Urine vancomycin level as an alternative for serum drug monitoring

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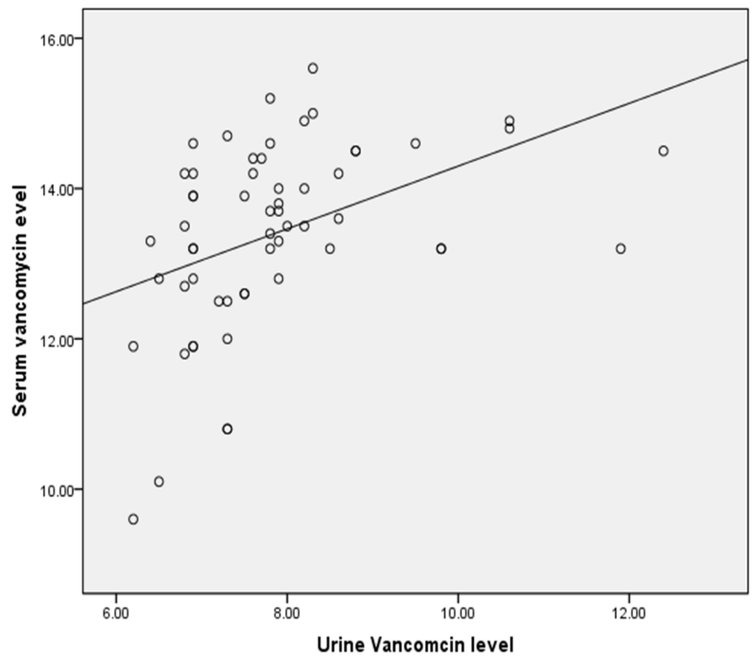
Therapeutic drug monitoring of vancomycin is an important and elusive issue in clinical decision-making and dosage modifying, particularly among patients with critical condition and decreased renal function. Urine is more available specimen in hospitalized patients and drug level monitoring in urine may be a reliable and non-invasive procedure compared to frequent blood sampling. We aimed to determine and validate diagnostic yield of vancomycin trough level in urine in correlation with serum level.

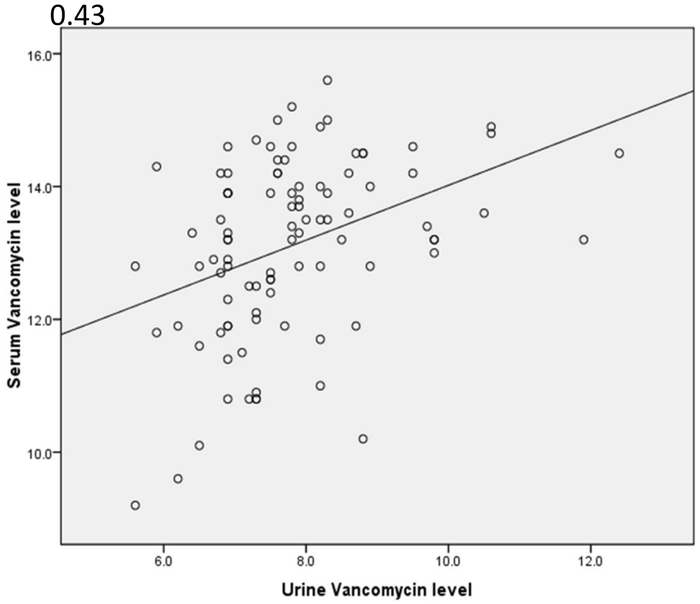
Materials & Methods

In a prospective study, adult patients who were treated with vancomycin for any clinical condition enrolled in this study. Patients were divided in two different groups according to their creatinine clearance. Subjects with normal glomerular filtration rate (GFR >80 ml/min) were received vancomycin 15 mg/kg twice daily (group-A). The second group was the patients with decreased GFR (<80 ml/min) who vancomycin was administered based on the formulation (15.4xGFR) ±150mg (group-B).

Serum trough levels of vancomycin before the fourth maintenance dose and simultaneous urine trough levels were detected by high-pressure liquid chromatography. Paired-t and Pearson tests were used to analyze the mean serum and urine trough levels and correlation, respectively.



Group A: Correlation of vancomycin levels, P: 0.001, R: 0.43



Total patients: Correlation of vancomycin levels, P: 0.000, R: 0.38

Results

Ninety-five patients were assigned to 2 groups, 58 and 37 in groups A and B, respectively (age: 46.3±21.1; 75 male and 20 female). The mean serum and urine trough levels of vancomycin were 13.44±1.24 and 7.86±1.28 mg/dl in group-A and 12.64±1.37 and 7.69±1.18 mg/dl in group-B, respectively. Despite of subtle differences in serum trough levels between two groups (P: 0.006), urine levels of vancomycin were similar (p: 0.51). The serum and urine trough levels had positive linear correlation in both groups, correspondingly (P: 0.001, R: 0.43 group-A, P: 0.07, R: 0.3 group-B). Usually, urine trough level >6 mg/dl was corresponding to serum level > 10 mg/dl).

Conclusion:

Vancomycin dosage based on GFR in patients with decreased renal function reaches to proper trough levels. Urine levels of vancomycin are correlated with simultaneous serum levels and consistently may predict serum levels. Therefore, we recommend using urine vancomycin monitoring as a non-invasive method and alternative to blood sampling.