STUDY OF THE RELATION BETWEEN DEGREE OF TUBULO-INTERSTITIAL FIBROSIS IN RENAL BIOPSIES AND ESTIMATED GLOMERULAR FILTRATION RATE (GFR) USING CREATININE BASED, CYSTATIN BASED AND COMBINED CYSTATIN AND CREATININE BASED EQUATIONS

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Background

Estimated GFR equations have many drawbacks in assessing CKD stages, and hence clinical decisions, as they depend on single serum measurement of either creatinine and /or cystatin regardless of urinary levels or timing. Serum creatinine level depends on glomerular filtration by 80% and tubular secretion by 20% in normal persons[1]. These ratios vary in CKD patients (with increased tubular secretion) and with degree of tubular dysfunction. Thus creatinine based GFR equations may vary with degree of tubulo-interstial pathology not only due to its effect on real GFR but also due to its effect on tubular secretion of creatinine. We did not detect any previous studies in the literature to correlate tubule-interstitial pathological changes in renal biopsies with creatinine nor with cystatin based estimated GFR equations. The aim of this study is to assess the possible relation between degree of tubule-interstitial fibrosis and estimated GFR by creatinine, cystatin and combined creatinine and cystatin based equations in renal biopsies of patients with CKD

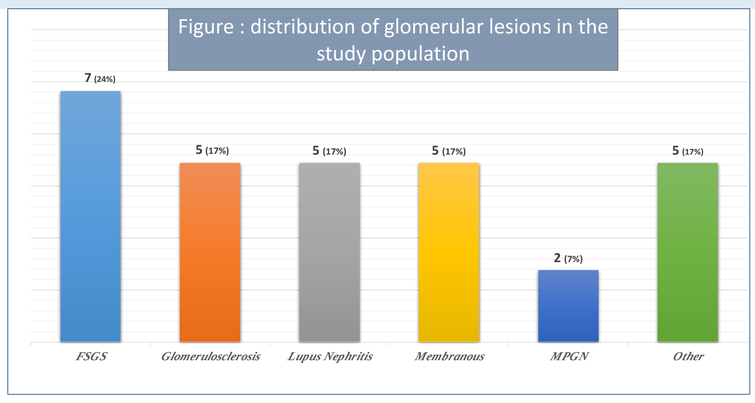
Method

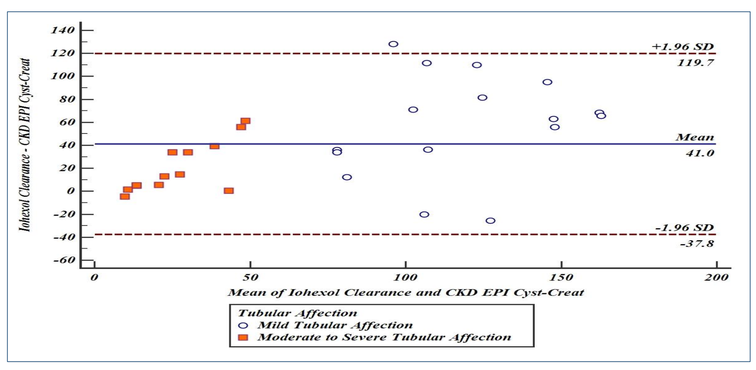
Twenty nine CKD patients presenting with different renal presentation necessitating performance of renal biopsies were randomly selected from our renal unit and were subjected to routine CBC and chemistry including measurement of serum cystatin by Particle-enhanced turbidimetric immunoassay (PETIA) to calculate Cockroft, MDRD, and creatinine EPI equations as well as cystatin EPI and combined Cystatin and creatinine EPI equations. Measuring of Iohexol plasma clearance using 2h, 3h, 4h, 5h, 6h and 24 hour samples was also performed [2] .Iohexol concentration was measured by ultra-performance liquid chromatography (UPLC) [3]. Renal biopsies were examined by light and electron microscopy and the degree of tubule-interstitial fibrosis was assessed by semiquantitave approach on a scale from 0 to 3 [4].

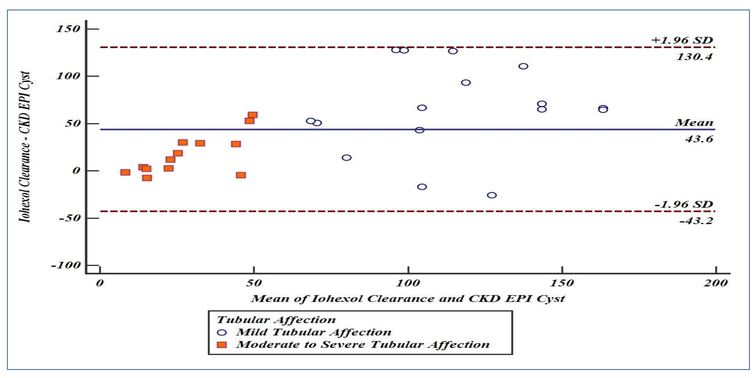
Results

We divided the patients according to degree of tubule-interstitial fibrosis into two groups, group A with no -mild tubulo-interstitial fibrosis (16 patients) and group B with moderate-severe tubulo-interstitial fibrosis (13 patients). Both groups were similar in age, sex and BMI. As expected Iohexol clearance was significantly lower in group B compared to group A (Mean GFR for group A: 147.3 ± 37.6 & group B: 37.1 ± 23.2) as well as all five equations studied to estimate GFR. However, CKDEPI cyst& CKDEPI creat-cyst equations showed significant positive correlation with Iohexol clearance (Gold standard) in group B with more interstial fibrosis but not significant in group A with mild fibrosis. Moreover, the improvement in bias between the two groups was significant only in CKDEPI cyst & CKDEPI creat-cyst equations using Bland Altman analysis to test the agreement between estimated and measured GFR. Regression analysis showed that the change in correlation & bias between groups was 2ry to change in GFR & tubulointerstial pathology in MDRD & CKDEPI creat cyst equations & only 2ry to change in GFR in CKDEPI cyst equation

Figure : distribution of glomerular lesions in the study population







Conclusion

It may be concluded that tubulointerstial fibrosis may affect the performance of GFR estimated creatinine based estimating equations possibly due to combined effect on glomerular filtration and tubular secretion of creatinine. Cystatin based equations as CKDEPI cyst may be more accurate for GFR estimation in the presence of advanced tubulointerstial fibrosis

References

1. Shemesh O, Golbetz H, Kriss JP, Myers BD.: Limitations of creatinine as a filtration marker in glomerulopathic patients. Kidney Int. 1985; 28(5):830
2. Stolz A , Hoizey G, Toupance O, Lavaud S, Vitry F, Chanard J,1and Rieu p: Evaluation of Sample Bias for Measuring Plasma Iohexol Clearance in Kidney Transplantation. *Transplantation* 2010;89: 440–445.
3. Cavalier E, Rozet E, Dubois N, Charlier C, Hubert P, Chapelle JP, Krzesinski JM, Delanaye P. Performance of iohexol determination in serum and urine by HPLC: validation, risk and uncertainty assessment. Clinica Chimica Acta 396 (2008) 80–85.
4. Waldman M, Crew RJ, Valeri A, Busch J, Stokes B, Markowitz G, D'Agati V, Appel G: Adult minimal-change disease: clinical characteristics, treatment, and outcomes, Clin J Am Soc Nephrol. 2007, 2: 445-453.

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