

COMPARISON OF JAMAR AND SMEDLEY DYNAMOMETERS FOR HANDGRIP STRENGTH MEASUREMENTS IN HAEMODIALYSIS PATIENTS

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INTRODUCTION

Studies have suggested handgrip strength (HGS) as a predictive nutritional marker and prognostic factor. The test is relatively economical and can be easily performed in most healthcare setting. Jamar dynamometer is known to be the ‘gold standard’ for HGS measurement. This study aims to assess inter-instrument reliability and validity when comparing Smedley to Jamar dynamometers for HGS measurement in haemodialysis (HD) patients.

METHODS

All patients who attended pre-placement clinic at The National Kidney Foundation from October 2017 to January 2018 were included in the study. Dietitian assessed patients using both Jamar Hydraulic Hand Dynamometer (Jamar) and Digital Smedley Spring Hand Dynamometer (Smedley). Patients’ demography were collected during dietitian’s assessment, including handedness. Patients who were able to follow the standardized protocol were included in the study. For each device, three measurements were taken for each hand alternatively to obtain the mean value in kilograms (kg). There were interval time between inter-instrument assessments. Data were analyzed using Bland Altman plot to assess agreement and linear regression to confirm the agreement between two instruments. P-value <0.05 was used for statistical significance.

RESULTS

114 haemodialysis patients were included in the study. 60.5% were males and 69.3% were aged ≥60 years. 73.7% are diabetics. 91.2% have right hand as dominant hand (DH). The means using Jamar are DH 17.9±7.3kg and non-dominant hand (NDH) 15.6±7.0kg, whereas the means using Smedley are DH 17.6±6.8kg and NDH 15.7±6.3kg. There are no statistical significant differences between the means of the two dynamometers used on both hands (DH, p=0.32; NDH, p=0.63). HGS measurement for both devices were strongly correlated for DH (r=0.89) and NDH (r = 0.88). There is a significant agreement of HGS measurement between the two instruments on DH (R²=0.006, p>0.05) but not on NDH (R²=0.038, p=0.029). When stratified by gender and age groups, there are significant agreements between the two instruments in male patients regardless of age group and handedness (DH: aged ≥60 years R²=0.021, p>0.05; aged <60 years R²=0.048, p>0.05; NDH: aged ≥60 years R²=0.024, p>0.05; aged <60 years R²=0.036, p>0.05). The significant agreements between the two instruments are only found in female patients aged ≥60 years regardless of handedness (DH: aged ≥60 years R²=0.022, p>0.05; NDH: aged ≥60 years R²=0.030, p>0.05).

Figure 1 (a&b): Associations of HGS measurement between Jamar and Smedley dynamometers in DH and NDH

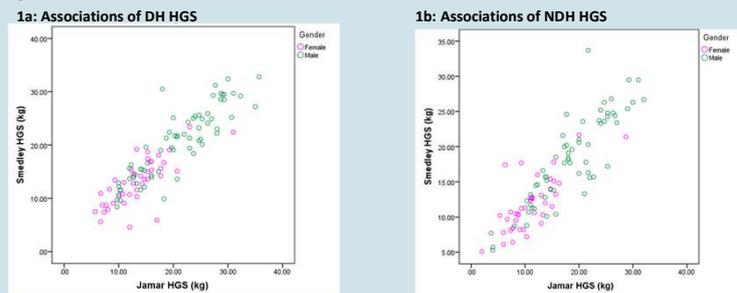
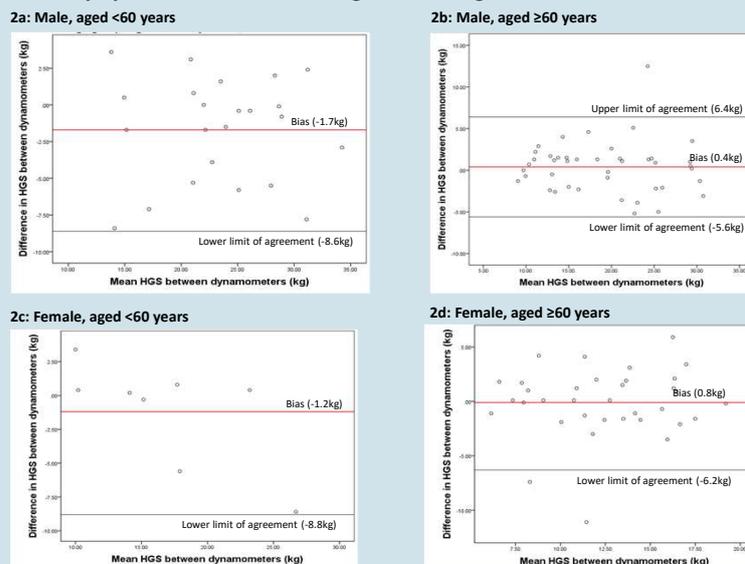


Figure 2 (a-d): Means and differences of HGS measurements between Jamar and Smedley dynamometers in DH with gender and age stratifications



CONCLUSION

The results show positive associations between Smedley dynamometer and Jamar dynamometer. There are significant agreements between Smedley dynamometer with gold standard on DH and NDH HGS in male HD patients regardless of age group but only in female HD patients aged ≥60 years. This may suggest that larger sample size may be needed to further investigate the agreement inter-instrumentally within the group of female HD patients due to its small sample size in this study.

EFFECTIVENESS OF ORAL NUTRITIONAL SUPPLEMENTATION ON DIALYSIS DAY AS EARLY NUTRITION INTERVENTION IN HAEMODIALYSIS PATIENTS

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1 INTRODUCTION

Malnutrition is common in haemodialysis (HD) patients that can be determined by the presence of a combination of biochemical abnormalities, changes in dietary intake and body weight. All of these individual components have been associated with poorer clinical outcomes in HD patients. Inadequate nutrients intake with poor appetite is probably the major cause of malnutrition and is mediated by various factors. Oral nutrition supplementation that increases energy and protein intake has been one of the recommendations to overcome this problem. Hence, we aimed to study the effectiveness of taking renal-specific oral nutrition supplement (RS-ONS) early in the course of malnutrition on nutritional parameters in HD patients.

2 METHODS

HD patients in The National Kidney Foundation (NKF) whose serum albumin (S-Alb) is <35g/L and normalized protein catabolic rate (nPCR) is <1g/kg/d at any one of the biochemical tests done between September 2015 and January 2017 were offered to initiate an early nutrition intervention by taking a serving of RS-ONS (1 packet Novasource Renal or 1 bottle Nepro HP) on dialysis day over a 6-month period. At each dialysis session, patients' RS-ONS consumption and compliance were recorded. Patients who terminated the dialysis and did not complete the given oral nutritional supplementation for 6-month duration during this study period were excluded. Throughout the study period, subjects received dietary counselling conducted by dietitians as standard nutrition care provided by NKF. Serial measurements of nutritional biochemical parameters including S-Alb, nPCR, pre-dialysis serum urea (pre-urea), pre-dialysis serum creatinine (pre-creat), serum phosphorous (PO4) and post-dialysis body weight were obtained before and after the intervention period. Paired sample T-test was performed and the significance threshold was set at 0.05.

3 RESULTS

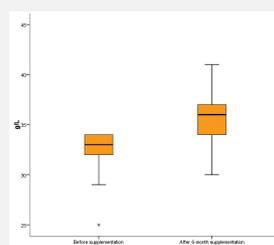
Total 162 patients included in the study (50% male, 75% aged ≥ 60 years, 56% Chinese, 70% diabetic and 69% underwent dialysis >1 year. 12% subjects was underweight (BMI<18.5kg/m²) whereas 40% subjects' weight were normal (BMI=18.5kg/m² to 22kg/m²). The average consumption rate of RS-ONS for subjects was 83.3%. After taking RS-ONS for 6 months, subjects' post dialysis weight showed improvement from 59.9±15.1kg to 60.3±15.1kg but insignificantly (p>0.05). Subjects' mean serum albumin and nPCR levels were both significantly increased from 32.5±1.8g/L and 0.78±0.14g/kg/d at baseline to 35.4±2.7g/L and 0.96±0.21g/kg/d at 6 months (p<0.05). Additionally, other biochemical parameters including pre-urea, pre-creat and PO4 also showed significant increment from 87.9±20.1mg/dL, 6.4±1.6mg/dL, 3.7±1.2mg/dL to 110.4±28.5mg/dL, 6.8±1.7mg/dL and 4.3±1.2mg/dL after subjects completed 6 months RS-ONS consumption (p<0.05).

Table 1: Patient Demographics

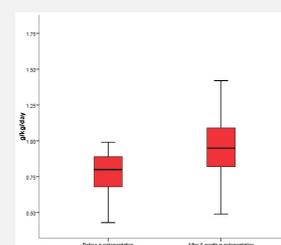
	n	Percentage (%)
Total	162	100
Gender		
Female	82	50
Male	80	50
Race		
Chinese	91	56
Malay	39	24
Indian	20	12
Other races	12	8
Diabetics		
Yes	114	70
No	48	30

Figure 1(a-d): Changes of biochemical parameters before and after supplementation

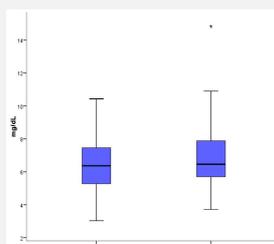
1a: Changes of Serum Albumin



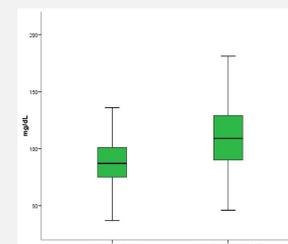
1b: Changes of Normalised Protein Catabolic Rate (nPCR)



1c: Changes of Pre-dialysis Serum Creatinine



1d: Changes of Pre-dialysis Serum Urea



4 CONCLUSION

RS-ONS consumption has shown as an effective early intervention to improve nutritional biochemical parameters of malnourished HD patients. However, there are limitations in this study including a pre-post design without a control group to prove the validity of the intervention effect and the total daily protein/energy intake of patients were not assessed. More studies are required to investigate the cost effectiveness and sustained benefits of oral nutritional supplementation after discontinuation.