

Comparison of five eGFR equations in younger vs older patients

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Introduction

New equations have been published in the last years that try to improve the accuracy of the estimation of the glomerular filtration rate (eGFR) in a wide range of patients. Each equation was created from a sample of specific individuals: patients with CKD (MDRD and CKD-EPI), healthy kidney donors (MQ), asian patients (Japanese GFR) and the elderly (BIS-1). We used five GFR equations to calculate the prevalence of CKD in a sample of healthy adult spanish individuals.

Materials and Methods

491 healthy patients were enrolled in the present study. eGFR was estimated using five methods: MDRDa, CKD-EPI, Mayo Quadratic (MQ), Japanese GFR equation (Japan) and Berlin Initiative Study 1 (BIS-1). Clinical and anthropometric data were collected from the hospital records. The statistical analysis was performed using IBM SPSS Statistics 22.

Results

Figure A summarizes the % of individuals within each stage of CKD according to the different equations. The performance of the equations varies with the age of patients. MQ offers the lowest % of patients aged < 70 years classified in CKD stages 3-5 (2.4%) followed by BIS-1 (6%), CKD-EPI (6.5%), MDRD (8%) and Japanese-GFR (38.4%). In the elderly MQ classifies 9.8% of patients in CKD stages 3-5, followed by MDRD (19.7%), CKD-EPI (19.8%), BIS-1 (40.9%) and Japanese-GFR (66.2%). The BIS-1 equation presents the most significant increase in the percentage of patients classified as CKD stages 3-5 when comparing the elderly with younger patients (+34,9%).

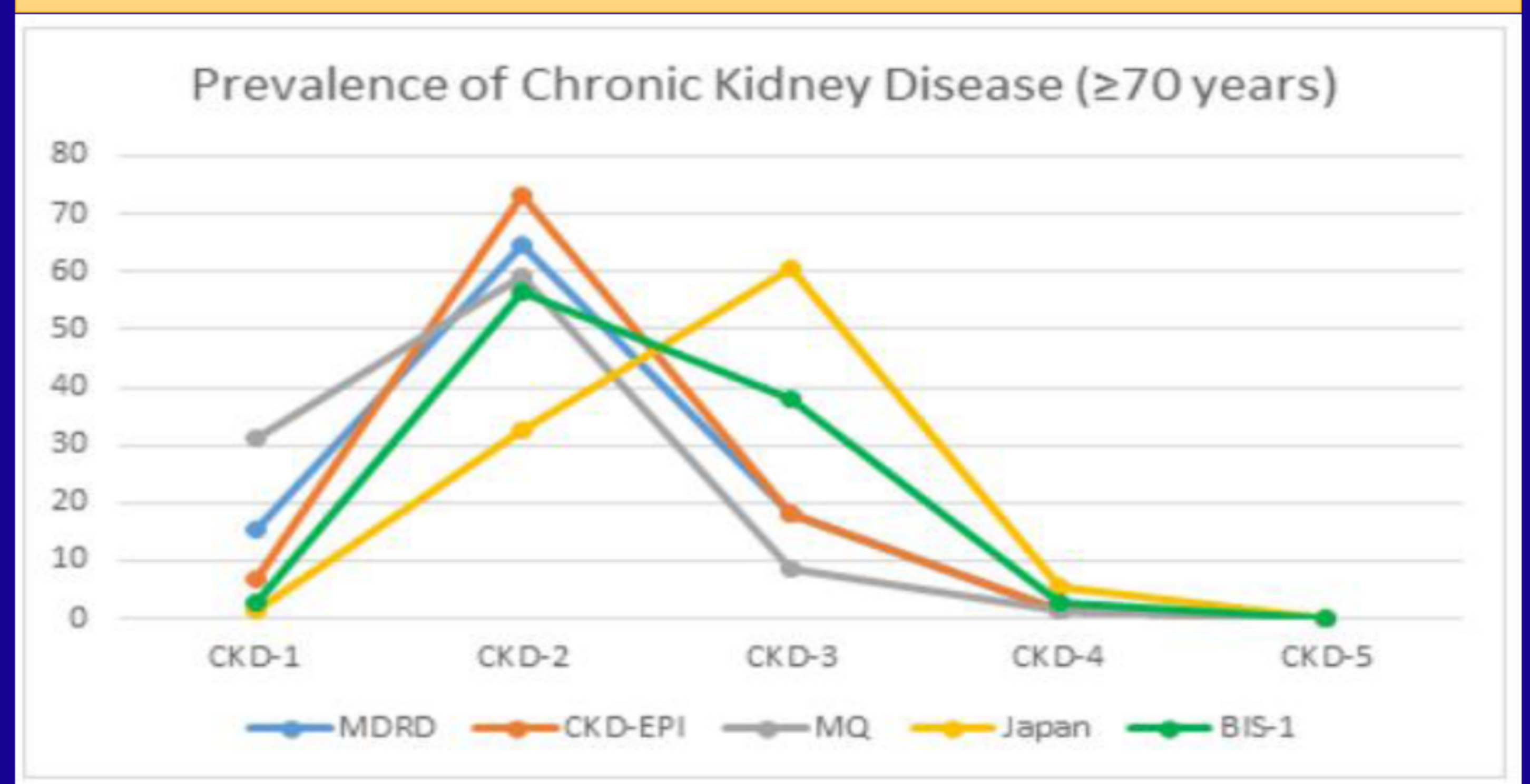
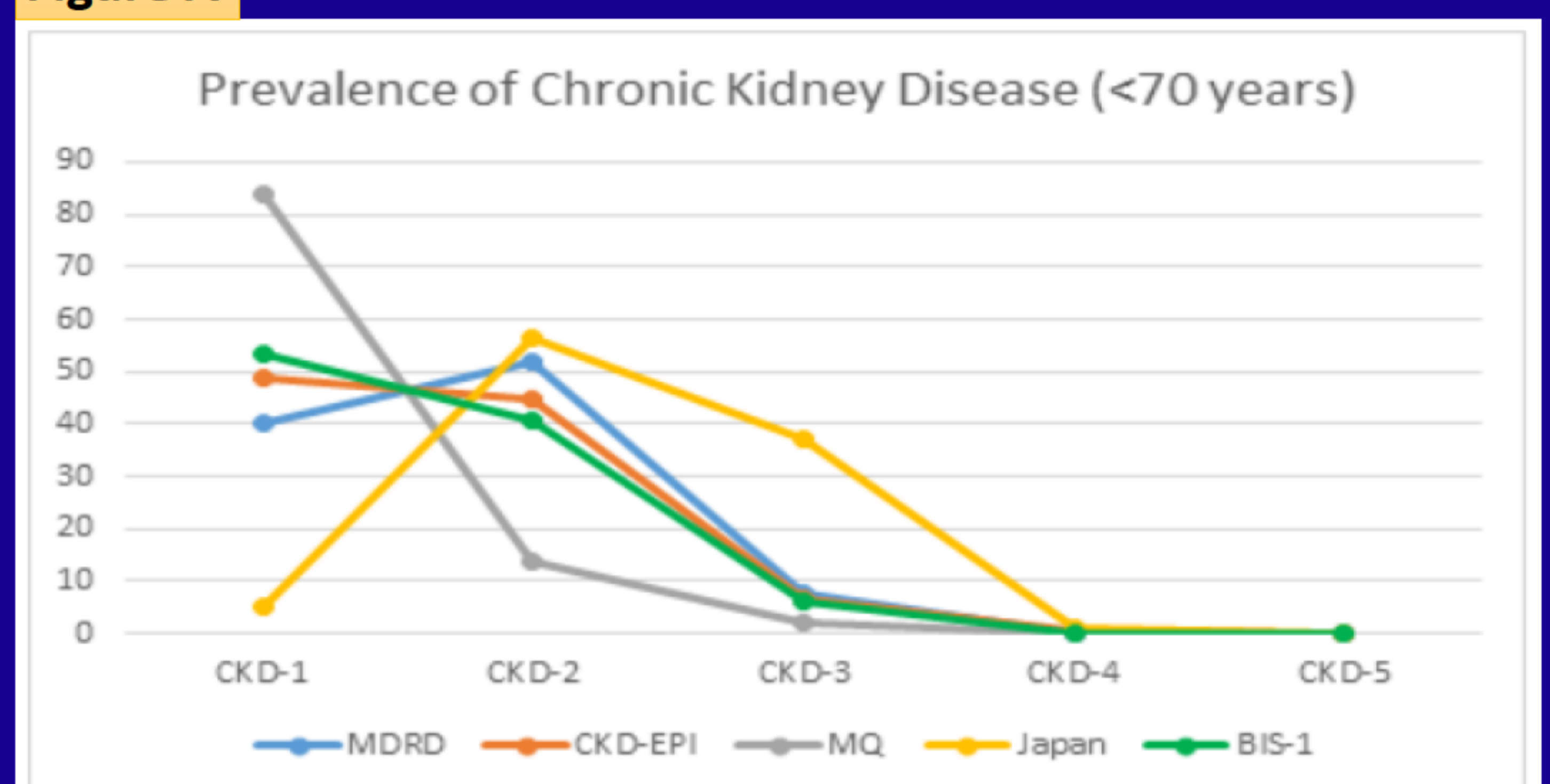
Table 1

	All Patients	Age < 70 y	Age ≥ 70y
N	491	420	71
Age (years)	54,2 ± 14,03	50,6 ± 11,83	75,14 ± 4,56
Male Gender (%)	58,2% (286)	58,8%(247)	54,9%(39)
Weight (kg)	73,08 ± 14,01	73,3 ± 14,2	71,2 ± 13,8
Hypertension (%)	33,4%(164)	29,3%(123)	50,7%(36)
Diabetes (%)	11%(54)	8,8%(37)	36,6%(26)
Serum Urea (mg/dl)	37,3 ± 11,9	36,3 ± 10,4	45,8 ± 18,7
Serum Creatinine (mg/dl)	0,93 ± 0,25	0,92 ± 0,23	0,97 ± 0,3

Table 2

	Estimated Glomerular Filtration Rate					
	Avg ± St.Dev	>90 (%)	90-60 (%)	60-30 (%)	30-15 (%)	<15 (%)
MDRD						
All	85,5 ± 20,11	36,5%(179)	54%(265)	9,2%(45)	0,4%(2)	0%
Age < 70 y	87 ± 19,65	40%(168)	52%(219)	7,6%(32)	0,2%(1)	0%
Age ≥ 70 y	76,7 ± 20,5	15,5%(11)	64,8%(46)	18,3%(13)	1,4%(1)	0%
CKD-EPI						
All	85,56 ± 18,32	42,4%(208)	49%(240)	8,1%(40)	0,6%(3)	0%
Age < 70 y	88 ± 17,41	49%(204)	44,5%(187)	6,4%(27)	0,5%(2)	0%
Age ≥ 70y	70,8 ± 16,7	7%(5)	73,2%(52)	18,3%(13)	1,4%(1)	0%
Mayo Quad						
All	100,23 ± 18,6	76,2%(374)	20,5%(100)	3,1%(15)	0,4%(2)	0%
Age < 70 y	103 ± 17,2	84%(353)	13,6%(57)	2,1%(9)	0,2%(1)	0%
Age ≥ 70y	83,7 ± 17,6	31%(22)	59,2%(42)	8,5%(6)	1,4%(1)	0%
J-GFR						
All	63,37 ± 14,66	4,7%(23)	53%(260)	40,5%(199)	1,8%(9)	0%
Age < 70 y	64,8 ± 14,3	5,2%(22)	56,4%(237)	37,1%(156)	1,2%(5)	0%
Age ≥ 70y	54,9 ± 14	1,4%(1)	32,4%(23)	60,6%(43)	5,6%(4)	0%
BIS-1						
All	92,9 ± 32,3	46%(226)	43%(210)	10,8%(53)	0,4%(2)	0%
Age < 70 y	98,3 ± 31,6	53,4%(224)	40,6%(170)	6,2%(26)	0%	0%
Age ≥ 70y	61,7 ± 13,7	2,8%(2)	56,3%(40)	38%(27)	2,8%(2)	0%

Figure A



Conclusions

The prevalence of CKD varies according to the equation used to estimate GFR. In younger patients BIS-1, although not being validated for this population, provides similar results to CKD-EPI across all stages. In the elderly its performance changes, increasing the percentage of patients classified as CKD-3 as opposed to CKD-EPI. GFR equations are a useful tool in clinical practice, although they should be carefully considered, especially in patients with extreme weight or age. The BIS-1 equation may constitute a promising tool to assess GFR in the elderly, especially with a progressively aging population.

