment day	Cystatin C (ng per ml)	GFR (ml per minute)
	Mean±SD	
Third day	4722.31±2707.57	59.51±20.88
Eighth day	4313.67±2566.66	63.01±22.31
Fourteenth day	4390.96±2476.20	61.33±1840

DISCUSSION

Early diagnosis of acute rejection is very important. Considering that serum creatinine at the beginning of rejection can have a slight changes or so be asymptomatic, it is considered to be necessary the replacement of more precise marker for early diagnosis. There are different studies with different results in the case of the use of cystatin C marker instead of serum creatinine in early diagnosis of rejection.In the study of geramizadeh and colleagues in 2009 on 60 transplanted patients, the serum cystatin c and serum creatinine value of the first week was evaluated that serum cystatin c changes in this week were increasing but serum creatinine changes were decreasing (10). In this study, it was suggested that serum cystatin c after the first week should be used as more accurate predictive marker of kidney function. In a study of zahran and colleagues in 2007, patients evaluated after relative stability and one month after kidney transplantation that, in this study, the serum cystatin was not sensitive predictor marker in renal function in comparison with creatinine, which was inconsistent with the present study (9). In the study of Krishnamurthy and colleagues in 2011 on 30 kidney transplanted patients and 29 controls who at least 6 months were past their kidney transplantation, it was shown that serum cystatin c in case of loss of GFR is a better marker than creatinine (11). It is recommended to calculate the GFR based on cystatin c to evaluate the accurate role of cystatin c.In our study, there was such a defect based on Cockcroft-Gault formula then it is recommended that in next studies newer formula should be used to avoid the underestimation or overestimation of GFR (12). In total and with comparison the results of our studies with similar studies, it is seems that serum cystatin c can be used as an alternative marker in the evaluation of decreased renal function.

CONCLUSION

Serum cystatin c as a valuable marker can be an effective predictor marker of renal function decreasing beside creatinine. Due to high cost of measuring kits of serum cystatin c, this marker can be used in high-risk patients with possibility of rejection.

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