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RESEARCH ARTICLE

Assessing Physical Functioning and Activity in Patients with Chronic Kidney Disease

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Abstract: Chronic Kidney Disease (CKD) is a growing global health problem that significantly impacts patients quality of life and physical functioning. This cross-sectional study aimed to assess the physical functioning and activity levels of CKD patients using the Physical Functioning (PF-10) subscale of the Short Form-36 (SF-36) questionnaire. A total of 100 patients diagnosed with CKD, end-stage renal disease (ESRD), and those undergoing dialysis were enrolled in the study. The results showed that 60% of patients had limited physical activity, 13% had mild physical activity, and 27% had good physical activity. Patients with CKD stages 4 and 5, undergoing hemodialysis, and having hypertension below 60 years of age were more likely to have limited physical functioning. The findings suggest that CKD progression is associated with reduced physical activity, and appropriate awareness through patient education and counseling by healthcare professionals can enhance patients' health-related quality of life. This study highlights the importance of regular assessment of physical functioning in CKD patients and the need for interventions to improve their physical activity levels and overall well-being.

Keywords: Chronic Kidney Disease; Physical Functioning; SF-36 Questionnaire; Quality of Life; Patient Education.

1. Introduction

Chronic Kidney Disease (CKD) is a global health problem with increasing prevalence and a significant burden on healthcare systems worldwide [1]. CKD is defined as kidney damage or a glomerular filtration rate (GFR) <60 ml/min/1.73 m² for 3 months or more, irrespective of cause [2]. It is a major source of physiological distress and is associated with cardiovascular diseases (as shown in Figure 1), resulting in substantial morbidity and mortality [3]. According to the global burden of disease study, CKD was ranked 18th in the list of causes of total number of global deaths in 2010 [4]. Physical functioning refers to an individual's ability to perform activities of daily living (ADLs) and is a crucial aspect of quality of life in CKD patients [5]. Reduced exercise capacity has been shown to be a strong predictor of survival among ambulatory patients with End-Stage Renal Disease (ESRD) [6]. This is important since a reduction in physical function is not exclusive to hemodialysis patients but has also been demonstrated in patients prior to requiring Renal Replacement Therapy (RRT) [7].

The Short Form-36 (SF-36) is a widely used standardized self-report measure of functional health and well-being [8]. It consists of eight scales, including the Physical Functioning (PF-10) subscale, which assesses an individual's ability to perform various physical activities [9]. Regular assessments of physical capacity using such tools can help kidney health providers identify patients at risk of adverse health-related outcomes that contribute to functional disability [10]. Despite the growing evidence of the impact of CKD on physical functioning, there is limited research on the assessment of physical activity levels in CKD patients using standardized questionnaires. This study aims to address this gap by examining the physical functioning and activity levels of CKD patients using the PF-10 subscale of the SF-36 questionnaire. The findings of this study can inform the development of interventions to improve physical activity and overall quality of life in CKD patients [11].

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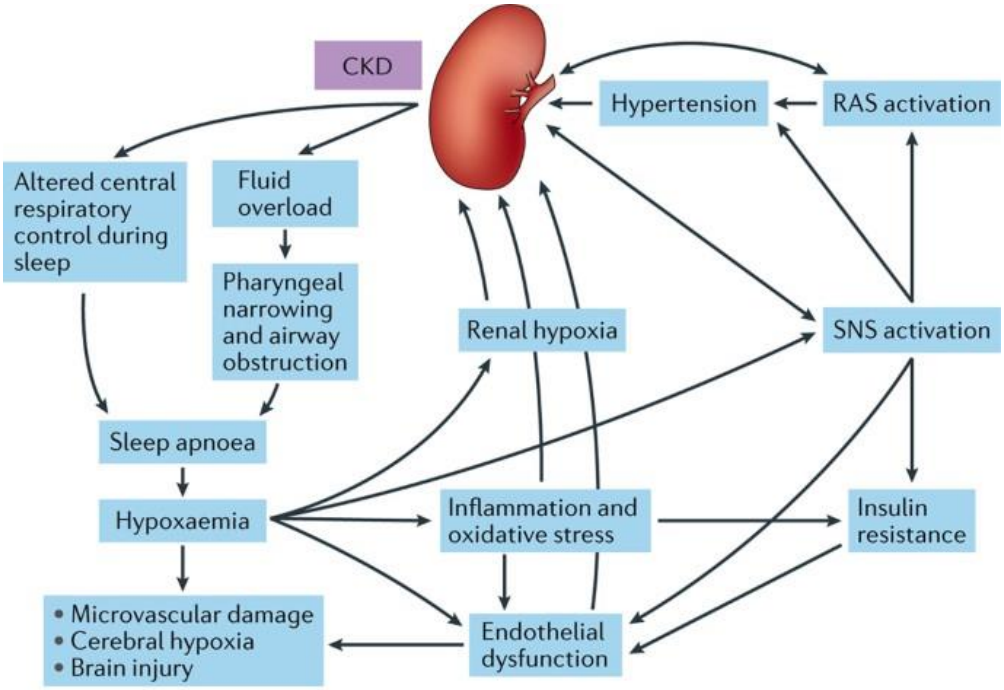

Figure 1. Complications of Chronic Kidney Disease

2. Materials and methods

2.1. Study design and setting

This cross-sectional study was conducted in the Nephrology ward of a tertiary care hospital. The study duration was six months, and a total of 100 patients diagnosed with chronic kidney disease (CKD), end-stage renal disease (ESRD), and those undergoing dialysis were enrolled.

2.2. Inclusion criteria and exclusion criteria

Patients above 18 years of age, diagnosed with CKD, ESRD, and those undergoing dialysis were included in the study. Patients with physical impossibilities (fractures and trauma conditions) and those with musculoskeletal disorders were excluded.

2.3. Data collection

Patient demographic details were collected using a structured form, which included information on age, gender, CKD staging, social history, past medical history of CKD, and treatment options. The Physical Functioning (PF-10) subscale of the Short Form-36 (SF-36) questionnaire was used to assess the physical activity levels of the patients [12]. The PF-10 consists of 10 items that evaluate the extent to which an individual's health limits their ability to perform various physical activities, such as climbing stairs, walking, and carrying groceries [13].

The questionnaire was administered to the patients by trained research assistants, and the patients were provided with a patient information leaflet explaining the purpose and importance of the study. The questionnaire was completed by the patients within five minutes, and the research assistants were available to clarify any doubts or concerns

2.4. Scoring and interpretation

The PF-10 subscale scores were calculated according to the standard scoring algorithm [14]. The scores ranged from 0 to 100, with higher scores indicating better physical functioning. The scores were categorized into three groups: limited physical activity (0-0.6), mild physical activity (0.7-1.3), and good physical activity (1.4-2.0).

2.5. Statistical analysis

Data on continuous variables were summarized as descriptive statistics, including mean and standard deviation. Categorical data were presented as number and percentage. The association between physical activity levels and patient demographic variables, such

as age, gender, CKD staging, and comorbidities, was assessed using chi-square tests. Results with $p<0.05$ were considered statistically significant. The obtained results were presented in tabular and graphical forms using Microsoft Word and Excel.

2.6. Ethical considerations

The study protocol was approved by the Institutional Ethics Committee, and informed consent was obtained from all the participants. The study was conducted in accordance with the principles of the Declaration of Helsinki [15]. Patients were assured of the confidentiality of their data, and their participation was voluntary. They were informed of their right to withdraw from the study at any time without any consequences on their medical care.

3. Results and discussion

3.1. Patient demographic characteristics

A total of 100 patients with CKD were included in the study, of which 82 (82%) were male and 18 (18%) were female. The majority of the patients (31%) were in the age group of 41-50 years, followed by 23% in the 51-60 years age group.

Table 1. Patient demographic data

Patient Demographic Details	n=100	n (%)
Age		
>60 years	75	75
<60 years	25	25
Gender		
Male	82	82
Female	18	18
CKD Staging		
Stage-1	11	11
Stage-2	15	15
Stage-3	23	23
Stage-4	22	22
Stage-5	25	25
ESRD	4	4
Social history		
Smoker	6	6
Alcoholic	5	5
Non-alcoholic	29	29
Ex-alcoholic	60	60
Past medical history of CKD		
Yes	76	76
No	36	36
Treatment Options		
Medications	100	100
Haemodialysis	48	48
Peritoneal dialysis	5	5

The distribution of patients according to CKD staging was as follows: Stage-1 (11%), Stage-2 (15%), Stage-3 (23%), Stage-4 (22%), Stage-5 (25%), and ESRD (4%). Regarding social history, 6% of the patients were smokers, 5% were alcoholic, 29% were non-alcoholic, and 60% were ex-alcoholic. A significant proportion of the patients (76%) had a past medical history of CKD. All the patients (100%) were on medications, while 48% were undergoing hemodialysis and 5% were on peritoneal dialysis (Table 1)

3.2. Physical activity assessment

The physical activity assessment using the PF-10 subscale revealed that 60% of the patients had limited physical activity (score range: 0-0.6), 13% had mild physical activity (score range: 0.7-1.3), and 27% had good physical activity (score range: 1.4-2.0) (Table 2).

Table 2. Results of physical activity assessment

Physical activity assessment	Frequency	Percentage
0-0.6	60	60%
0.7-1.3	13	13%
1.4-2.0	27	27%

3.3. Correlation of physical activity with patient demographic data

The correlation analysis showed that patients with CKD Stage-4 and undergoing hemodialysis or peritoneal dialysis had limited physical activity (score range: 0-0.6). Patients with CKD Stage-5 and hypertension below 60 years of age had mild physical activity (score range: 0.7-1.3). Patients with CKD Stage-3, hypertension, and undergoing hemodialysis had good physical activity (score range: 1.4-2.0) (Table 3).

Table.3. Physical Activity Functioning Scoring Correlation with CKD Staging and Comorbidities

Sl. No	Physical activity scoring	Frequency	CKD STAGE	Frequency	Co-morbidities	Frequency
1.	Scoring Range 0-0.6	60	Stage-1	3	HTN	22
			Stage-2	11	DM	13
			Stage-3	14	HTN+DM	7
			Stage-4	15	CKD +DM	4
			Stage-5	14	-	-
			ESRD	3	-	-
2.	Scoring range0.7-1.3	13	Stage-1	3	HTN	4
			Stage-2	1	DM	3
			Stage-3	1	HTN+DM	2
			Stage-4	3	-	-
			Stage-5	4	-	-
			ESRD	1	-	-
3.	Scoring range1.4-2.0	27	Stage-1	5	HTN	12
			Stage-2	3	DM	3
			Stage-3	8	HTN+DM	7
			Stage-4	4	CKD+DM	2
			Stage-5	7	-	-
			ESRD	0	-	-

3.4. Discussion

This study assessed the physical functioning and activity levels of CKD patients using the PF-10 subscale of the SF-36 questionnaire. The results showed that a significant proportion of the patients (60%) had limited physical activity, while only 27% had good physical activity. These findings are consistent with previous studies that have reported reduced physical function and activity levels in CKD patients [16,17].

The correlation analysis revealed that patients with advanced CKD stages (Stage-4 and Stage-5) and those undergoing dialysis (hemodialysis or peritoneal dialysis) had limited physical activity. This finding highlights the impact of CKD progression on physical functioning and the need for early interventions to prevent further decline [18]. Patients with hypertension and CKD Stage-3 had better physical activity levels, suggesting that early management of comorbidities may help in maintaining physical function [19].

The study also found that the majority of the patients were male (82%) and in the age group of 41-60 years. This gender and age distribution is similar to that reported in other studies on CKD patients [20,21]. The high prevalence of past medical history of CKD (76%) and the use of medications (100%) and dialysis (53%) reflect the chronic nature of the disease and the need for long-term management [22].

The study has several strengths, including the use of a standardized and validated questionnaire (SF-36) for assessing physical functioning, the inclusion of patients with various CKD stages and treatment modalities, and the correlation analysis with patient demographic data. However, the study also has some limitations, such as the cross-sectional design, which precludes the establishment of causal relationships, and the relatively small sample size from a single center, which may limit the generalizability of the findings

4. Conclusion

In conclusion, this study demonstrates that a significant proportion of CKD patients have limited physical activity, which is associated with advanced CKD stages and the need for dialysis. The findings highlight the importance of regular assessment of physical functioning in CKD patients and the need for interventions to improve their physical activity levels and overall quality of life. Early management of comorbidities and patient education and counseling can play a crucial role in promoting physical activity and preventing further decline in physical function.

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