

Nutritional Status and Handgrip Strength in Dialysis And Non-Dialysis

Chronic Kidney Disease Patients – A Comparative Study

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Abstract

Protein-Energy Wasting (PEW) is associated with the high mortality rate in dialysis patients, and some PEW indicators, such as serum albumin value, Subjective Global Assessment (SGA) score, and Handgrip Strength (HGS), may determine mortality. The study aimed to associate the relationship between handgrip strength and nutritional status in non-dialysis chronic kidney disease patients and haemodialysis patients. The study enrolled 248 patients and grouped into dialysis and non dialysis CKD patients. The nutritional status of all patients in both groups was assessed using the Subjective Global Assessment Tool (SGA), and Handgrip Strength (HGS) was measured using a hand-held dynamometer. Baseline characteristics, laboratory data, HGS, SGA scores were examined to analyse the nutritional status among the study population. The prevalence of severe malnourishment was higher in the dialysis group (12%) when compared with non-dialysis group (3%). A significant association between subjective global assessment and handgrip strength was observed in both groups. Early diagnosis of malnutrition is a key for proper management and for a better outcome.

Keywords: Nutritional Status; Chronic Kidney Disease; Subjective Global Assessment; Hand Grip Strength; Dialysis Patients; Non - Dialysis Chronic Kidney Disease Patients

Background

Dialysis patients are depleted of protein and energy stores, although the amount of protein and energy lost may be due to inadequate nutrition or wasting [1-5]. Protein-energy wasting (PEW) syndrome was adopted by the International Society of Renal Nutrition and Metabolism (ISRNM) in 2009 as a term to describe protein and energy depletion in patients with end-stage kidney disease (ESKD) [6]. Nutritional status is assessed routinely in maintenance dialysis patients to detect PEW syndrome early and/or treat the syndrome. PEW markers have been found to predict severe morbidity and mortality in patients with ESRD [3,7].

In CKD, PEW, inflammation, and hormonal changes all play critical roles, and patients commonly manifest muscle atrophy, anorexia, abnormal energy expenditure, and metabolic changes [8-10]. These patients are likely to develop frailty, disability, and impaired muscle function due to a reduction in serum proteins and progressive loss of skeletal muscle due to PEW and inflammation [9,11,12].

Handgrip Strength (HGS) can be a reliable marker of muscular function, and its relationship with morbidity and mortality has been demonstrated among CKD patients, suggesting that HGS can be employed as a screening tool for CKD patients in clinical practice [12-15].

Thus, the aim of the study was to examine the relationship between handgrip strength and nutritional status in non-dialysis chronic kidney disease and hemodialysis patients.

Materials and Methods

An observational study carried out in Sri Ramachandra Hospital, Porur Chennai. The study included patients over 18 years of age, of both sexes, stages 3-5 of non-dialysis dependent CKD, who had been on HD for a minimum of three months and had no physical or cognitive limitations that prevented them from taking the HGS measurements. Informed consent was obtained from all study participants, and the Institution Ethics Committee of the Sri Ramachandra Medical college and Hospital approved the study.

Baseline characteristics including gender, age, basic kidney disease, viral status, weight, height, BMI, BSA and others co morbidity were collected. The dialysis parameters like dry weight, dialysis duration, frequency of dialysis, urine output, vascular access and Kt/v were collected from the irrespective medical records for hemodialysis patients. The basic kidney disease, stage of CKD, eGFR, was assessed for non-dialysis patients. Laboratory parameters like BUN, Serum Creatinine, Serum albumin, Hemoglobin, Calcium, phosphorus and TIBC was collected from their medical records. All patients from both the groups were assessed for their nutritional status using Subjective Global Assessment Tool (SGA) and the Handgrip Strength (HGS) was assessed by hand hold dynamometer. To measure the grip strength, the participants were reclined on bed with 90° elbow flexion and wrist at neutral position. In dialysis patients it was performed in non-fistula hand and dominant hand for the other group. The dynamometer was held for 3

seconds. The mean reading was taken into consideration after measuring the strength for about three times.

Results

CKD patients on maintenance haemodialysis and CKD patients who were not on dialysis participated in the study. A total of 248 patients were enrolled, with 124 patients not on dialysis and 124 patients on hemodialysis. Patients in the non-dialysis group were well-nourished 11 (9%), moderately malnourished 109 (88%), and severely malnourished 4 (3%). In a sample of 124 dialysis patients, 6 (5%) were adequately nourished, 103 (83%) were moderately malnourished, and 15 (12%) were

severely malnourished. The SGA was statistically significant with a p value of 0.018*, between the two groups (Graph 1). Among 124 non-dialysis patients, 44(36%) had normal handgrip strength and 80(64%) patients had low handgrip strength. Among 124 dialysis patients, 29(23%) had normal handgrip strength and 95 (77%) patients had low handgrip strength. The HGS was statistically significant among both the groups with the p value of 0.025*(Graph 2).

The data were then analyzed using Pearson correlation, to rule out the significant between the subjective global assessment, handgrip strength and demographic characteristics of the study population (Table 1).

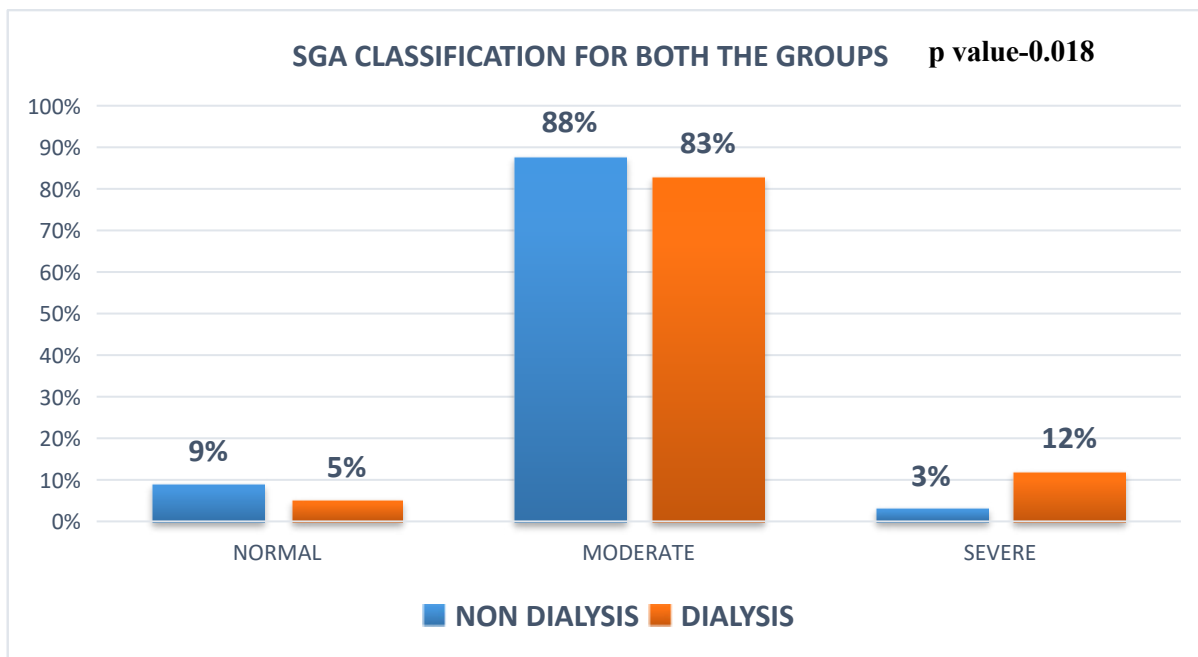


Figure 1: Representation of subjective global assessment for the study population.

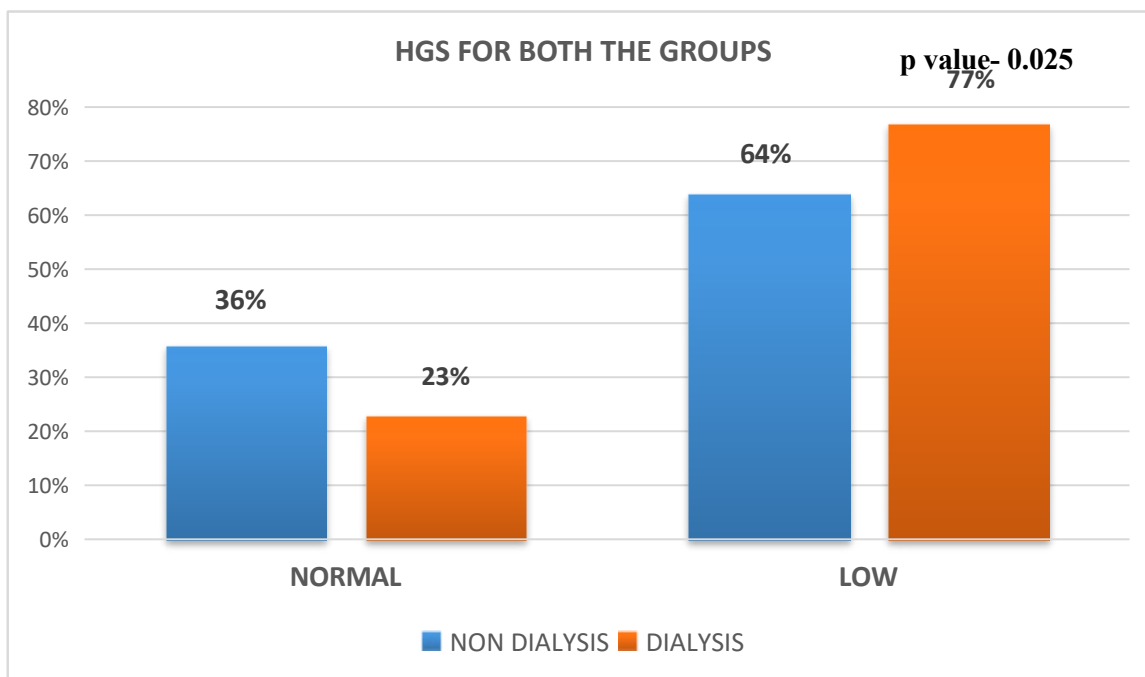


Figure 2: Representation of hand grip strength for the study population.

Table 1: Statically significant values-SGA AND HGS with demographic data for both groups.

VARIABLES	SGA	HGS
NON-DIALYSIS CKD PATIENTS		
eGFR	0.005**	0.012*
BSA	0.002**	0.563
BUN	0.014*	0.109
Sr.Cr	0.009**	0.018*
HEMODIALYSIS PATIENTS		
AGE	0.019	0.664
BMI	0.000**	0.001**
BSA	0.000**	0.853

Discussion

Malnutrition in dialysis patients is characterized by a loss of both protein and energy reserves, also termed as protein energy wasting (PEW) [16]. It's rather frequent among dialysis patients. SGA scores have been used to estimate the prevalence in several research, which range from 20 to 60% [17]. According to recent research from an Indian tertiary care hospital, the incidence is 32% [18].

Analytical techniques for diagnosing malnutrition have been widely utilized, including biochemical markers, anthropometry, malnutrition scores, and bioimpedance [19]. Albumin, haemoglobin, transferrin, and prealbumin are often used biochemical markers for detecting high-risk individuals, although they are masked by other variables such as inflammation, chronic liver disease, and iron deficiency anemia [20].

The study reveals there is a significant value between age and SGA (0.019*), whereas in a research paper by Angela Yee-Moon Wang, there was significant between HGS and age (0.015*) in dialysis patients [21]. In non-dialysis group, there was significant correlation of BUN (0.014*), Sr.Cr (0.009**), eGFR (0.005**) and BSA (0.002**) in accordance with SGA and HGS showed significant with eGFR(0.012*) and Sr.Cr (0.018*) , whereas in a research paper by Yu-Tzu Chang ,there was highly significant in BUN(<0.0001***) , Sr.Cr (<0.0001***) , eGFR (<0.0001***) .

In the current study, the relationship between the nutritional status and handgrip strength were compared in both the groups. The patients on maintenance hemodialysis had a higher prevalence of malnutrition and low handgrip strength than in various stages of CKD patients. Furthermore, there was significant association between SGA score and handgrip strength in both the groups.

Conclusion

Thereby, the current study proves that subjective global assessment and handgrip strength is a significant tool to assess the nutritional status in the chronic kidney disease patients. In accordance, usage of this tool is an cost effective and ease in determining the malnutrition. Timely screening of malnutrition is critical for effective management and a better outcome.

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