KSN 2021
FULLY VIRTUAL MEETING
September 02 (Thu) - 05 (Sun)

Abstract Submission No. : 2142

Serum cystatin C to creatinine ratio is a potential biomarker for sarcopenia in patients with non-dialysis-dependent chronic kidney disease

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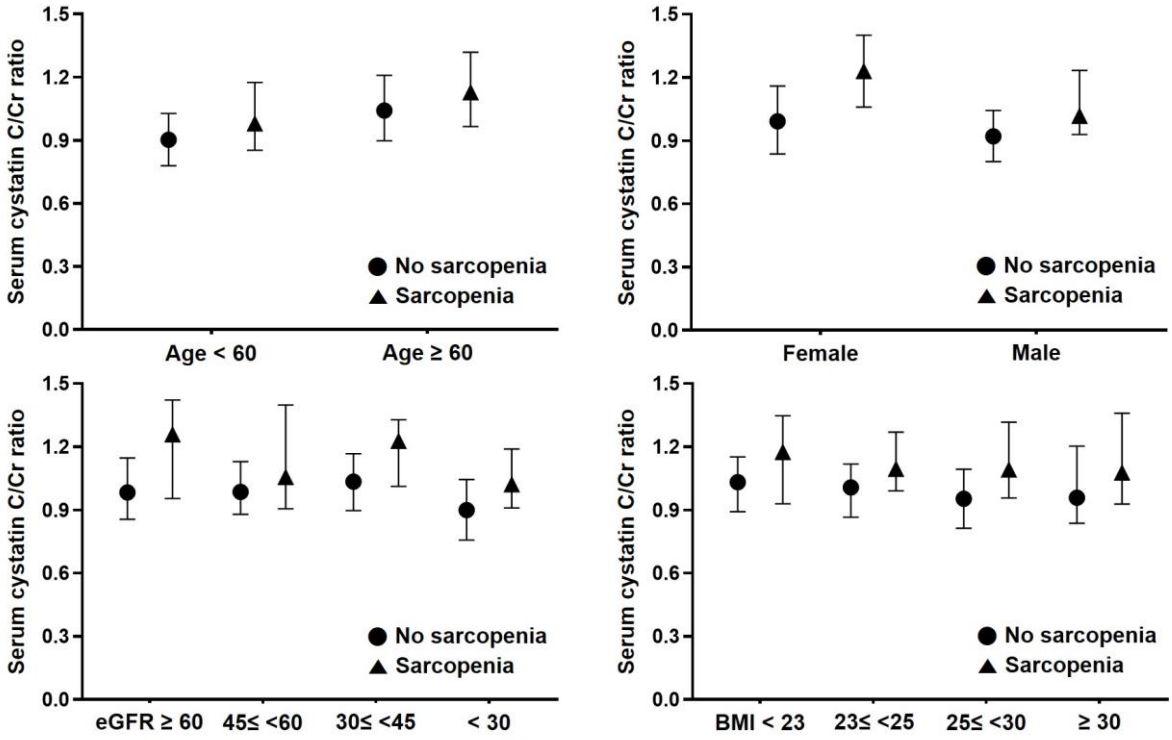
Objectives: Sarcopenia is a prevalent complication in patients with chronic kidney disease (CKD) and is associated with quality of life, morbidity and mortality. This study aimed to assess serum cystatin C to creatinine (Cr) ratio as a potential biomarker for sarcopenia in patients with non-dialysis-dependent CKD.

Methods: A total of 517 outpatients were enrolled in this observational cohort study. Sarcopenia is defined as a condition characterized by low handgrip strength (HGS) and low muscle mass. We measured the muscle mass (lean tissue index, LTI) using bioimpedance analysis and HGS.

Results: Sarcopenia was observed in 25.5% of patients. The serum cystatin C/Cr ratio was significantly higher in patients with sarcopenia regardless of age, sex, estimated glomerular filtration rate (eGFR), and body mass index (BMI) and showed a positive correlation with age and pulse pressure. In contrast, LTI, HGS, hemoglobin (Hb), and serum albumin levels showed a negative correlation with serum cystatin C/Cr ratio. In patients with eGFR ≥ 45 mL/min/1.73 m^2, serum cystatin C/Cr ratio displayed a high negative predictive value in predicting sarcopenia (90.5%) and low LTI (90.4%). As the serum cystatin C/Cr ratio increased by 1, the prevalence risk of sarcopenia and low LTI increased by approximately 5.8 times and 9.9 times, respectively even after adjusting for sex, age, BMI, underlying disease, albumin, Hb, and eGFR. The association between serum cystatin C/Cr ratio and sarcopenia or low LTI was maximized in patients with eGFR < 30 mL/min/1.73 m^2, resulting in a 22.7-fold or a 43.9-fold increase in prevalence risk, respectively. However, no significant result was identified for a low HGS.

Conclusions: Measurement of serum cystatin C/Cr ratio is inexpensive, easy, quick, and permits repeated assessments. This enables prompt screening and early initiation of management for sarcopenia, which would be of great benefit in the treatment of patients with CKD.

Comparison of serum cystatin C/Cr ratio in patients with and without sarcopenia


Serum cystatin C/Cr ratio
1.5
1.2
0.9
0.6
0.3
0.0
No sarcopenia
Sarcopenia
Age < 60
Age ≥ 60
Female
Male
eGFR ≥ 60
45≤ <60
30≤ <45
< 30
BMI < 23
23≤ <25
25≤ <30
≥ 30