

De-indexed estimated glomerular filtration rates: Improving renal function estimation in obese patient

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Background

Obesity is increasingly prevalent as nearly a third of the world's population is now categorized as overweight or obese. Chronic kidney disease (CKD) patients with obesity very often have underestimated renal function according to standard UK laboratory method using the chronic kidney disease-epidemiology collaboration equation (CKD-EPI) in which estimated glomerular filtration rates (eGFR) is corrected for body surface area (BSA) in mL/min/1.73m². Accurate assessment of kidney function is imperative to guide the dosage adjustment of renally excreted medications, CKD categorization, renal replacement therapy planning. Given that body surface area of obese patients is highly variable, we propose that their eGFR should be de-indexed in clinical practice.

Methods

We retrospectively collected data of 33 patients known to our renal services with BMI of greater than 30 kg/m² and CKD (stage 3 and below). We accessed electronic systems such as DiProton, Quadramed, and clinic letters to collect demographic (age, gender, race), anthropometrical (height and weight) and biochemical data (creatinine value at steady state). We then calculated BMI using standard formula and BSA using Mosteller formula ($m^2 = [\text{Height, cm} \times \text{Weight, kg} / 3600]^{1/2}$). We compared the standard method (CKD-EPI equation) and de-indexed eGFR which is corrected for individual BSA. Derivation of the de-indexed values was made with the use of GFR calculator on https://www.kidney.org/professionals/kdoqi/gfr_calculator.

Results

Patient characteristics are shown in Table 1. Our 33 patients are divided according to CKD classification into 5 (15%) in CKD 3, 11 (33%) in CKD 4 and 17 (52%) in CKD 5 respectively. Following de-indexing, we observed improvement of eGFR less than 2 ml/min/1.73m² in 8 patients (24%), 2 to 4 ml/min/1.73m² in 12 patients (36%) and more than 5ml/min/1.73m² in 13 patients (39%). Improvement of eGFR is very minimal (less than 2 ml/min/1.73m²) in CKD 5 group especially when their BSA is less than 2 m². 7 patients (21%) have clinically significant changes in their eGFR leading to improvement in CKD staging, 5 out of which have BSA of greater than 2 m² as well as BMI of greater than 35 kg/m² (Figure 1). The difference between standard and de-indexed eGFR are more prominent in parallel to increasing BSA.

Conclusion

In light of the positive findings in this small study, we suggest that eGFR de-indexing should be considered in patients with obesity to improve the performance of this CKD-EPI formula thus the accuracy in renal function assessment. This is to allow better dosing in medication, staging in CKD and assess the risk of progression. Further studies are being undertaken.