

초기 만성콩팥병 환자에서 다양한 공식으로 추정된 사구체여과율과 24시간 소변으로 측정된 사구체여과율의 비교

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Comparison of Performance of Various Estimated Glomerular Filtration Rate Equations with Measured Creatinine Clearance from 24-hour Urine

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Background: There are several equations to estimate glomerular filtration rate (GFR), but each of the methods have specific limitations. The most commonly used equation of Modification of Diet in Renal Disease (MDRD) is well known to underestimate GFR in CKD stage 1-3 populations. We compared various creatinine-based GFR with measured GFR by 24-hour urine collection (24u-GFR) in these populations.

Methods: A total of 731 urine samples from 245 patients with CKD Stages 1-3 were analyzed by following equations: Cockcroft-Gault formula (CG); 4 variable abbreviated MDRD equation (abbMDRD); 4 variable IDMS-MDRD equation (IDMS-MDRD); Chronic Kidney Disease Epidemiology Collaboration equation (CKD-EPI); and novel 4 variable equations for Korean (KOR-MDRD and KOR-IDMS-MDRD). Serum creatinine (Cr) was measured by compensated IDMS-traceable method. The creatinine clearance from 24-hour urine and CG formula were adjusted to 1.73 m² body surface. The adequacy of 24-hour urine samples was analyzed by calculating the predicted daily creatinine excretion.

Results: The mean age of the participants was 49.5 years, and 49.8% of the patients were men. The mean value of serum Cr was 1.06 mg/dL. Of 731 urine samples, 455 urine samples were well collected as measured urine Cr/estimated urine Cr between 0.8-1.2. The IDMS-MDRD GFR showed the best overall correlation with 24u-GFR (by Pearson correlation analysis, R=0.936, p<0.001) and best reliability by intraclass correlation coefficient (ICC, 0.914, 95% CI 0.897-0.928, p<0.001). In subgroup analysis, IDMS-MDRD showed the highest ICC values in CKD stage 2,3 (0.622 in CKD stage 2, 0.820 in CKD Stage 3, all p<0.001). In CKD Stage 1, KOR_MDRD showed the highest ICC value (0.764, p<0.001) and the best correlation with 24u-GFR (R=0.773, p<0.001). Fifteen to thirty percent accuracy (P15, P30) of KOR-MDRD was the highest in overall (P15: 63.7, P30: 97.4), and CKD-EPI and KOR-IDMS-MDRD showed higher P30 than other equations in CKD stage 1 (92.4 and 94.9, respectively).

Conclusion: The estimated GFR with IDMS-MDRD equation was well calibrated with 24u-GFR in CKD stage 2,3. In CKD stage I, KOR-MDRD equation showed good performance with 24u-GFR.

Key Words: 사구체여과율, 만성콩팥병

Glomerular filtration rate, Chronic kidney disease