

COMPARING DIFFERENT EQUATIONS FOR GLOMERULAR FILTRATION RATE CALCULATION IN AN EGYPTIAN ELDERLY POPULATION

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INTRODUCTION

Chronic kidney disease (CKD) is an important epidemic and public health problem, resulting in end-stage renal disease (ESRD) and increased risk of morbidity and mortality.

CKD is common in elderly individuals, and there is a debate about the accuracy of GFR estimates in this important subgroup of the population.

Accordingly, the present study compared six different GFR estimating equations [MDRD, Cockcroft–Gault–BSA, CKD-EPI (creatinine) CKD-EPI (cystatin C), BIS-1, and BIS-2] in a cohort of Egyptian elderly population.

AIM OF THE WORK

This work aims at comparing different equations with measured GFR in cohort of Egyptian elderly population.

SUBJECTS AND METHODS

One hundred patients were included in the study to compare different equations of measured GFR in a cohort of Egyptian elderly population. They were 65 years or older and were recruited from the wards of the internal medicine department of Alexandria Main University Hospital. Patients in the study were divided according to eGFR estimated by CKD-EPI equation based on the most recent creatinine measured into four groups:

Group 1: stage 2 CKD.

Group 2: stage 3 CKD.

Group 3: stage 4 CKD.

Group 4: stage 5 CKD not on heamodialysis.

RESULTS

Table 1: Distribution of the studied cases according to demographic data (n = 100)

Demographic data	No.	%
Sex		
Male	47	47.0
Female	53	53.0
Age (years)		
Min. – Max.	65.0 – 89.0	
Mean ± SD.	70.0 ± 5.61	
Median (IQR)	68.0 (66.0 – 72.0)	
Weight (kg)		
Min. – Max.	54.0 – 145.0	
Mean ± SD.	89.05 ± 17.78	
Median (IQR)	85.0 (76.25 – 98.5)	
Height (cm)		
Min. – Max.	150.0 – 192.0	
Mean ± SD.	164.38 ± 9.96	
Median (IQR)	163.50 (155.0 – 171.5)	
BMI (kg/m ²)		
Underweight (<18.5)	0	0.0
Normal weight (18.5-24.9)	9	9.0
Overweight (25-29.9)	29	29.0
Obese (30-34.9)	22	22.0
Severely obese (35 – 39.9)	23	23.0
Morbidly obese (>40)	17	17.0
Min. – Max.	19.38 – 60.16	
Mean ± SD.	33.25 ± 7.48	
Median (IQR)	32.05 (27.50 – 37.83)	

Table 2: Descriptive analysis of the studied cases according to calculation by different GFR formulas (n = 100)

Calculation by different GFR formulas	Min. – Max.	Mean ± SD.	Median (IQR)
MDRD	5.78 – 71.41	23.02 ± 11.87	22.09 (12.3 – 32.4)
CKD-EPI (creatinine)	5.13 – 70.07	21.39 ± 11.58	20.04 (10.9 – 30.4)
CKD-EPI (cystatin C)	4.06 – 52.71	14.99 ± 7.40	12.77 (9.66 – 19.5)
CKD-EPI (cystatin C-creatinine)	4.17 – 60.51	17.0 ± 8.79	14.90 (9.71 – 24.03)
Cockcroft–Gault–BSA	7.99 – 91.15	31.19 ± 16.59	26.09 (17.59 – 42.50)
BIS-1	9.85 – 65.18	26.0 ± 10.52	24.75 (16.41 – 34.15)
BIS-2	7.36 – 57.72	20.76 ± 8.18	18.90 (14.08 – 27.89)

Table 3: Correlation between the different parameters (n = 100)

		MDRD	CKD-EPI (creatinin)	CKD-EPI (cystatinC)	CKD-EPI (cystatinC-creatinine)	Cockcroft –Gault–BSA	BIS-1	BIS-2
MDRD	r		0.999	0.828	0.957	0.887	0.988	0.951
	p		<0.001*	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*
CKD-EPI (creatinine)	r			0.834	0.961	0.896	0.993	0.956
	p			<0.001*	<0.001*	<0.001*	<0.001*	<0.001*
CKD-EPI (cystatin C)	r				0.952	0.709	0.817	0.954
	p				<0.001*	<0.001*	<0.001*	<0.001*
CKD-EPI (cystatinC-creatinine)	r					0.837	0.948	0.996
	p					<0.001*	<0.001*	<0.001*
Cockcroft–Gault–BSA	r						0.907	0.841
	p						<0.001*	<0.001*
BIS-1	r							0.951
	p							<0.001*
BIS-2	r							
	p							

CONCLUSION

The current study concluded the following:

- Cystatin C-based equations may overestimate the severity of chronic kidney disease in elderly patients while only creatinine-based equations may underestimate the severity of the disease.
- Using different formulae for CKD may lead to slight misclassifications for elderly patients with CKD.
- Despite of the difference between the studied equations, we suggested all studied formulae perform in a close manner in elderly individuals as all show a high level of agreement and consistency.
- We propose a comparable accuracy of all studied formulae in CKD staging.