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Prediction of pathologic proteinuria by dipstick albuminuria is different according to the specific gravity

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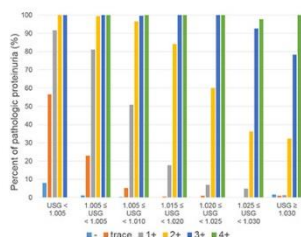
Background: Proteinuria is essential to diagnose kidney disease. Urine dipstick test is easy to recognize pathologic proteinuria with lower cost, so usual health examination programs use it for screening of kidney diseases. However, spot urine dipstick albumin is known to be affected by urine specific gravity. The impact of urine specific gravity (USG) on estimation of proteinuria remains obscure.

Methods: We included patients who were tested dipstick albuminuria, spot urine protein to creatinine ratio (UPCR), and spot urine albumin to creatinine ratio (UACR) on the same day. From Jan. 2010 and Dec. 2013, a total of 23,575 cases were collected. To avoid bias from multiple readings for the same patient, we excluded duplicated cases (n = 16,304). From these, we compared dipstick albuminuria and quantified proteinuria/albuminuria. Pathologic proteinuria was defined as UPCR more than 0.5 g/g creatinine.

Results: In this study, total of 7,262 patients were included. Mean age was 58.7 ± 20.0 years old and 45.2% were women. Patients with dipstick albuminuria trace and 1+ had pathologic proteinuria in only 4.4% and 33.0%, respectively. However, those with dipstick albuminuria with 2+, 3+, and 4+ had 82.3%, 98.4%, and 99.7% had pathologic proteinuria. The average amount of proteinuria was 0.06 ± 0.13 , 0.17 ± 0.21 , 0.52 ± 0.69 , 1.31 ± 1.24 , 3.4 ± 2.86 , and 6.0 ± 3.88 g/g in dipstick albuminuria -, trace, 1+, 2+, 3+, and 4+, respectively. This association was different according to the USG. In the diluted urine with $USG \leq 1.010$, more than 80% of patients with dipstick albumin 1+ had pathologic proteinuria. However, in the concentrated urine with $USG \geq 1.025$, it was less than 5% (Figure 1).

Conclusion: From the above exploration dipstick albumin and pathologic proteinuria according to USG, we confirmed an importance of USG in interpretation of dipstick albuminuria. A novel algorithm to predict pathologic proteinuria and proteinuria quantitation using USG and dipstick albumin may be helpful to screening kidney disease more precisely.

Figures:



Keywords: microalbumin to urine creatinine ratio, urinalysis, urine protein to urine creatinine ratio, urine specificity gravity