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Association and Predictive Value of Handgrip Strength in Nutritional Status on Haemodialysis Patients

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Introduction

- **Malnutrition** is common in haemodialysis (HD) patients.
- Malnutrition was associated with **loss of muscle mass, muscle strength or both** which could affect patients' functional capacity and quality of life.
- Handgrip strength (HGS) is a simple, non-invasive and objective tool in assessing muscle strength.
- This study is to investigate the association and predictive value of HGS to nutritional status in HD patients.

Methodology

- Patients who attended pre-placement clinic at The National Kidney Foundation (NKF) from October 2017 to February 2018 were assessed by dietitian using Subjective Global Assessment (SGA).
- Jamar Hydraulic Hand Dynamamoter was used to assess patients' HGS.
- Patient was instructed to extend his arm fully in sitting position while gripping the dynamometer with maximum grip strength.
- Average HGS strength was determined over 3 measurements for each hand for patient who able to follow the standardized protocol.

Standardised
position during
hand grip strength
measurement



Jamar® Hydraulic Hand
Dynamometer

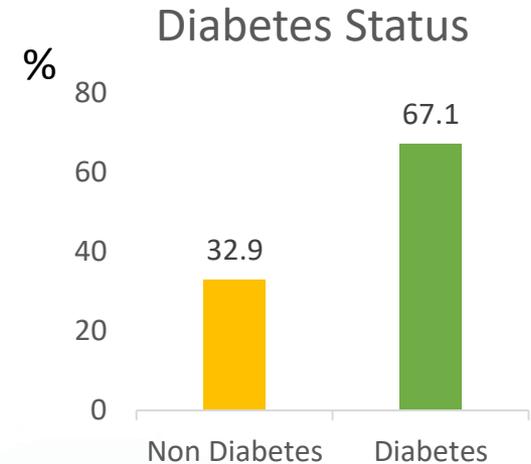
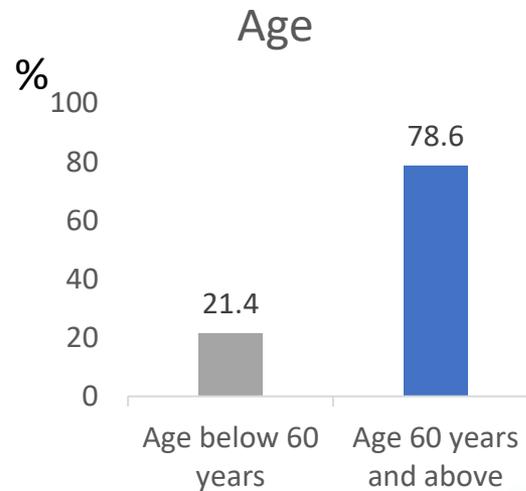
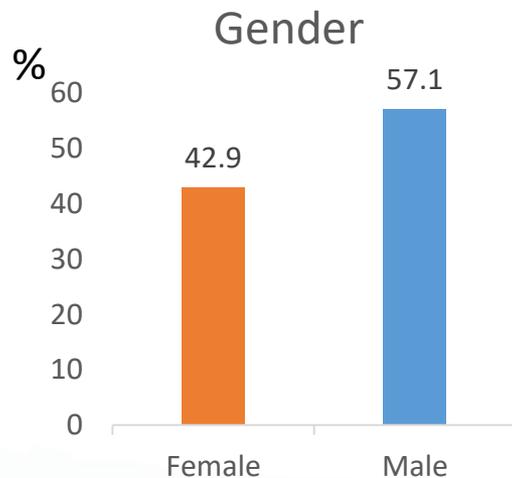


Methodology (cont.)

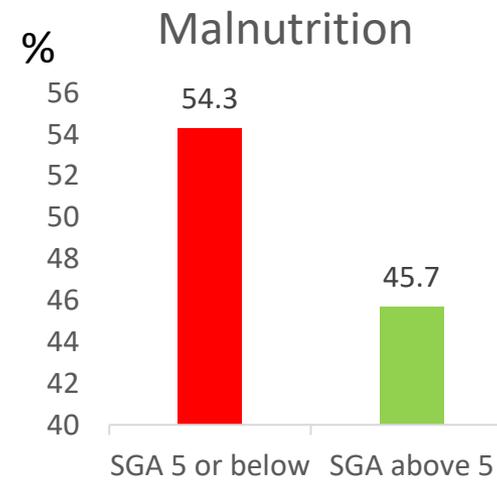
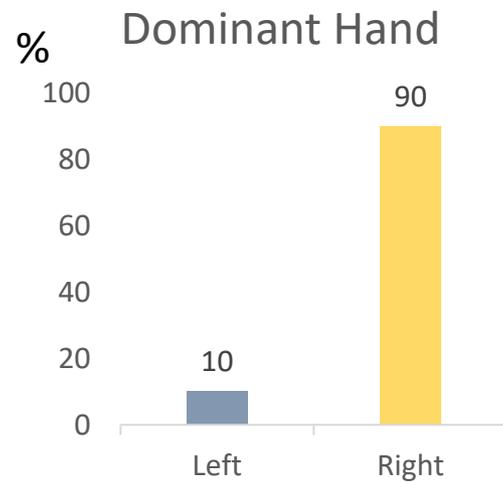
- Patient who started dialysis at NKF within the study period and had at least one laboratory result available were included in this study.
- Malnourished was defined as SGA 5 and below.
- The primary outcome of this study is the predictive value of HGS on nutritional status defined by SGA.
- Correlation, Independent t Test and Binary Logistic Regression were used in the analysis and results were considered significant when $p < .05$.

Patient profile

- A total of 70 patients were included in this study.
 - mean Body Mass Index (BMI) is 24.4 ± 5.8 kg/m².



Patient Profile

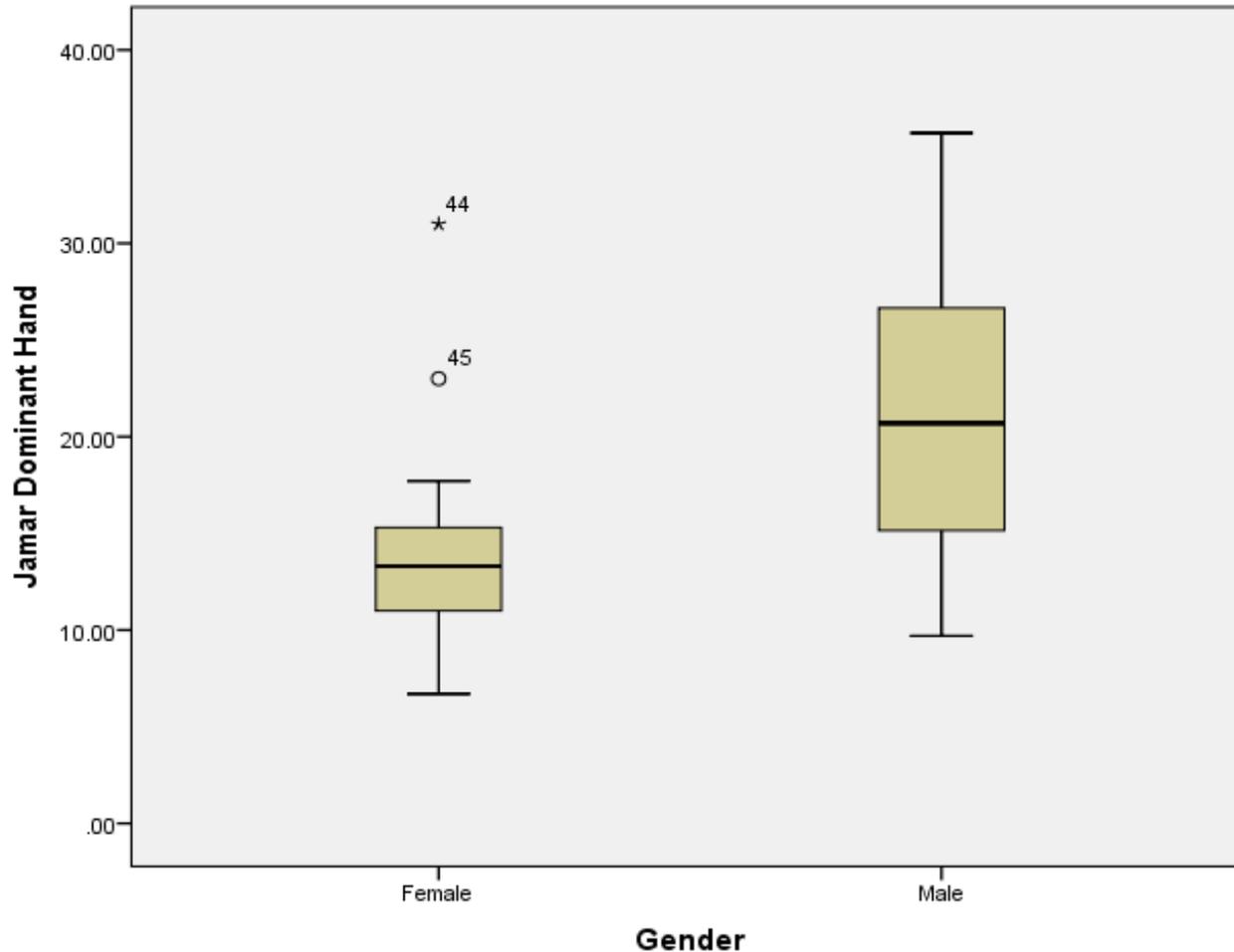


54.3% of the patient have malnutrition.

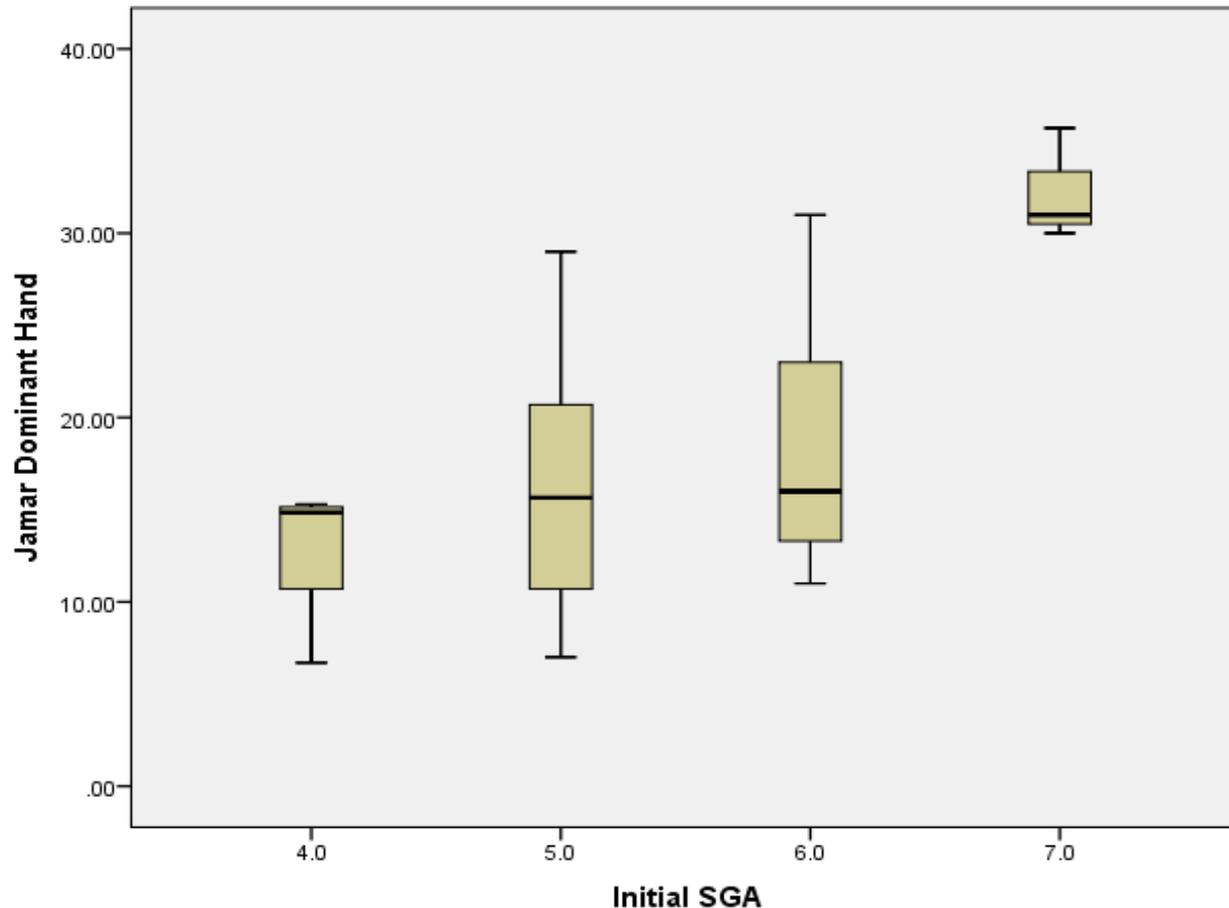
Result

- Mean hand grip strength
 - Dominant Hand 18.1 ± 7.0 kg
 - Non dominant hand 15.3 ± 6.7 kg
- HGS is significantly correlated to age, gender, BMI, serum albumin, pre dialysis creatinine, SGA and nutritional status.
- But no correlation to normalized protein catabolic rate (nPCR) and pre dialysis urea.

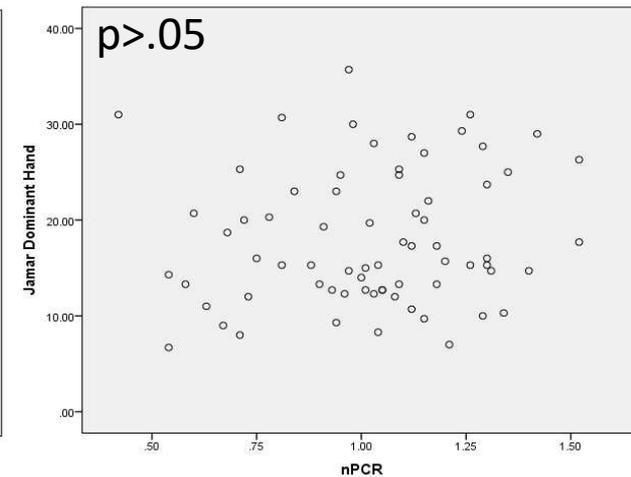
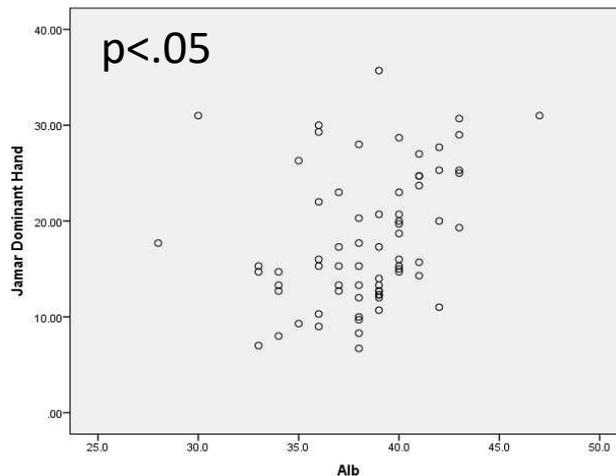
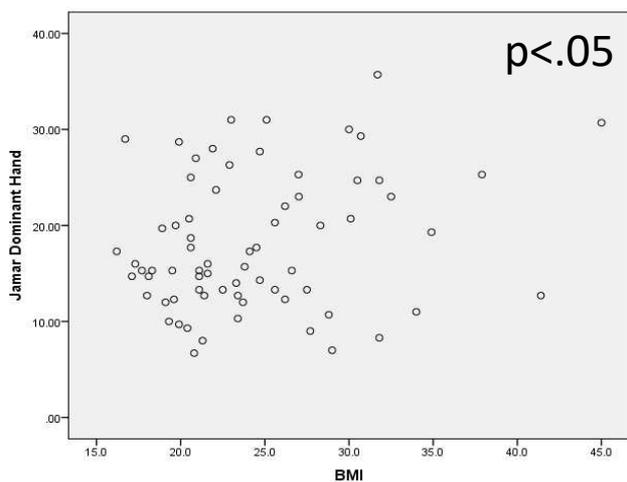
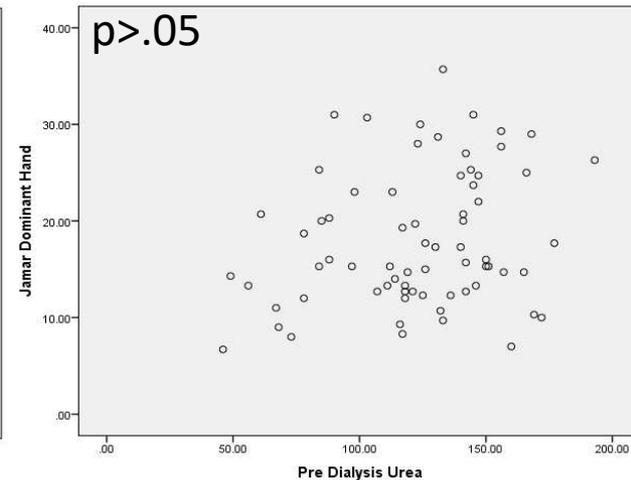
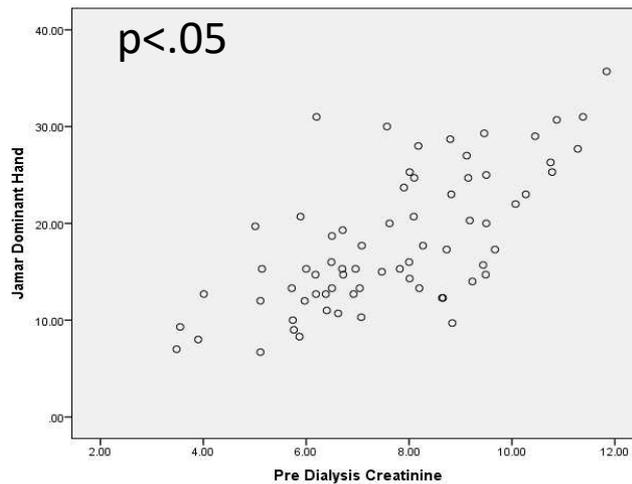
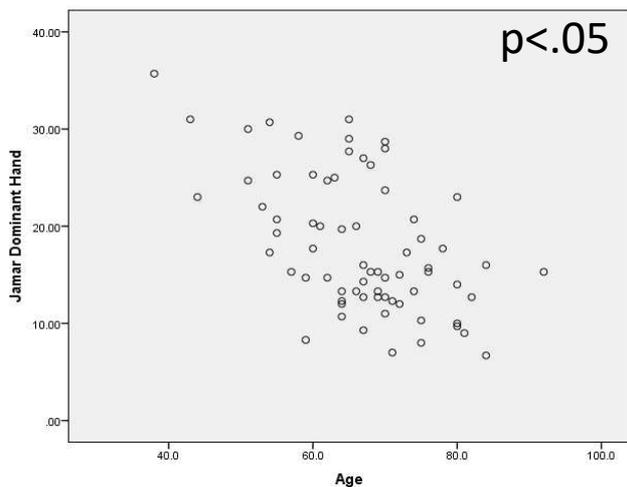
Hand Grip Strength on dominant hand based on gender



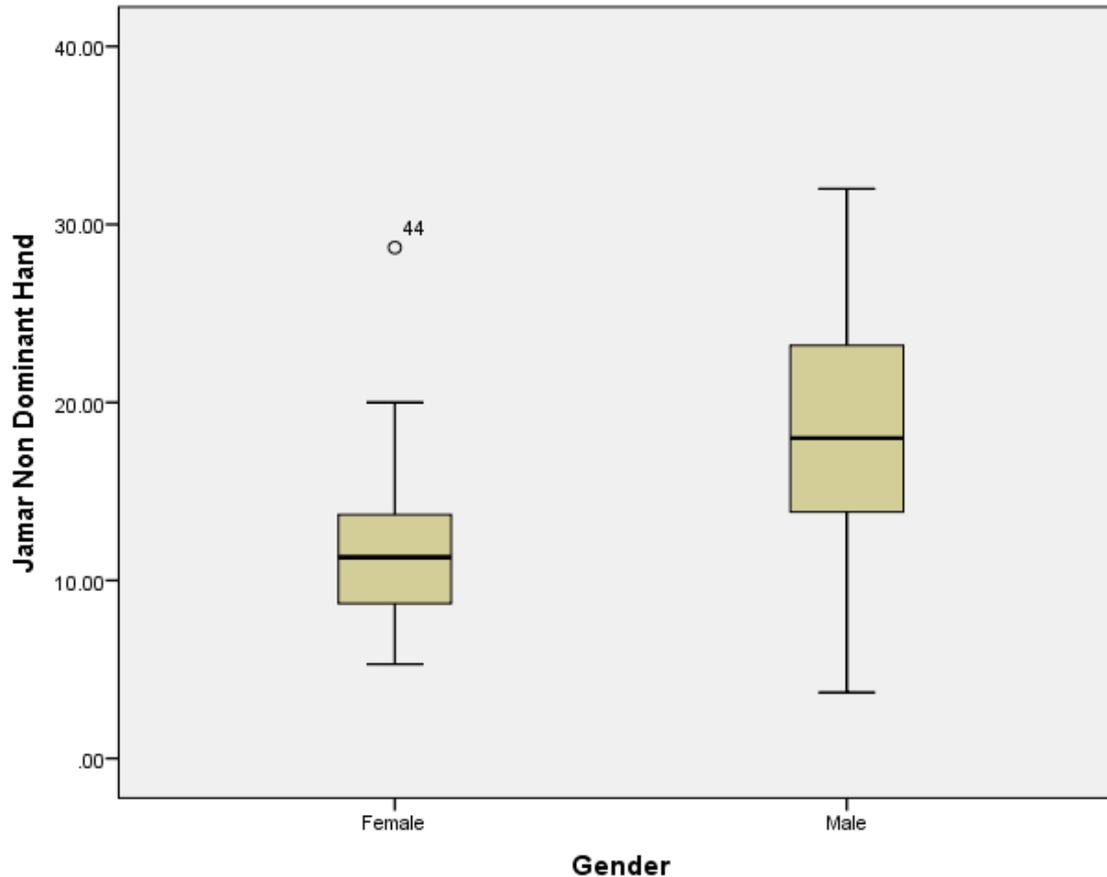
Hand Grip Strength on dominant hand based on SGA



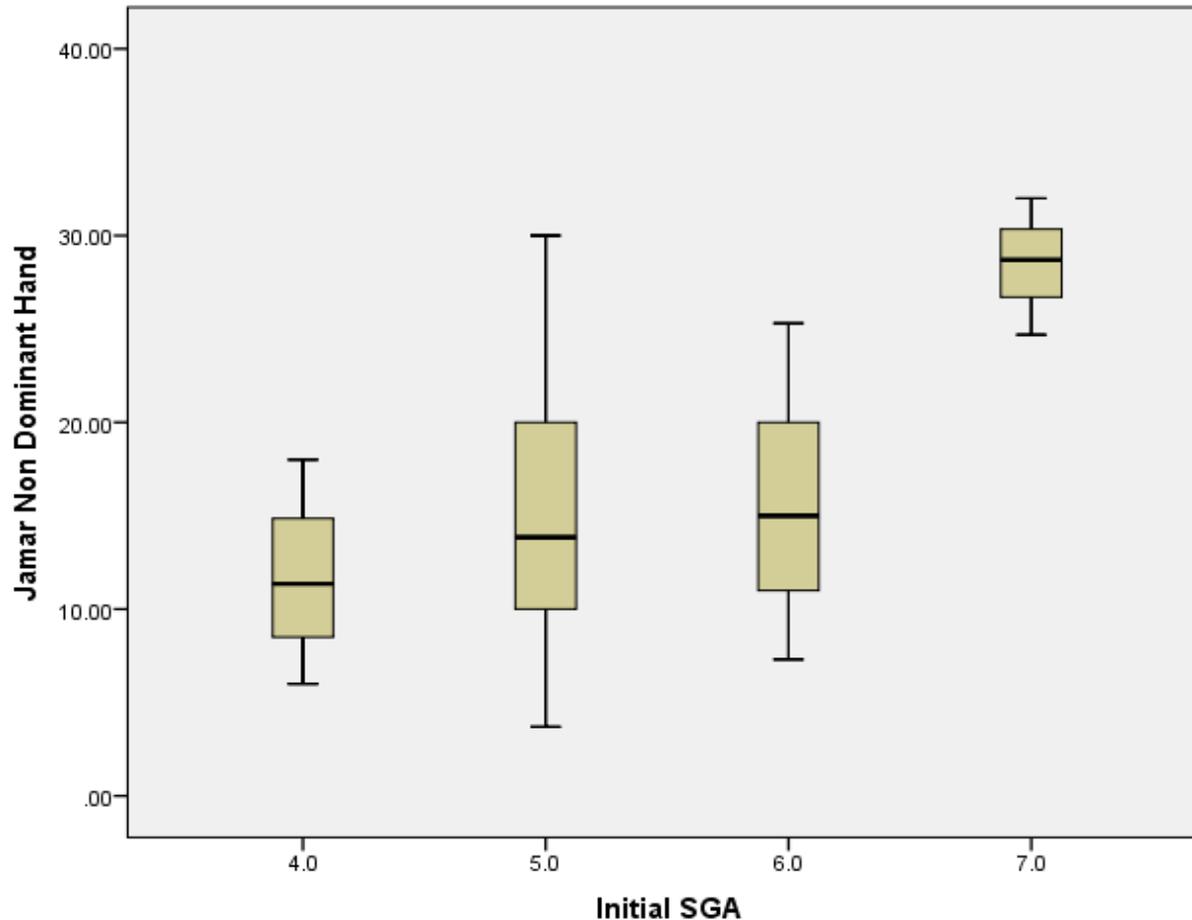
Correlation – Dominant Hand



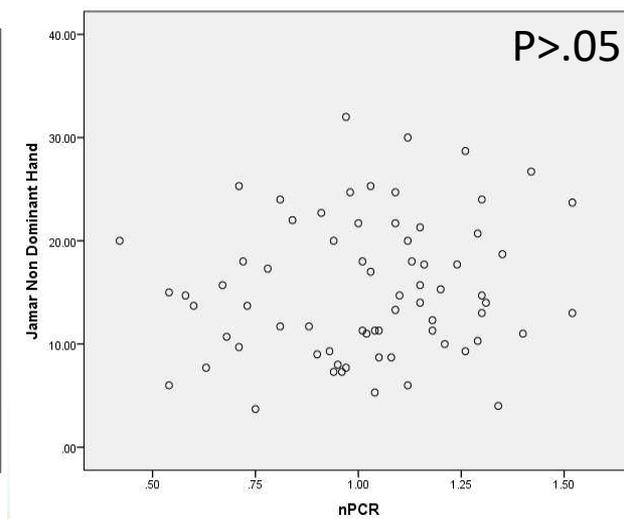
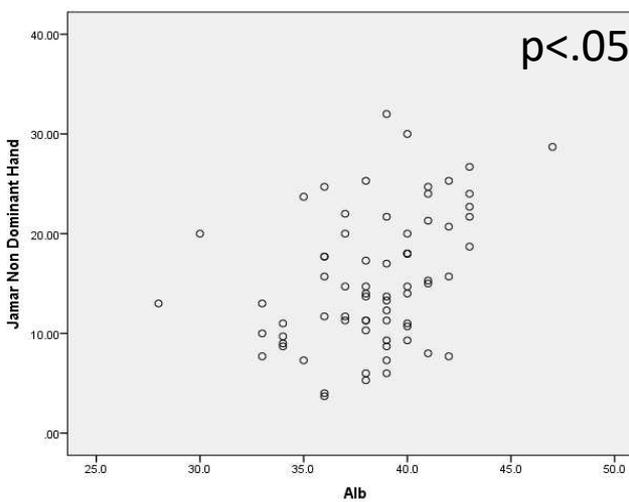
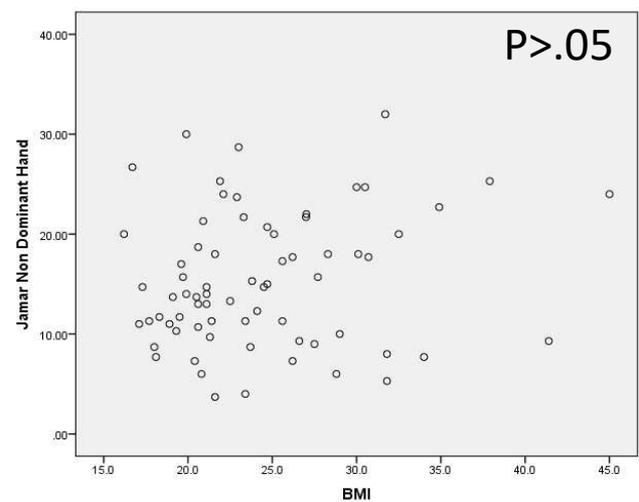
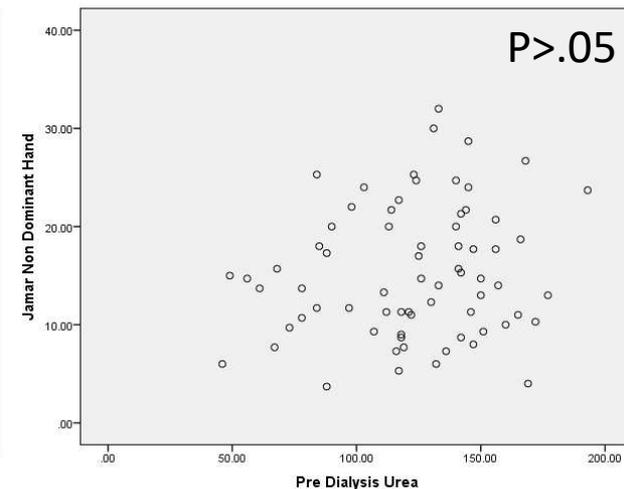
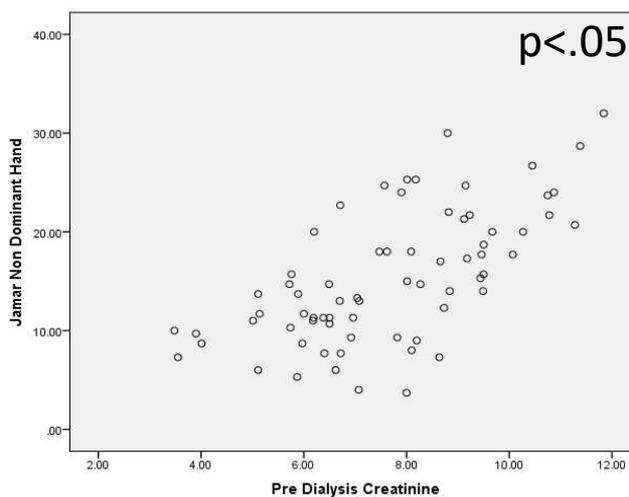
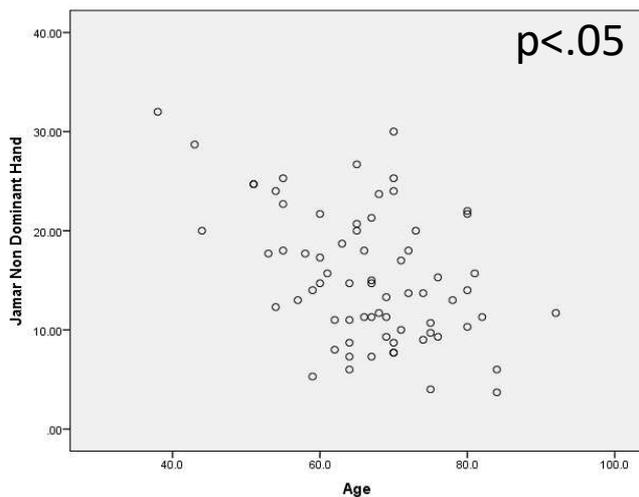
Hand Grip Strength on non dominant hand based on gender



Hand Grip Strength on non dominant hand based on SGA

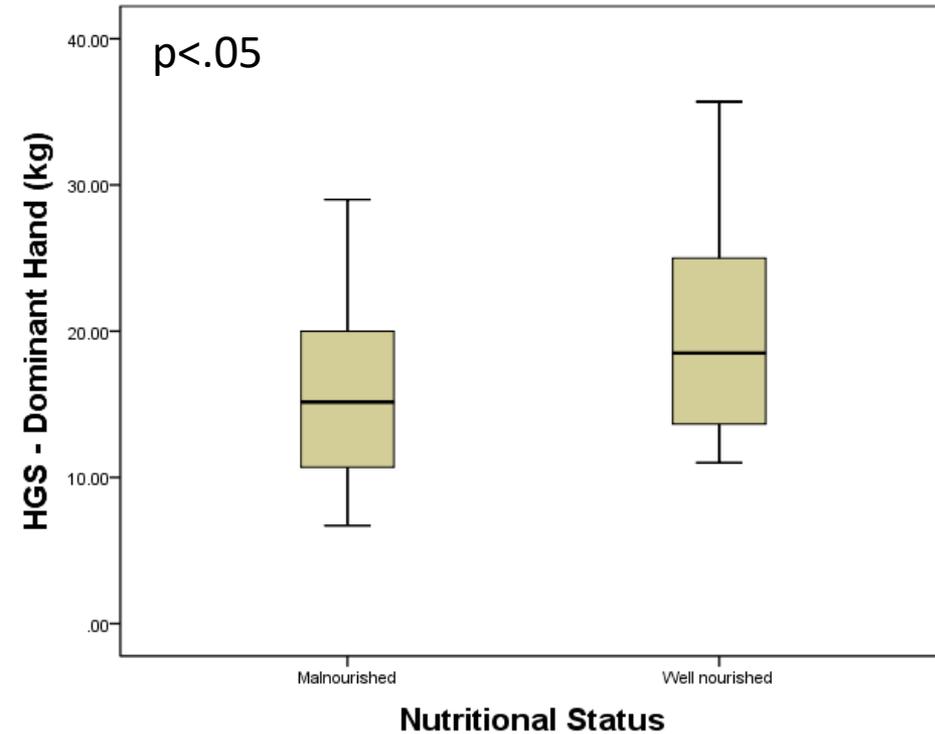


Correlation – Non Dominant Hand

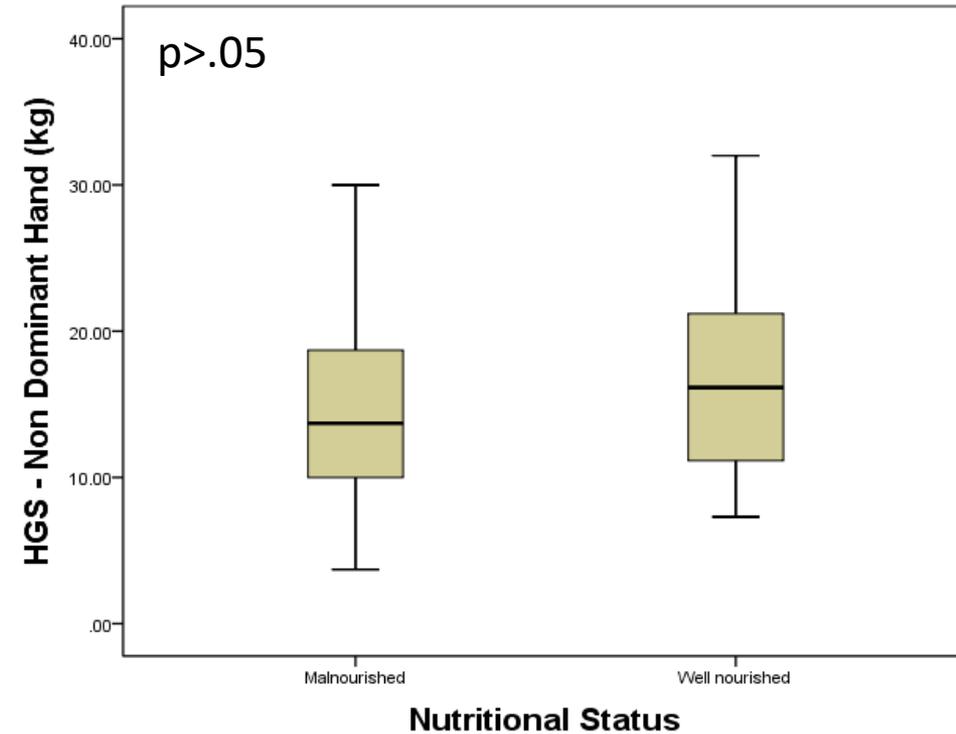


Correlation, r

	Dominant Hand	Non Dominant Hand
Age	-0.546 ^{**}	-0.455 ^{**}
Gender	0.535 ^{**}	0.494 ^{**}
Initial SGA	0.390 ^{**}	0.290 ^{**}
BMI	0.236 ^{**}	0.170
Alb	0.320 ^{**}	0.381 ^{**}
nPCR	0.125	0.127
Nutritional Status	-0.264 ^{**}	-0.155
Pre Dialysis Urea	0.233	0.160
Pre Dialysis Creatinine	0.682 ^{**}	0.650 ^{**}



- Malnourished patients had lower HGS (DH-HGS $16.4.6 \pm 6.5$ kg) than well nourished patients (DH-HGS 20.1 ± 7.1 kg).
- The mean HGS difference between group was 3.7 ± 1.6 kg ($p < .05$).



- Malnourished patients had lower HGS (Non-HD-HGS 14.4 ± 6.6 kg) than well nourished patients (Non-DH-HGS 16.5 ± 6.6 kg).
- The mean HGS difference between group was 2.1 ± 1.6 kg ($p > .05$).

Binary Linear Regression

- Using univariate model the DH-HGS and Non-DH-HGS were unable to predict nutritional status ($p > .05$).
- However, after controlling the potential confounders (age group, gender and BMI), DH-HGS was significant predictor of patient's nutritional status (17%, $p < .05$) but not in Non-DH-HGS ($p > 0.05$).

Stratified Mean (SD) HGS (kg)

Age group	Gender	N	Dominant Hand
< 60	Female	5	19.0 (8.5)
	Male	10	25.2 (6.3)
60 and above	Female	25	12.7 (3.0)
	Male	30	20.0 (6.4)

Stratified Mean (SD) HGS – weak grip strength (kg)

Age group	Gender	N	Dominant Hand	85% of normal
< 60	Female	5	19.0 (8.5)	10.5
	Male	10	25.2 (6.3)	18.9
60 and above	Female	25	12.7 (3.0)	9.7
	Male	30	20.0 (6.4)	13.6

- Klidjian et al 1980 propose 85% of normative value by age which is equivalent to 1 SD

Conclusion

- HGS on both hands are significantly correlated to nutritional markers.
- This study also suggested that HGS is able to predict nutritional status defined by SGA after controlling the potential confounders.
- However, further research with larger sample size is required to confirm the predictive value of HGS on early detection of malnutrition risk and develop the normative value for our HD population.

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