

Oral Communication Abstract

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KIDNEY DYSFUNCTION AND COVID-19: CHARACTERISTICS, PREDICTIVE FACTORS, AND INFLUENCE OF AGE

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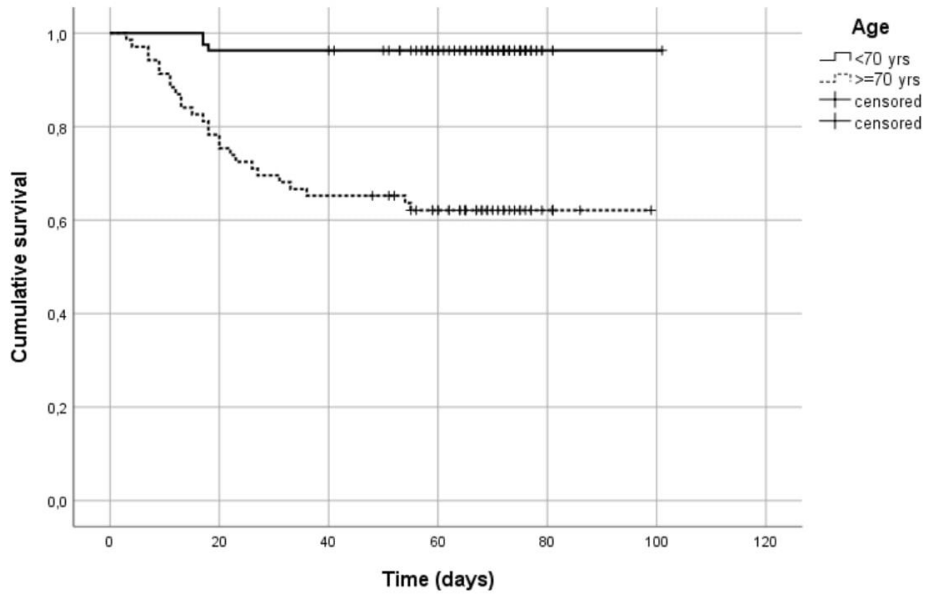
Objectives: COVID-19 is strongly influenced by age and comorbidities. Among comorbidities, kidney dysfunction plays a crucial role. Acute kidney injury (AKI) is a frequent finding in COVID-19 patients and it is associated with mortality and severity. The role of chronic kidney disease (CKD) in COVID-19 is more debated.

Methods: We performed a retrospective study in a cohort of 174 hospitalized COVID-19 patients in Italy from March 3rd to May 21st, 2020, to investigate the role of kidney dysfunction on COVID-19 severity and mortality. Moreover, we examined in-depth the relationship between kidney function, age, and progression of COVID-19, also using different equations to estimate the glomerular filtration rate (GFR). Hazard ratios (HR) and odds ratios (OR) were obtained by logistic regression, while a predictive analysis was made through a machine learning approach.

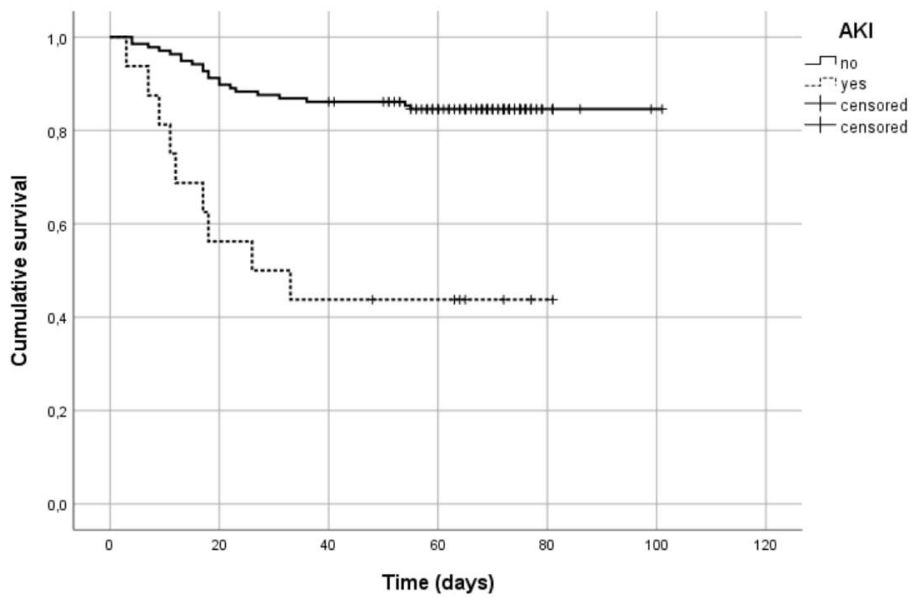
Results: AKI and death occurred in 10.2 % and 19.5% respectively, in our population. Serum creatinine, blood urea nitrogen, neutrophils, lymphocytes, c-reactive protein and procalcitonin were significantly correlated to mortality and severity of the disease. The major risk factors for mortality in our cohort were age [adjusted HR, 6.2; 95% confidence interval (CI) 1.8-21.4] and AKI [3.36 (1.44-7.87)], while, in these relationships, GFR at the baseline mitigated the role of age. The occurrence of AKI was influenced by baseline kidney function, D-dimer and procalcitonin and hypertension. Our predictive analysis for AKI and mortality reached an accuracy \geq of 94% and 91%, respectively. In patients \geq 70 years, MDRD and CKD-EPI showed a better performance in the prediction of AKI and mortality, compared to BIS-1 formula.

Conclusions: Our study confirms the importance of AKI as a risk factor in COVID-19 disease, while it scales down the role of CKD, especially in elderly patients. BIS-1 formula demonstrated a worse performance to predict the outcomes in COVID-19 patients when compared to MDRD and CKD-EPI.

Fig. 1 Kaplan-Meier plots of mortality. Curves represent mortality in (A) = patients over and under 70 years old – Logrank test: $p < 0.001$ (B) = patients with and without occurrence of Acute Kidney Injury (AKI) – Logrank test: $p < 0.001$



A)



(B)

Table 1

TABLES

Table 1. Patient's characteristics

	Mean	SD	Median	IQR
Age (years)	69.06	15.69		
eGFR (MDRD)	88.90	33.42		
eGFR (CKD-EPI;BIS-1 over-80 years)	76.71	25.77		
eGFR (CKD-EPI; BIS-1 over-70 years)	75.48	25.77		
eGFR (CKD-EPI)	79.78	23.88		
Creatinine (mg/dL)	0.93	0.40	0.88	0.32
Creatinine (micromol/L)	82.68	35.50	77.81	28.29
Creatinine 48 hours (mg/dL)	0.97	0.60	0.83	0.37
Creatinine 7 days (mg/dL)	0.97	0.57	0.80	0.47
Blood urea nitrogen (mg/dL)	40.23	22.92		
Blood urea nitrogen 48 hours (mg/dL)	42.85	27.91		
White blood cells (n°/cc)	7014.77	6826.20	5590	3740
Neutrophils (n°/cc)	4957.08	3432.36	3800	3400
Lymphocytes (n°/cc)	1058.78	560.43		
Platelets (n°)	212.91	90.33		
LDH (IU/L)	277.38	116.32	244	128
GOT (IU/L)	39.92	32.57	31	24
GPT (IU/L)	37.89	37.52	27	28
CRP (mg/L)	69.96	70.83	47.0	98.55
Procalcitonine	0.90	4.00	0.10	0.16
Ferritine	832.46	907.65	573	723
D-didimer	2548.91	5157.41	948	1764
Systolic blood pressure (mmHg)	127.02	20.37		
Diastolic blood pressure (mmHg)	73.60	12.35		
Lenght of hospitalization (days)	25.20	20.36	19	21
Time between the onset of symptoms and discharge/death	25.47	16.12		

Median and Interquartile Range are shown for non normally distributed variables only
 SD=Standard Deviation; IQR=Interquartile Range; eGFR=Estimated Glomerular Filtration Rate; MDRD= Modification of Diet in Renal Disease Study; CKD-EPI=Chronic Kidney Disease Epidemiology Collaboration; BIS-1= Berlin Initiative Study 1 Equation; LDH=Lactate Dehydrogenase; GOT=Glutamic Oxaloacetic Transaminase; GPT= Glutamate Pyruvate Transaminase; CRP= C-Reactive Protein;