

## PREVALENCE OF MALNUTRITION AND ITS ASSOCIATED FACTORS AMONG HEMODIALYSIS ELDERLY IN SELECTED HEMODIALYSIS CENTRES, SELANGOR

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### ABSTRACT

**Background:** In Malaysia, the number of patients on dialysis increased from 59 to almost 15,000 patients and the largest new population is older patients' age 55 years. Most of the hemodialysis (HD) patient's (69%) intake fall behind the recommendations which was lower than 35 kcal/kg energy and 50% lower than 1.2 gram protein/kg. This study aimed to determine the association between socio-demographic factors, medical history, anthropometry data, dietary intake and QOL with malnutrition among HD elderly.

**Materials and Methods:** A total of 112 HD elderly (aged 60 years and above) were recruited from selected HD centers. Interview-based questionnaires were used to measure patients' socio-demographic, medical history, anthropometry data, dietary intake and QOL. The dietary intake was measured using 24-hour diet recall (non-HD day) and one day food record (HD day). KDQOL-36 consists of 3 parts with 36 questions to assess respondents QOL. The nutritional status was assessed by using SGA-DMS which divided into medical history and physical examination.

**Result:** Majority (45.5%) of the respondent had moderate malnourished, 30.4% were well nourished and 24.1% had severe malnutrition. The HD duration ( $p < 0.001$ ), phosphate level ( $p = 0.010$ ) and the BMI ( $p = 0.010$ ) were significantly associated with SGA-DMS. The energy and protein intake ( $p < 0.005$ ) and QOL ( $p < 0.001$ ) had negative correlation with malnutrition.

**Conclusion:** Malnutrition among HD elderly had correlation with BMI, dietary intake (energy and protein) and QOL. An intervention towards diet and lifestyle is recommended to improve the nutritional status and the QOL of the HD elderly.

**Keywords:** Malnutrition, hemodialysis, elderly, dietary intake, quality of life

## 1.0 Introduction

In Malaysia, from 1980 to 2006 the number of patients on dialysis was increased from 59 to almost 15,000 dialysis patients and it had been a fast growth among elderly patients at the age of 55 years and above which was largest population of new dialysis patient (Malaysian dialysis registry of the National Renal Registry, 2008). Malnutrition can be defined as undernutrition which is nutritional deficit and over-nutrition which was excessive nutrition (American Heart Association, 2017). Adequate nutrition is compulsory to prevent protein energy malnutrition among patients with HD (Janardhan et al., 2011). In another country, 6 to 8% of all dialysis patients had severe malnutrition while another one-third of the patients had mild to moderate malnutrition & malnutrition which present 10-30% among dialysis elderly was associated with increased in the rate of morbidity and mortality (Lacquaniti et al., 2017). Studies in Malaysia, 73% of the dialysis patients were moderately malnourished and the prevalence of moderate malnutrition was equally high between CAPD and HD patients (Harvinder et al., 2013). 69% of the HD patients intake fall behind the recommendations in which they received lower than 35 kcal/kg energy and 50% eats lower than 1.2 gram protein/kg (Jahromi et al., 2010). Higher Malnutrition Inflammation Scores (MIS) among patients with severe malnutrition and the Quality of life because patients that were severely-malnourished showed lower physical and mental scored (Sohrabi et al., 2015).

## 2.0 Materials and Methods

A cross-sectional study was conducted with HD elderly to determine the association between socio-demographic factors, medical history, dietary intake and QOL with malnutrition from in Selangor. A total of 112 subjects were recruited to become a respondent from a selected Haemodialysis Centers in Selangor from Petaling and Hulu Langat districts. Subjects were chosen by using purposive sampling method and all haemodialysis elderly who were above 60 years and fulfilled the inclusion criteria will be selected to be recruited in this study with informed consent. In this study, the number of HD elderly that were tested for pre-test questionnaire was 20 respondents. The data collection process was conducted for 2 months and the questionnaires consist of English and Malay version. The questionnaire was filled by the researcher using interviewed method except for the one-day food record for haemodialysis day which were filled by the respondent at home.

**Malnutrition-** The nutritional status of the patients will be assessed by using SGA-Dialysis Malnutrition Score (DMS). The SGA-Dialysis Malnutrition Score (DMS) consist of two parts which is medical history of the patient and physical examination. These two parts consists of seven elements which are weight change, dietary intake, gastrointestinal symptoms, functional capacity, co-morbidity, fat stores or subcutaneous fat and signs of muscle wasting. Each of these components from the first part (patients related medical history) has a score from 1 (none) to 5 (very severe). Meanwhile, for the second part (physical examination) the score will be 1 (well nourished), 3 (mild to moderate malnutrition) and 5 (severe malnutrition). Thus, the total score will be in between 7 to 35 which shows, lower score is normal nutritional status while the highest is severely malnourished.

**Socio-demography-** The information of the patients' socio-demography will be obtained directly from the patients using interviewing method. All the information such as age, gender, date of birth, age, ethnicity (Chinese, Malays, Indian and other), marital status, education level (no formal education, primary school, secondary school and tertiary education), employment status and household income (monthly) were required.

**Medical history-** Medical history of the patients will be obtain from patients medical or dialysis record and also by interviewing the patient the information such as type of the vascular access, duration of HD (Months/Years) were obtained. Other than that, all the laboratory data (Alb, Haemoglobin,, Phosphate, Potassium,) were required. Staff and nurses in charge will be refer for any uncertainties as well as the patients.

**Anthropometry data-** Anthropometry data will be assessed by measuring the height (m) and weight of the HD elderly patients (pre-dialysis weight, post-dialysis weight, dry weight) and Body Mass Index. The weight of the patients was measure before and after the HD session using weighing scales and the height was measure by using SECA213 portable stadiometre. In order the get the subjects BMI, weight and height need to be measured.

**Dietary Intake-** The dietary intake of the patients will be assessed by using a 24-hour diet recall and food diary. The patients will be interviewed on 24-hour diet recall (non-dialysis day) and patients need to give their one day food record (dialysis day). The patients need to be as specific as possible when describing the food items eaten (method of cooking, estimated amount of food eaten, brand names if possible). The household measurement (cups, tablespoon, teaspoon, slices or bowl) is provided with the food record form. For the patients who could not understand the instructions or need helps to read can get assistance from family members. Both 24-hour diet recall and food record forms required patients to give information on the meal time (breakfast, morning tea, lunch, afternoon tea, dinner and supper), food items, ingredients, estimated amount, brand name, method of preparation and others fluid or food in between meals.

**Quality-of Life-** QOL among HD elderly will be measure using Kidney Disease QOL 36 (KDQOL-36). The Kidney Disease QOL 36 (KDQOL-36) consists of 3 parts with 36 questions. Based on all the 36 question shown that, the first 12 items are SF-12 while items 13-16 are the burden of kidney disease, question 17-28 are symptoms or problems of the kidney disease and lastly items 29-36 are effects of kidney disease. The KDQOL-36 for the first part which is the wide variety of questions about your health and life which include the health status, health limitation of activities, result of the regular daily physical activities health, emotional problems, interference of work, analysis of feelings, analysis of physical health or emotional problems that interfered social activities. For the second part is question about their kidney disease which include question about burden of the kidney disease towards their life, symptoms or problems and the scales effects. The last part of this section is the effects of kidney disease on daily life.

**Statistical Analysis-** The statistical analyses will be performed using SPSS software version 24. The descriptive statistics will be analysed using multivariate analysis including means, ranges standard deviation and frequencies were used to present the respondent's socio-demography, medical history, anthropometry data, energy and nutrient intakes, QOL scores and SGA-DMS of the HD patients. The categorical variable will be presented as frequencies and continuous variable will be presented as percentage. The Pearson correlation is used to

analysed the correlation between the variables and Chi Square test is used to test the association between variables to the level of statistical significant of  $p < 0.05$ .

### 3.0 Result

#### 3.1 Socio-demography

**Table 4.1** Socio-demographic characteristics of the HD elderly in HD centres in Selangor (n=112)

Characteristics	Mean $\pm$ SD			t-value	p-value
	Male (n=62)	Female (n=50)	Total (n=112)		
Age	67.06 $\pm$ 7.19	67.72 $\pm$ 6.73	67.36 $\pm$ 6.96	0.494	0.623
Characteristics	Male (n=62)	Female (n=50)	Total (n=112)	$\chi^2$	p
Ethnicity				3.660	0.160
Malay	34 (54.8)	36 (72.0)	70 (62.5)		
Chinese	18 (29.0)	8 (16.0)	26 (23.2)		
Indian	10 (16.1)	6 (12.0)	16 (14.3)		
Marital Status				4.957	0.084
Single	4 (6.5)	1 (2.0)	5 (4.5)		
Married	51 (82.3)	36 (72.0)	87 (77.7)		
Divorced/widowed	7 (11.3)	13 (26.0)	20 (17.9)		
Educational level				9.357	0.025
No formal education	5 (8.1)	9 (18.0)	14 (12.5)		
Primary school	11 (17.7)	18 (36.0)	29 (25.9)		
Secondary school	35 (56.5)	18 (36.0)	53 (47.3)		
Tertiary education	11 (17.7)	5 (10.0)	16 (14.3)		

As shown in Table 4.1, a total of 112 HD elderly with mean age of  $67.36 \pm 6.96$  were participate by being respondent in this study where 55.4% of the participant were male and another 44.6% were female. The most ethnicity of the subjects are Malay which are 62.5% and another 23.3% were Chinese, 13.2% Indians and there was no other ethnicity. Next, most of the subjects were married which was 77.7% from the total subjects and only 17.9% were widowed or divorce and most of the HD elderly had education.

#### 3.2 Medical History

Data on medical history is shown in table 4.2. The mean of the HD duration for the elderly were  $4.25 \pm 4.17$  years (51 months). As for the laboratory data, 22.3% of the HD elderly Alb level is at high level as compared to low level which is 14.3% and the others 63.4% is normal. Next, 61.6% of the HD elderly had highest percentage of the phosphate level and the other were normal and low. There are four categories for type of vascular access among HD elderly as shown in table 4.2. The mean percentage of type of vascular access was highest on AV fistula which was 72.3%.

**Table 4.2** Mean Percentage of the Medical History among HD elderly in HD centres in Selangor (n=112)

Characteristics	Mean $\pm$ SD			t-value	p-value
	Male (n=52)	Female (n=50)	Total (n=112)		
<b>Duration of HD (Months/Year)</b>	3.99 $\pm$ 4.47	4.50 $\pm$ 3.77	4.25 $\pm$ 4.17	-0.716	0.476
Characteristics	n(%)			$\chi^2$	p
	Male (n=52)	Female (n=50)	Total (n=112)		
<b>Laboratory Data</b>				6.160	0.046
<b>Alb</b>					
Low	5 (8.1)	11 (22)	16 (14.3)		
Normal	45 (72.6)	26 (52.0)	71 (63.4)		
High	12 (19.4)	13 (26.0)	25 (22.3)		
<b>Hb</b>				-	-
Low	31 (50.0)	25 (50.0)	67 (59.8)		
Normal	31 (50.0)	25 (50.0)	45 (40.2)		
<b>Phosphate</b>				3.854	0.146
Low	1 (1.6)	5 (10.0)	6 (5.4)		
Normal	21 (33.9)	16 (32.0)	37 (33.0)		
High	40 (64.5)	29 (58.0)	69 (61.6)		
<b>Potassium</b>				0.819	0.664
Low	1 (1.6)	0 (0.0)	1 (0.9)		
Normal	46 (74.2)	38 (76.0)	84 (75.0)		
High	15 (24.2)	12 (24.0)	27 (24.1)		
<b>Type of vascular access</b>				2.071	0.558
Arterioveous (AV) fistula	45 (72.6)	36 (72.0)	81 (72.3)		
AV graft	1 (1.6)	0 (0.0)	1 (9)		
BCF	14 (22.6)	10 (20.0)	24 (21.4)		
Catheter	2 (3.2)	4 (8.0)	5 (5.4)		

### 3.3 Anthropometry data

According to table 4.3, the mean of Body Mass Index (BMI) of the respondent was  $23.86 \pm 5.16 \text{ kg/m}^2$ . There were slightly higher in the mean of Body Mass Index (BMI) of the male respondents than female where, males  $24.40 \pm 5.62 \text{ kg/m}^2$  while female  $23.18 \pm 4.51 \text{ kg/m}^2$ . Thus, the independent sample t-test showed that there was significant difference in BMI ( $\text{kg/m}^2$ ) between genders ( $t=0.683, p=0.496$ ). Most of the subjects were classified under normal Body Mass Index (BMI) categories ( $18.5 - 24.99 \text{ kg/m}^2$ ) which are 50.9% and followed by 27.7% were overweight ( $25.00 - 29.99 \text{ kg/m}^2$ ) and 11.6% were underweight ( $<18.5 \text{ kg/m}^2$ ).

**Table 4.3** Anthropometric measurement of HD elderly in selected HD centres in Selangor (n=112)

Characteristic	Mean $\pm$ SD			t-value	p-value
	Male (n=62)	Female (n=50)	Total (n=112)		
Pre-dialysis	70.35 $\pm$ 12.93	57.74 $\pm$ 11.47	64.72 $\pm$ 13.77	5.394	-
Post-dialysis	76.02 $\pm$ 55.92	55.92 $\pm$ 11.15	67.05 $\pm$ 48.64	2.213	0.029
Dry-weight	67.55 $\pm$ 12.58	55.60 $\pm$ 11.43	62.22 $\pm$ 4.76	5.204	-
Body Height (cm)	165.30 $\pm$ 7.36	154.9 $\pm$ 7.07	160.65 $\pm$ 8.87	7.536	-
Body Mass Index	24.40 $\pm$ 5.62	23.18 $\pm$ 4.51	23.86 $\pm$ 5.16	1.817	0.496
Characteristics	n (%)			$\chi^2$	p
	Male (n=52)	Female (n=50)	Total (n=112)		
Body Mass Index				3.884	0.274
Underweight	5 (8.1)	8 (16.0)	13 (11.6)		
Normal	31 (50.0)	26 (52.0)	57 (50.9)		
Overweight	21 (33.9)	10 (20.0)	31 (27.7)		
Obesity	5 (6.5)	6 (12.0)	11 (9.8)		

### 3.4 Dietary Intake

The energy (kilocalories) and protein (gram) intake of the respondent were obtained on HD day and non-HD day. The energy contained were compared with the Recommended Nutrient Intake, RNI (2015). Based on table 4.4, the mean energy for both HD and non-HD day was 1186.54  $\pm$  364.25 kcal while for protein was 46.91  $\pm$  19.79 g. As for the energy adequacy, it is found that 91.1% of the respondent had inadequate energy intake (<30-35kcal/kg) and 87.5% of the respondent had inadequate protein intake (<1.2g/kg).

**Table 4.4** Mean Percentage for energy and protein intake among HD elderly in Selangor (n=112)

Characteristics	Mean $\pm$ SD		
	Male (n=52)	Female (n=50)	Total (n=46)
Energy (kcal/kg)	1241.42 $\pm$ 369.84	1118.48 $\pm$ 348.90	1186.54 $\pm$ 364.25
Protein (g/kg)	47.56 $\pm$ 18.65	46.10 $\pm$ 21.30	46.91 $\pm$ 19.79
Characteristics	n (%)		
Energy (kcal/kg)			
Inadequate		102 (91.1)	
Adequate		10 (8.9)	
Protein (g/kg)			
Inadequate		98 (87.5)	
Adequate		14 (12.5)	

### 3.5 Quality of Life

The total mean score for the QOL of the respondent were  $71.23 \pm 13.78$  which indicate most of the respondent had a great quality of life (refer table 4.5). From the total mean score of KDQOL-36 showed that, the highest mean score of the respondent were items four and five on symptoms and problems of kidney disease ( $80.30 \pm 14.37$ ) and effects of kidney disease ( $81.22 \pm 16.95$ ).

**Table 4.5** Mean Score for Kidney Disease – QOL Score (KDQOL-36) among HD elderly in Selangor (n=112)

Characteristics	Mean $\pm$ SD
Total Score	$71.23 \pm 13.78$
Physical Health	$54.76 \pm 27.69$
Mental Health	$69.66 \pm 19.57$
Burden of kidney disease	$51.11 \pm 27.65$
Symptoms and Problems of kidney disease	$80.30 \pm 14.37$
Effects of kidney disease	$81.22 \pm 16.95$

### 3.6 Malnutrition

Based on table 4.6 showed that, there are three categories for SGA-DMS score which were well-nourished, mild to moderate and severe malnutrition. The highest mean percentage for SGA-DMS score were mild to moderate categories which was 67.9% followed by 30.4% of the respondent were well nourished and another 1.8% were severe malnutrition. The chi-square test showed that there are no significant differences between malnutrition among genders ( $\chi^2 = 5.060$ ,  $p = 0.080$ ).

**Table 4.6** Mean Percentage for the total score of SGA – Dialysis Malnutrition Score (SGA-DMS) among HD elderly in Selangor (n=112)

Characteristics	n(%)			$\chi^2$	p
	Male (n=52)	Female (n=50)	Total (n=46)		
SGA-DMS total score				5.060	0.080
Well nourished	23 (37.1)	11 (22.0)	34 (30.4)		
Mild to Moderate	39 (62.9)	37 (74.0)	76 (67.9)		
Severe Malnutrition	0 (0.0)	2 (4.0)	2 (1.8)		

### 3.7 Association between SGA – Dialysis Malnutrition Score (SGA-DMS) with Socio-demographic characteristics, medical history, anthropometry data, dietary intake and quality of life among the HD elderly in HD centres in Selangor (n=112).

In this study, found that majority of the Malay had highest number of severe malnourished (55.6%), mild to moderate malnutrition (60.6%) and well nourished (70.6%) as Malay was most of the respondent followed by Chinese and Indian which had the same pattern for all three categories. The chi-square test showed that there are no significant differences between

malnutrition with ethnicity ( $\chi^2 = 5.232$ ,  $p = 0.264$ ). Next, there was no significant differences between malnutrition and marital status as showed in chi-square test ( $\chi^2 = 7.524$ ,  $p = 0.111$ ). The results showed that, majority of the respondent was married which included 85.2% of the respondent that have severe malnutrition and 66.7% of the respondent that have mild to moderate malnutrition. As for the educational level showed that only 12.5% of the HD patient who are well nourished had no formal education. The chi-square test showed there was no significant differences between malnutrition with educational level ( $\chi^2 = 5.714$ ,  $p = 0.456$ ).

In this study found that severe malnutrition HD elderly had normal to high Alb level. As for mild to moderate malnourished, 15.7% of the elderly had low Alb level and 64.7% of the elderly had high Alb level. Majority of the elderly with severe (59.3%), normal (64.7%) or high (64.7%) malnutrition had normal Alb level. However, the chi-square test showed that there was no significant differences between Alb level with malnutrition ( $\chi^2 = 4.722$ ,  $p = 0.317$ ). As for the Phosphate level the chi-square test showed that there was significant difference between phosphate level with malnutrition ( $\chi^2 = 13.378$ ,  $p = 0.010$ ). This study found that most of the HD elderly had high phosphate level in DMS score.

The mean duration of the HD was  $4.25 \pm 4.17$  years. It is found that there was association between HD duration with malnutrition ( $p < 0.001$ ). The mean height of the respondent was  $160.65 \pm 8.87$  cm and the mean for dry weight was  $62.22 \pm 13.43$  kg. It is found that there were significant negative correlation between height and dry weight with malnutrition among HD elderly in selected. Based on the table 4.10 showed that, the highest percentage of severe malnutrition (33.3%) come from respondent with Body Mass Index (BMI) underweight. While for mild to moderate category, mean percentage showed that 64.7% of the respondent were normal, 15.7% were overweight, 11.8% were obese and the lowest was underweight (7.8%). However, the chi-square test showed that, there was significant association in BMI classification between SGA-DMS score ( $\chi^2 = 16.739$ ,  $p = 0.010$ ).

The mean energy and protein for the respondents were  $1186.54 \pm 364.25$  kcal/kg and  $46.91 \pm 19.80$  g respectively. Thus, there was negative correlation between the mean of Energy ( $r = -0.281$ ,  $p = 0.003$ ) intake and protein ( $r = -0.272$ ,  $p = 0.004$ ) intake with malnutrition (SGA-DMS score).

There was negative correlation between percentage of items Physical ( $r = -0.368$ ,  $p < 0.001$ ), Mental Health ( $r = -0.417$ ,  $p < 0.001$ ) with the malnutrition. However, there were no correlation between Burden ( $r = -0.176$ ,  $p = 0.064$ ), Symptoms and Problems ( $r = -0.183$ ,  $p = 0.054$ ) as well as Effects ( $r = -0.162$ ,  $p = 0.089$ ) in KDQOL-36 with malnutrition (SGA-DMS score). Overall, there were negative correlation between QOL with malnutrition among HD elderly ( $r = -0.368$ ,  $p < 0.001$ ).

## 4.0 Discussion

In this current study, the numbers of respondent were slightly higher among male than female. This study showed the highest number of respondent involve in the study were Malay followed by Chinese and Indian. The differences in the proportion between the ethnicity might be due to the same trend of ethnicity proportion in Malaysia among Malays, Chinese, Indians and others. A study conducted in Malaysia by Siong Ting et al. (2012) among institutionalized elderly showed that most of the participants in the study were Malays (45%), followed by 38.1% of Chinese and 16.9% of Indians which was in consistent with this study. It was found that, most of the subjects marital status were married, which was higher among male than female and followed by widowed and the least were single. Similarly with previous study, the risk of marital status on survival of HD patients were investigated that majority of the elderly above 65 years old were married (67.6%) followed by widowed (27.5%) and the others are single (2.3%) or divorced (2.6%) respectively (Chi Wu et al., 2014). In term of educational level, respondent with education were higher as compared to no education. Suzana et al. (2013) showed that there are no significant differences on malnutrition and educational level among elderly and respondent who had education than without education both equally had malnutrition risk and no malnutrition risk. The finding was consistent with this study that found no correlation between educational level with malnutrition ( $r= 5.714$ ,  $p= 0.456$ ).

In this study found that the mean of the HD duration for the elderly were longer among female than male and the total mean of HD duration was  $4.25 \pm 4.17$  years and results showed that there was significant difference between HD duration with malnutrition ( $r= 0.437$ ,  $p< 0.001$ ). However, there was contradiction with the previous study conducted by Janardhan et al. (2011) which found that the mean HD for both males ( $2.11 \pm 1.04$ ) and female ( $2.08 \pm 1.04$ ) had no significant correlation with the SGA-DMS ( $r= 0.089$ ,  $p= 0.531$ ) even though years and frequency of dialysis had impact on the nutritional status of the patient with dialysis.

The biochemical data of the respondents were obtained from the subject's medical report which was as a secondary data. This current study also found that 14.8% of the severe malnutrition HD elderly had low Alb level, 59.3% and 25.9% of the respondent had normal and high Alb level. This study found there were no significant differences between Alb level with malnutrition ( $\chi^2= 4.722$ ,  $p= 0.317$ ). This might be due to non-nutritional factors as stated by El M'Barki Kadiri M et al. (2011) the non-nutritional factors influenced the distribution, catabolism and generation of the Alb level as an example of plasma volume expansion, Alb redistribution, Alb degradation, Alb loss, increased catabolism, and decreased synthesis, as seen in the acute phase response.

As for the phosphate level, majority of the respondent had high phosphate level. This study found that most of the HD elderly had high phosphate level in each DMS category from severe malnutrition (59.3%), mild to moderate malnourished (62.7%) as well as for well-nourished (73.5%) and it is found that there was correlation between phosphate level with malnutrition ( $\chi^2= 13.378$ ,  $p= 0.010$ ). According to (Durose et al., 2004) stated that elevation of phosphate level was due to the fail to comply their dietary intake. Majority of the HD elderly in HD centres used Arterioveous (AV) fistula (72.3%) for their vascular access. This is due arteriovenous fistula (AVF) was recommended as a first-choice vascular access for chronic HD patient based on the vascular access (VA) guidelines (Asano et al., 2013). Thus,

there was no significant different between vascular access with malnutrition ( $\chi^2 = 8.288$ ,  $p = 0.218$ ).

In this study, it is found that there was correlation between height ( $p < 0.05$ ) and weight ( $p < 0.05$ ) of the respondent with SGS-DMS score. This is supported by Janardhan et al (2011) which stated that malnutrition might course the weight of both men and women had less body weight than the standard as the body weight showed a significant negative correlation with modified SGA-DMS ( $r = -0.342$ ;  $P = 0.037$ ). Next, BMI was classified according to classification developed by WHO (2004). In term of association of BMI with nutritional status, it is found that the respondent who had low BMI or underweight ( $< 18.5 \text{ kg/m}^2$ ) were mostly at severe malnutrition (25.9%) and majority of the respondent with normal BMI were at mild-moderate malnourished (64.7%). Thus, the chi-square test showed that there was significant association in BMI classification between SGA-DMS score ( $\chi^2 = 16.719$ ,  $p = 0.010$ ). Similarly, in previous study conducted by Vanitha et al., (2016) among HD patient which showed that there was significant difference ( $p < 0.05$ ) between BMI with nutritional status of the HD patient. It is found that the mean values of the BMI were the lowest at moderate to severe malnourished ( $20.6 \text{ kg/m}^2$ ) and the highest ( $23.3 \text{ kg/m}^2$ ) at well-nourished score of DMS.

The energy and protein intake were compared with the Recommended Nutrient Intake, RNI (2015). In this study, the mean energy for both HD day and non-HD day was  $1186.54 \pm 364.25$  kcal while for protein was  $46.9 \pm 19.8$  g. Jahromi SR et al. (2010) stated that based on a study conducted by Panzetta et al. state that the ideal energy and protein intake for HD populations were  $35 \text{ kcal/kg/day}$  and  $1.2 \text{ g/kg/day}$  respectively. In this study, found that 91.1% of the elderly energy intake is less than requirement ( $35 \text{ kcal/kg/day}$ ) and majority of the HD elderly consumed protein less than  $1.2 \text{ g/kg/day}$  was 87.5%. According to Chul Kim J et. al (2012) found that, there was significant negative correlation between mean of Energy ( $r = -0.281$ ,  $p = 0.003$ ) intake and protein ( $r = -0.272$ ,  $p = 0.004$ ) intake with malnutrition (SGA-DMS score). According to Jahromi S.R. et al. (2010) found that there was correlation between DMS score with energy ( $r = -0.294$ ,  $p = 0.000$ ) and protein intake ( $r = -0.480$ ,  $p = 0.004$ ) of the HD patient which supported to this study.

This study found that there was significant negative correlation between percentage of items Physical Health ( $r = -0.417$ ,  $p < 0.001$ ) and Mental Health ( $r = -0.343$ ,  $p < 0.001$ ). However, Burden ( $r = -0.176$ ,  $p = 0.064$ ), Symptoms and Problems ( $r = -0.183$ ,  $p = 0.054$ ) as well as Effects ( $r = -0.162$ ,  $p = 0.089$ ) in KDQOL-36 with malnutrition (SGA-DMS score) had no significant correlation. Overall, in this study found that there was significant negative correlation between QOL (KDQOL-36) with malnutrition (SGA-DMS) among HD elderly ( $r = -0.368$ ,  $p < 0.001$ ). Consistent with previous study found in a cross-sectional study conducted among HD patient which showed that in physical and mental score of the QOL scored was low among severely-malnourished patients and it is showed that there were significant different between QOL with malnutrition score (Sohrabi et al., 2015). According to Chen, J.Y. et al. (2016), it was found that the disease-specific items of the KDQOL-36 were a valid, reliable and sensitive measure to assess the health-related quality of life among the Chinese patients on maintenance dialysis.

The nutritional risk of the patient had been measured using the SGA-DMS tools. Lower score indicate tendency towards a normal nutritional status and higher score indicate presence of

malnutrition such as protein energy malnutrition. (Janardhan, et al., 2011). In this study it was found that, majority of the respondent had mild to moderate categories which was 67.9% followed by 30.4% of the respondent were well nourished and another 1.8% were severe malnutrition. This findings was in line with a cross-sectional study that conducted on malnutrition prediction using SGA-DMS state that majority of the patient (91% ) were mild to moderately malnourished and there were no significant differences between men and women with the malnutrition score because of both men and women had equal tendency towards malnutrition (Janardhan et al.,2011).

## 5.0 Conclusion and recommendation

The prevalence of malnutrition among HD elderly who had severe malnutrition was 24.1% only. However, the number of respondent who had mild to moderate malnutrition were high which was 45.5% of the HD elderly which considered high. Majority of the respondent were Malay, married and had education. Overall, there were correlations of malnutrition with phosphate level as most of the patient had phosphate. The anthropometry of height and weight among HD elderly had significant correlation with malnutrition as well as for the BMI of the respondent. The dietary intakes of the patient were correlates with malnutrition because most of the energy and protein daily requirement were not achieved. As for the QOL, there was significant negative correlation with the malnutrition. Thus, an intervention towards diet and lifestyle is recommended to improve the nutritional status as well as the quality of life or the HD Elderly.

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## Declaration

Author(s) declare of no conflict of interest.

## Authors' contribution

Author 1: collected data, conceptualized the study, data analysis and interpretation and prepared the draft of the manuscript; Author 2: led the data collection in Hulu Langat district and reviewed the manuscript; Author 3: adviced on the data analysis and interpretation and reviewed the manuscript.

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