

Original Article

Incidence of Renal Impairment in Elderly Hospitalized Patients

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Conflict of Interest: None.

Ali Y, et al. (2024). 4(2): DOI: <https://doi.org/10.61919/jhrr.v4i2.1178>

ABSTRACT

Background: Chronic kidney disease (CKD) is increasingly prevalent among the elderly, leading to progressive kidney function decline and adversely affecting their physical and cognitive well-being.

Objective: This study aimed to assess the incidence and effects of renal impairment on physical and cognitive functions in elderly hospitalized patients.

Methods: A total of 420 elderly patients admitted with renal impairment to a tertiary care hospital in Karachi were included from January to August 2023. We measured the estimated glomerular filtration rate (e-GFR) and Short Physical Performance Battery (SPPB) score, and collected comprehensive demographic, socioeconomic, and clinical data, including a detailed geriatric assessment.

Results: The cohort had a mean age of 78.4±5.8 years, with a nearly even gender split (51.9% male, 48.9% female). Average BMI was 24.8±4.5 Kg/m², mean eGFR was 56.6±18.6 mL/min per 1.73 m², and mean SPPB score was 4.9±3.5. High prevalence of comorbidities was noted: hypertension (68.6%), diabetes (27.6%), coronary artery disease (28.6%), and others. Renal impairment was categorized as severe (12.9%), mild (27.1%), and moderate (60%).

Conclusion: There is a significant correlation between advanced age and renal failure, leading to diminished physical and cognitive capabilities in the elderly, indicating a critical need for integrated care strategies.

Keywords: Chronic Kidney Disease, Elderly, Hospitalized Patients, Physical Performance, Renal Impairment, SPPB Score.

INTRODUCTION

Chronic kidney disease (CKD) is a prevalent condition among the elderly, often leading to detrimental outcomes such as decreased autonomy, increased hospitalization rates, and higher mortality (1). This disease is commonly associated with chronic conditions that contribute to frailty, including hypertension, coronary artery disease, arterial fibrillation, congestive heart failure, stroke, and peripheral vascular disease (2, 3). Furthermore, CKD has been identified as a predictor of disability in older adults. Although the precise mechanisms linking CKD to declines in physical and cognitive performance are not fully understood, evidence suggests that an elevated inflammatory state may play a significant role (4, 5).

Research has also demonstrated a substantial correlation between lower cognitive function scores and reduced estimated glomerular filtration rates (eGFR) (6). Moreover, studies have objectively shown that physical activity is linked to renal function (7, 8). Given these associations, incorporating targeted physical performance assessments in the management of older individuals with CKD could potentially predict and mitigate disability related to the disease (9).

The Short Physical Performance Battery (SPPB) score, which evaluates speed, balance, and strength, is often utilized due to its minimal exertional requirement, though it primarily assesses lower body strength and balance (10). Despite its frequent use, a rigorous analysis of its relationship with CKD in non-hospitalized settings has yet to be conducted. Furthermore, the diagnosis of psychological impairments associated with CKD can often be delayed due to inadequate assessment methods, potentially exacerbating the progression to end-stage psychosis (11).

Renal failure not only imposes a significant burden on healthcare resources, necessitating interventions such as dialysis or transplantation to avert fatal outcomes, but it also enhances the risk and severity of cardiovascular diseases (12). Therefore, developing effective diagnostic and therapeutic strategies is crucial in reducing the complications associated with psychological and physical injuries in CKD patients (13).

The objective of this study is to elucidate the extent to which CKD contributes to physical disability in elderly patients outside of hospital settings and to assess the potential benefits of integrating physical performance measures into their routine management.

MATERIAL AND METHODS

The study was conducted on a cohort of 420 elderly patients who were admitted with renal impairment at the Department of Medicine in a tertiary care hospital in Karachi between January and August 2023. The primary objective was to assess the relationship between the estimated glomerular filtration rate (eGFR) and physical performance as measured by the Short Physical Performance Battery (SPPB) score.

Upon admission, each patient underwent a comprehensive evaluation to measure their eGFR and to administer the SPPB, which rates physical performance on a scale from 0 to 12. This assessment included a battery of tests designed to evaluate speed, balance, and strength, with each of the three test areas contributing to an individual score ranging from 0 to 4. The sum of these three scores provided an overall SPPB score, classifying patients into three categories: 0–4 indicating severe impairment, 5–8 denoting moderate impairment, and 9–12 suggesting mild or no impairment.

Data were meticulously collected, encompassing a variety of demographic, socioeconomic, and clinical variables. These included age, gender, specific medical conditions, and details from a comprehensive geriatric assessment. This broad spectrum of data allowed for a multifaceted analysis of the interplay between renal function and physical performance in the studied population.

The collected data were then statistically analyzed to identify and quantify the correlation between eGFR and SPPB scores. This approach provided insights into how renal impairment could influence physical capabilities in elderly patients, aiming to inform better clinical strategies for managing the broader impacts of CKD.

RESULTS

In the study, the cohort comprised 420 elderly patients with a mean age of 78.4 years, showing a standard deviation of ± 5.8 years. The distribution of participants was nearly balanced between genders, with 218 males (51.9%) and 202 females (48.9%). Body mass index (BMI) among the cohort averaged 24.8 kg/m^2 , with a standard deviation of $\pm 4.5 \text{ kg/m}^2$.

The renal function, as measured by the estimated glomerular filtration rate (eGFR), revealed a mean of $56.6 \text{ mL/min per } 1.73 \text{ m}^2$, with considerable variation observed ($\text{SD} = \pm 18.6$). Physical performance, evaluated using the Short Physical Performance Battery (SPPB), showed an overall mean score of 4.9 with a standard deviation of ± 3.5 , indicating varied levels of physical impairment among the participants.

The study also explored the prevalence of comorbidities, which were significant among the participants. Hypertension was the most common, affecting 68.6% of the patients ($n=288$), followed by chronic obstructive pulmonary disease (COPD) and anemia, which affected 38.6% ($n=162$) and 41% ($n=172$) of the patients, respectively. Other notable conditions included diabetes (27.6%, $n=116$), coronary artery disease (28.6%, $n=120$), arterial fibrillation (18.6%, $n=78$), congestive heart failure (20.5%, $n=86$), stroke (11.9%, $n=50$), and peripheral vascular disease (27.7%, $n=108$).

In terms of renal impairment severity, 12.9% of the patients ($n=54$) had severe impairment ($\text{eGFR} < 30$), 27.1% ($n=114$) had mild impairment ($\text{eGFR} = 30\text{--}59.9$), and the majority, 60% ($n=252$), exhibited moderate impairment ($\text{eGFR} \geq 60$).

These findings were systematically presented in tables and figures to illustrate the demographic, clinical characteristics, and comorbidity profiles of the studied population. Specifically, Table I detailed the demographic and baseline characteristics, while Figure 1 depicted the distribution of comorbidities, and Table II outlined the severity of renal impairment based on eGFR levels. These visual and tabular representations provided clear, structured insights into the health status and challenges faced by the elderly patients with renal impairment.

Table-I Demographic and baseline details

Variables	N (%)
Age (years)	78.4±5.8 years
Gender	
Male	218 (51.9%)
Female	202 (48.9%)
BMI (Kg/m2)	24.8 ±4.5
Mean eGFR (mL/min per 1.73 m2)	56.6 ± 18.6
Mean SPPB score	4.9 ± 3.5

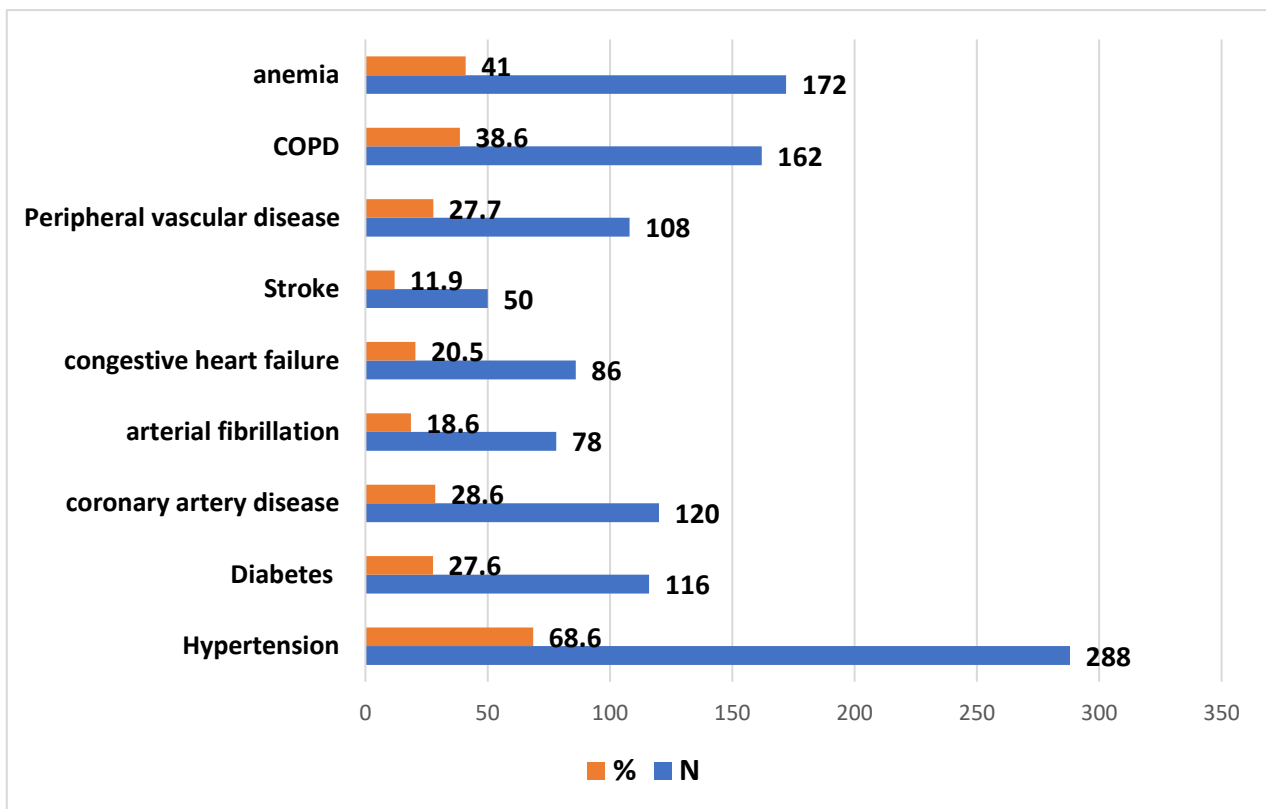


Figure-1 Comorbidities

Table-II Severity of renal impairment

Renal Impairment	N (%)
Severe (eGFR < 30)	54 (12.9%)
Mild (eGFR 30-59.9)	114 (27.1%)
Moderate (eGFR >60)	252 (60%)

DISCUSSION

The study focused on the incidence of renal impairment in elderly patients, uncovering a significant link between advanced age, decreased renal function, and reductions in both physical and cognitive performance. Consistent with previous research, the findings highlighted that elderly individuals with renal failure generally exhibit impaired muscle strength, corroborated by studies measuring lower eGFR rates (14, 15). Notably, patients in this study presented an average SPPB score approximately one unit lower than those with an eGFR of at least 60 mL/min per 1.73 square meters, underlining the strong prognostic value of physical activity in this demographic (16, 17).

Further analysis revealed that physical function, as assessed by SPPB scores, serves as a critical indicator for assessing risk associated with falls and mortality among the elderly (18). This association assumes greater significance given the high prevalence of comorbidities within the studied population, which could potentially obscure the relationship between SPPB scores and eGFR (19). Moreover, the predictive value of the SPPB in identifying risks of functional decline and falls, often exacerbated by other medical conditions such as arthritis and Parkinson's disease, underscores its utility in clinical assessments (20, 21).

Sarcopenia, characterized by a loss of muscle mass and strength, was markedly prevalent among the study's participants and was strongly correlated with renal impairment (24). This condition, coupled with elevated inflammatory markers such as interleukin-6, which are linked to the onset of immobility and disability in the elderly, provides a mechanistic explanation for the observed decline in physical activity among patients with CKD (25). Additionally, anemia was identified as another significant factor adversely affecting physical performance, manifested through diminished SPPB scores, handgrip strength, and knee extension (27, 28).

While the study robustly elucidates the multifaceted relationship between renal function and physical performance in the elderly, certain limitations are acknowledged. The cross-sectional nature of the study limits the ability to infer causal relationships between observed variables. Moreover, while the study controlled for various confounders, the potential for unmeasured variables to influence outcomes remains (25).

In conclusion, the intricate interplay between renal impairment, sarcopenia, and systemic inflammation illustrates the complex pathways through which CKD contributes to physical decline in the elderly. This study not only adds to the body of evidence supporting the use of SPPB scores in the clinical assessment of elderly patients with renal impairment but also highlights the need for integrated care approaches that address the multifactorial nature of disability in this vulnerable population. Further longitudinal studies are warranted to explore these relationships over time, potentially guiding more effective interventions aimed at improving quality of life for elderly patients with CKD (18).

CONCLUSION

The study demonstrated a significant correlation between advancing age and renal failure, with consequential declines in physical and cognitive performance among the elderly. It is evident that older individuals with renal impairment experience marked reductions in muscle strength. These findings underscore the importance of incorporating comprehensive geriatric and renal assessments in the routine care of elderly patients. Addressing renal health proactively could mitigate the impact of CKD on physical and cognitive functions, thereby enhancing quality of life. Further research is needed to develop targeted interventions that can effectively slow the progression of renal impairment and its associated declines in elderly populations.

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