ASSOCIATION BETWEEN RISK OF MALNUTRITION, ALBUMIN LEVEL AND QUALITY OF LIFE (QOL) AMONG HEMODIALYSIS PATIENTS IN HOSPITAL PAKAR USM (HPUSM)

BY

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CERTIFICATE

This is to certify that the dissertation entitled "ASSOCIATION BETWEEN RISK OF MALNUTRITION, ALBUMIN LEVEL AND QUALITY OF LIFE (QOL) AMONG HEMODIALYSIS PATIENTS IN HOSPITAL PAKAR USM (HPUSM)" is the bona fide record of research work done by Ms "ANNA ZAFIRA BINTI FASRE" during the period from April 2025 to June 2025 under my supervision. I have read this dissertation and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation to be submitted in partial fulfilment for the degree of Bachelor of Health Science (Honours) (Dietetics).

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DECLARATION

I hereby declare that this dissertation is the result of my own investigations, except where otherwise stated and duly acknowledged. I also declare that it has not been previously or concurrently submitted as a whole for any other degrees at Universiti Sains Malaysia or other institutions. I grant Universiti Sains Malaysia the right to use the dissertation for teaching, research and promotional purposes.

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ABSTRACT

Patients undergoing hemodialysis treatment were susceptible to have poor QOL because the treatment is consuming a lot of time and increase risk of morbidity. Lower albumin level which can be due to manlnutrition status may indicate a lower health-related quality of life (QOL) and higher hospitalization rates and greater risk of fatality. The objective for this study is to determine the association between risk of malnutrition, albumin level, and QOL among hemodialysis patients in Hospital Pakar USM (HPUSM). This cross-sectional study involving 81 participants was obtained through purposive sampling and utilized the questionnaires of Dialysis Malnutrition Score (DMS) to identify risk of malnutrition, Kidney Disease and Quality of Life (KDQOL-36) to determine the quality of life, and albumin level were also obtained from the medical folder. Majority of the participants were Malay (92.6%), mean age of 56.3 ± 12.4 years old, most of them were working (90.1%) and married (74.1%). The result shown majority of the participants were in the category of moderate risk of malnutrition (87.7%), the albumin level was 40.0 (IQR 9.0) g/L and the highest score of KDQOL was in domain of social interaction with mean of 85.76 ± 17.66. Based on the Spearmen correlations test, it has been found that there was a strong negative correlation between risk of malnutrition and albumin level (r = -0.534, p <0.001). In addition, there no significant correlation between albumin level and Quality of life (QOL) among hemodialysis patients. However, there was no significant correlation between risk of malnutrition with KDQOL. QOL among hemodialysis could not be determined by using albumin level alone since suggesting that QOL is influenced by multiple factors beyond nutritional status alone. Future studies should incorporate additional variables such as inflammation markers, comorbidities, hemoglobin levels, and dialysis adequacy to better understand the multifactorial influences on QOL in hemodialysis patients.

ABSTRAK

Pesakit yang menjalani rawatan hemodialisis terdedah kepada kualiti hidup (QOL) yang rendah kerana rawatan ini memerlukan masa yang lama dan meningkatkan risiko morbiditi. Tahap albumin yang rendah yang mungkin berpunca daripada malnutrisi boleh menjadi punca penurunan tahap kualiti hidup berkaitan kesihatan (HRQoL), meningkatkan kadar kemasukan ke hospital, serta risiko kematian yang lebih tinggi. Objektif kajian ini adalah untuk menentukan hubungan antara risiko malnutrisi, tahap albumin, dan kualiti hidup dalam kalangan pesakit hemodialisis di Hospital Pakar USM (HPUSM). Kajian keratan rentas ini melibatkan 81 orang responden yang dipilih melalui pensampelan bertujuan dan menggunakan soal selidik 'Dialysis Malnutrition Score' (DMS) untuk mengenal pasti risiko malnutrisi, 'Kidney Disease and Quality of Life' (KDQOL-36) untuk menilai kualiti hidup, dan tahap albumin diperoleh daripada rekod perubatan. Kebanyakan responden berbangsa Melayu (92.6%), dengan purata umur 56.3 ± 12.4 tahun, kebanyakannya bekerja (90.1%) dan berkahwin (74.1%). Hasil kajian menunjukkan bahawa majoriti peserta berada dalam kategori risiko malnutrisi tahap sederhana, iaitu sebanyak 87.7%. Nilai median tahap albumin yang diperoleh ialah 40.0 g/L dengan interkuartil julat (IQR) sebanyak 9.0 g/L. Selain itu, domain dengan skor tertinggi dalam instrumen KDQOL-36 ialah interaksi sosial, dengan nilai purata 85.76 ± 17.66. Berdasarkan analisis korelasi Spearman, terdapat hubungan negatif yang kuat dan signifikan antara risiko malnutrisi dan tahap albumin (r= -0.534, $p < 0.001$). Namun begitu, analisis juga menunjukkan bahawa tiada hubungan signifikan di antara tahap albumin dan domain kepuasan pesakit dalam kualiti. Sementara itu, tiada hubungan yang signifikan di antara risiko malnutrisi dan skor keseluruhan KDQOL. Hasil kajian ini mencadangkan tahap albumin berkaitan dengan status pemakanan dan sebahagian aspek kualiti hidup, namun tidak mencukupi untuk menggambarkan keseluruhan kualiti hidup pesakit hemodialisis secara menyeluruh. Oleh itu, kajian lebih lanjut perlu dilakukan dengan mengambil kira pemboleh ubah lain seperti penanda

keradangan, komorbiditi, tahap hemoglobin, dan kecukupan dialisis bagi memahami faktor-faktor yang mempengaruhi kualiti hidup dalam kalangan pesakit hemodialisis secara menyeluruh.

1.0 INTRODUCTION

1.1 Background of Study

Chronic kidney disease (CKD) is defined as an irreversible decrease of renal function that last for at least three months and has become a major public health concern. Chronic kidney disease (CKD) is also defined as kidney damage or an eGFR of less than 60 mL/min/1.73 m^2 that is persisting for 3 months and above, with or without evidence of kidney damage (CPG, Management of CKD, 2018). In 2020, Malaysia had a 9.1% CKD prevalence rate. According to the Malaysian Dialysis and Transplant Registry, there were 9,592 new dialysis patients in 2022, with 7,768 receiving hemodialysis treatment (Ong et al., 2022). According to the study from Gama-Axelsson et al. (2012), hemodialysis patients with higher risk of malnutrition had a lower albumin level (Gama-Axelsson et al., 2012). Risk of malnutrition will eventually lead to low health-related quality of life (QOL) due to increase in morbidity, reduce functional capacity, and increase in number and duration of hospital admissions (Visiedo et al., 2022). It is also stated that patients that are malnourished have poorer QOL (Visiedo et al., 2022). Due to these factors that contribute to higher risk of malnutrition, lower level of albumin and poorer QOL among hemodialysis patients, it is important to do further research to deepen the understanding and knowledge about CKD patients that receive hemodialysis treatment so that a study can be conducted to determine whether malnutrition risk and albumin level are associated with the QOL among hemodialysis patients.

Risk of malnutrition among CKD patients undergoing hemodialysis patients is a very important parameter as patients with CKD is more susceptible to become malnourished. Older age and decreased glomerular filtration rate are more susceptible to lead to the development of geriatric syndromes and malnutrition. In addition, malnutrition is a general complication of CKD (Hejazi et al., 2021). Furthermore, losing appetite and reduced nutrient intake, hormonal derangements, metabolic imbalances, inflammation, increased catabolism, and dialysis related

abnormalities are related to CKD (Iorember, 2018). Malnutrition increases the risk of morbidity, mortality and overall disease burden in these patients (Iorember, 2018). By providing enough calorie requirement and protein intake alone do not necessarily indicate that the strategy is enough to address risk of malnutrition amongst chronic kidney disease patients (Iorember, 2018). This is due to the complex and multifaceted issues such as fluid restrictions and phosphate restriction which affect the malnutrition risk of CKD patients (Iorember, 2018).

It is important to have a thorough understanding and wider knowledge to have better comprehension regarding the pathophysiologic mechanisms that contribute to malnutrition in chronic kidney disease in order to create successful interventions that may be helpful improve clinical outcomes of the patients (Iorember, 2018). Therefore, monitoring and enhancing the nutrient intake is significant steps to reduce the risk of malnutrition among chronic kidney disease that undergo hemodialysis treatment (Saminathan *et al.*, 2020). Albumin is a protein that can be found in the body. Serum albumin is a protein synthesized by the liver, whose synthesis and thereby serum levels are impacted by conditions related to both nutrition and inflammation (Hsiung *et al.*, 2019). A kidney that is in a healthy condition will not let albumin pass or leaked into the urine. However, the kidney that is damaged may let some albumin leaked into the urine (National Institute of Diabetes and Digestive and Kidney Diseases, 2016). Serum albumin can be an indicator of nutrition and inflammation, as well as predicts mortality, particularly when the albumin level is <3.8 g/dL. Generally, patients with low serum albumin which is below 2.8 g/dL possess the highest risk of mortality when compared to the patients with normal value of serum albumin which is higher than 4.0 g/dL (Sridhar & Josyula, 2013). Therefore, it is important to conduct more research among hemodialysis patients regarding their risk of malnutrition. Hence, a study can be conducted to study the association of albumin level among hemodialysis patients, risk of malnutrition and QOL among hemodialysis patients.

1.2 Problem Statement

It is estimated that by 2020, there will be more than 51,000 patients on dialysis in this country (Ministry of Health Malaysia, 2018). Although hemodialysis treatment has greatly increased the life expectancy of end stage renal disease patients, it is commonly stated that the hemodialysis patients have poor quality of life (QOL) (Yusop *et al.*, 2013). Hemodialysis treatment can lead to implications and consequences in terms of QOL for both the patient and their family which include changes in their profession, food habits, exercise routines, sense of stability and security, social interactions, and capacity to find value in any part of everyday life (Zaharuddin Bujang *et al.*, 2023). Besides, patients are required to undergo treatment that can be complicated which requires several visits to the hospital or dialysis facility (Hashmi *et al.*, 2023). In general, the visit to the hospital or dialysis facility for the treatment can be as often as three times per week, which leads to consequential alteration or modification in terms of the patients' daily routines or habits (Hashmi *et al.*, 2023).

In addition, another common complication of CKD is having a higher risk for malnutrition which developed over time while living with the disease (Iorember, 2018). Malnutrition is linked to an increase in morbidity, a decrease in functional capacity, and an increase in the number and duration of hospital admissions, all of which can result in a poor health-related QOL and will give an impact on patients' emotional, physical, and psychosocial health of the hemodialysis patients (Visiedo *et al.*, 2022). Based on the study by Visiedo *et al.*, (2022), it shows how crucial it is to conduct a study on albumin level and impact of QoL as poor albumin level will lead to patients' overall health which is associated with QOL. When CKD develops up to the late stage, the risk of malnutrition becomes greater. Thus, a proper lifestyle modification such as weight monitoring, exercise, fluid restriction, and smoking status are required to manage chronic kidney disease as well.

1.3 Rationale and Justification of study

The prevalence of chronic kidney disease (CKD) in Malaysia at stage 3 and 5 is 15.5%, respectively (Cheo *et al.,* 2022). Diabetes mellitus remains as the primary cause of end-stage renal disease (ESRD) in Malaysia, which contributes 69.2% of new cases in 2018 (Ministry of Health Malaysia, 2018). In addition, there is limited information available about the quality of life (QOL) of patients undergoing hemodialysis especially in Malaysia. The majority of research done focused on QOL and its associated factors in individuals with various health disorders, including asthma, coronary artery bypass, and thalassaemia (Yusop *et al.,* 2013). Hence, in this study, it is significant to identify the prevalence of malnourished people with hemodialysis treatment. On top of that, the study is done to identify the prevalence of malnourished individuals that are having poor QOL. It is to ensure that the risk of malnutrition can be reduced and to improve the score in QOL among hemodialysis patient by implementing nutritional assessment and assessing biochemical data. It has been described by Visiedo *et al.,* (2022), hemodialysis patients who are malnourished have a poorer QOL which indicates that early diagnosis is crucial to prevent the risk of malnutrition thus, will enhance the patients' QOL. Therefore, further information and research are needed to be able to conduct the upcoming study to gain more significant and useful insight regarding the association between risk of malnutrition, albumin level QOL among hemodialysis patients. This study is significant because it does not only be looking at the QOL as a whole but it also includes the study fir each of the domain of QOL that influence the risk of malnutrition among hemodialysis patients.

1.4 Research Questions

i. What is the prevalence of malnutrition among hemodialysis patients in Hospital Pakar USM (HPUSM)?

ii. What is the albumin level among hemodialysis patients in Hospital Pakar USM (HPUSM)?

iii. What is the status of Quality of Life (QOL) among hemodialysis patients in Hospital Pakar USM (HPUSM)?

iv. Is there any relationship between risk of malnutrition and albumin level among hemodialysis patients in Hospital Pakar USM (HPUSM)?

v. Is there any relationship between risk of malnutrition and Quality of Life (QOL) among hemodialysis patients in Hospital Pakar USM (HPUSM)?

vi. Is there any association between albumin level and Quality of Life (QoL) among hemodialysis patients in Hospital Pakar USM (HPUSM)?

1.5 Objectives

1.5.1 General Objective

To determine the association between risk of malnutrition, albumin level and quality of life (QOL) among hemodialysis patients in Hospital Pakar USM (HPUSM).

1.5.2 Specific Objectives

i. To determine the prevalence of malnutrition among hemodialysis patients in Hospital Pakar USM (HPUSM).

ii. To investigate the albumin level among hemodialysis patients in HPUSM Kubang, Kerian, Kelantan.

iii. To determine the Quality of Life (QOL) among hemodialysis patients in Hospital Pakar USM (HPUSM).

iv. To investigate the relationship between malnutrition and albumin level among hemodialysis patients in Hospital Pakar USM (HPUSM).

v. To study the relationship between malnutrition risk and Quality of Life (QOL) among hemodialysis patients in Hospital Pakar USM (HPUSM).

vi. To determine association between albumin level and Quality of Life (QOL) among hemodialysis patients in Hospital Pakar USM (HPUSM).

1.6 Research Hypothesis

Null Hypothesis (H_0)

i. There is no significant association between malnutrition and albumin level among hemodialysis patients in Hospital Pakar USM (HPUSM).

ii. There is no significant association between malnutrition and Quality of Life (QOL) among hemodialysis patients in HUSM Kubang, Kerian, Kelantan.

iii. There is no significant association between albumin level and Quality of Life (QOL) among hemodialysis patients in HUSM Kubang, Kerian, Kelantan.

Alternative hypothesis (Ha)

i. There is significant association between malnutrition and albumin level among hemodialysis patients in Hospital Pakar USM (HPUSM).

ii. There is significant association between risk of malnutrition and Quality of Life (QOL)among hemodialysis patients in HUSM Kubang, Kerian, Kelantan.

iii. There is significant association between albumin level and Quality of Life (QOL) among hemodialysis patients in HUSM Kubang, Kerian, Kelantan.

2.0 LITERATURE REVIEW

2.1 Malnutrition among Chronic Kidney Disease (CKD) and Hemodialysis patients

Dialysis treatment is said to contribute to malnutrition burden, and newly dialyzing patients are at risk of the early mortality attributed by malnutrition as evidenced by diagnostic assessment of nutrition risk screening using SGA (Kwon *et al.*, 2016), lower range of body mass index (BMI), mid-arm muscle circumference (MAMC), albumin level (Lukowsky *et al.*, 2012), cholesterol levels (Kwon *et al.*, 2016), and reduced food intake (Sahathevan *et al.*, 2020). Based on the study, it was reported that the nutritional parameters were discovered to be correlated with impaired health-related QOL among hemodialysis patients as evaluated by scores on the KDQOL-SF questionnaire (Almulhim *et al.*, 2022). Hemodialysis treatment itself, including dialysis-induced nutrient losses, multiple dialyzer reuse, dialysis-induced inflammation, the efficacy of uremia and metabolic acidosis correction, and dialysis adequacy, frequency, and duration, are unavoidable iatrogenic factors contributing to malnutrition (Sahathevan *et al.*, 2020).

Research was done by Sahathevan *et al.* (2015) among 205 Malaysian patients that undergo hemodialysis in the Klang Valley was recruited and divided into two categories which are hemodialysis with good appetite and poor appetite (Sahathevan *et al.*, 2015). The result of the study demonstrates that hemodialysis patients with poor appetite obtained higher Malnutrition Inflammation Score (MIS) score compared to the hemodialysis patient that have good appetite (9.5 vs. 6.6, $p = 0.039$) in which a higher MIS score is a sign of higher risk of malnutrition (Sahathevan *et al.*, 2015).

2.2 Tools assessing Malnutrition among CKD patients

The screening tool that can be used to assess malnutrition risk among CKD patients includes Dialysis Malnutrition Score (DMS), Malnutrition Inflammation Score (MIS) and Subjective Global Assessment (SGA) (Uy *et al.*, 2018). Dialysis Malnutrition Score (DMS)

contains seven features which are weight change, dietary intake, Gastrointestinal (GI) symptoms, functional capacity, co-morbidity, subcutaneous fat and signs of muscle wasting. Meanwhile, MIS, comprised of the seven features of DMS but with another three additional components which are BMI, serum albumin and total iron binding capacity (TIBC) (Uy *et al.,* 2018). Another screening tool for malnutrition risk is Subjective Global Assessment (SGA). The 7-point SGA scale is classified into two categories which are medical history and physical examination (As'habi *et al.,* 2013). The professional researcher scored each item on a scale of 1 to 7 and determined the overall SGA score (Kwon *et al.,* 2016).

Subjective Global Assessment (SGA) serves important purposes regarding assessment of risk of malnutrition (Jagadeesan, Sreedhar, & Vijayakumar, 2023). Next, DMS is focusing and is more quantitative version if compared to SGA (Dogra *et al.,* 2020). On the other hand, MIS is relatively associated and related with hospitalization days, hospitalization frequency, level of creatinine, hematocrit, and CRP level if compared to SGA and DMS since MIS also include assessment of BMI, serum albumin and total iron binding capacity (TIBC) in the questionnaire (Uy *et al.,* 2018b). Dialysis Malnutrition Score (DMS) is known to be more reliable and considered as an appropriate nutritional assessment tool to monitor the risk of malnutrition in patients with chronic kidney disease (CKD) (Jagadeesan, Sreedhar, & Vijayakumar, 2023). SGA is a questionnaire to assess malnutrition risk nevertheless, SGA has several limitations such as SGA has the probability of overestimating severe malnutrition, lower sensitivity to identify acute changes in nutritional status and in terms of its subjectivity (Jagadeesan, Sreedhar, & Vijayakumar, 2023).

On the other hand, DMS can be an effective nutritional assessment tool since DMS is simpler to use, more convenient and laboratory markers needed (Dogra *et al.,* 2020). DMS evaluations are considered as the most efficient techniques when determining malnutrition with BMI, biological markers (Jagadeesan, Sreedhar, & Vijayakumar, 2023). These procedures are

also beneficial due to its convenience, does not consume a lot of time, does not require the individuals to possess any specific skills, and its capability and efficiency to determine risk of malnutrition (Jagadeesan, Sreedhar, & Vijayakumar, 2023). It was also stated that DMS is considered as a nutritional assessment tool that is very reliable and suitable to analyse risk of malnutrition among CKD patients (Jagadeesan, Sreedhar, & Vijayakumar, 2023).

Both Dialysis Malnutrition Score (DMS) and Malnutrition Inflammation Score (MIS) are useful to assess risk of malnutrition among CKD patients, in fact, the results of the study done by As'habi *et al.* (2013) shows that both DMS and MIS are almost similar to SGA in which both can be used as assessment tool among hemodialysis patients. Nevertheless, DMS is a better alternative of SGA for regular hospital assessments (As'habi *et al.,* 2013). This can be clearly observed when DMS was compared to SGA, the sensitivity, specificity, accuracy of DMS were 94 %, 88 %, 92 %, meanwhile, when MIS was compared to SGA, the sensitivity, specificity, accuracy of MIS were 87 %, 96 %, 91 %, respectively (As'habi *et al.,* 2013b). Therefore, DMS is said to be a more proper assessment tool as alternative for SGA (As'habi *et al.,* 2013b), because DMS has higher sensitivity, more practical as well as a simpler assessment tool that can apply to identity or assess malnutrition among patients in hospital practices (Uy *et al.*, 2018). DMS has been recommended by European Best Practice Guidelines (EBPG) on Nutrition and Kidney Disease Outcomes Quality Initiative (K/DOQI) to be the assessment tool to assess risk of malnutrition among CKD patients undergoing hemodialysis (Ho Ho *et al.,* 2018). DMS is also seen as a more practical assessment tool in Malaysia dialysis settings since it is very easy to be used, save time, is not costly, more objective compared to SGA (Ho Ho *et al.,* 2018).

2.3 Quality of Life among Hemodialysis Patients

Based on the World Health Organisation (WHO), the term "quality of life" refers to the components of an individual's physical, psychological, and social well-being that are shaped by their experiences, beliefs, hopes, and aspirations (WHOQOL, 2012). Quality of Life (QOL) refers to how an individual perceives and feels satisfied with their life in terms of goals, social connections, expectations, norms, and autonomy (WHOQOL, 2012).

In one of hemodialysis center in Penang, Malaysia, reported that the score of QOL from KDQOL-SF24 questionnaire were poor based on components of work status, cognitive function, quality of social interaction, sleep, social support, patient satisfaction, physical functioning, general health and role emotional (Ramatillah *et al.*, 2019). Hemodialysis is one of the treatments utilized for CKD patients that is above stage 3, and it will be required continuously to restore kidney (Goh *et al.*, 2019). Malnutrition risk, the hemodialysis duration, age, and ethnicity are other factors which are associated with QOL of hemodialysed patients (Ramatillah *et al.*, 2019). Information about QOL among hemodialysed patients in Malaysia is limited which some studies have examined the relationship between sociodemographics with QOL among hemodialysed patients. (Ramatillah *et al.*, 2019).

One of the questionnaires which intent to assess QOL among hemodialysis patient is Kidney Disease Quality of Life (KDQOL) questionnaire which has been used worldwide and have the version with different languages including Malay version. KDQOL-36 is a self-administered tool which measures kidney disease-related HRQOL. However, main weakness of the original tool is that the questionnaire was too lengthy (comprised of 134 items) and time-consuming to be administered in a clinical practice. Hence, a shorter KDQOL-SF™ version 1.3 has been developed which makes it easier to be completed and does not consume a lot of time compared to the original KDQOL. In addition, Malay KDQoL-36 Malaysian version which is in a shorter version similar to KDQOL-SF™ version 1.3 can be obtained from RAND website

and was used towards hemodialysed patients in this hemodialysis center. KDQOL questionnaire will be used in the study because it can specifically measure the QOL among CKD patients up to the end stage renal disease patients (Doan *et al.*, 2020). The questionnaire covers the symptoms/issues, effects, burden related to kidney disease, work status, cognitive function, quality of social interactions, sexual function, sleep, social support, dialysis staff encouragement, and patient satisfaction (Doan *et al.*, 2020).

Furthermore, another questionnaire that can be applied to measure QOL among hemodialysis patient in Malaysia is called 3-level EQ-5D version (EQ-5D-3L) that was originally created by EuroQol Group during 1990 (EuroQol, 2023). EQ-5D-3 L is a form of a questionnaire that is used to assess health-related quality of life (HRQOL). The EQ-5D-3L descriptive system comprises of five main components which includes mobility, self-care, usual activities, pain/discomfort and anxiety/depression (EuroQol, 2023).

However, EQ-5D-3L is commonly used to assess health-related quality of life (HRQoL) among general population but, it can be used to assess QOL among CKD patients. It is can be utilised to assess HRQOL of different diseases or wide range of health conditions (Janssen *et al.*, 2021) such as transfusion-dependent thalassemia (TDT) (Shafie *et al.*, 2021), tuberculosis, high blood pressure, liver disease, HIV/AIDS , diabetes mellitus, as well as cancer (Amer *et al.*, 2023). Since 3-level EQ-5D is for assessment of HRQOL, it is more suitable to be used for the evaluation of general health that is broader and involves various domain such as physical functioning, role physical, pain, general health, emotional wellbeing, role emotional, social function, and fatigue or energy (Doan *et al.*, 2020). Next, WHOQOL-BREF is said to be more appropriate to be used for the assessment of QoL among CKD patients at early stage, whereas KDQOL-SF™ version 1.3 has higher sensitivity and more suitable to be used to assess QoL among hemodialysis patients (Goh *et al.*, 2019). On top of that, KDQOL-SF™ was developed by the Kidney Disease Quality of Life Working Group of USA and it was particularly made for

patients with chronic kidney disease (Taptagaporn *et al.*, 2021). This tool incorporated the 36-item Short-Form Health Survey (SF-36) and end-stage renal targeted area (ESRD-targeted areas), therefore, enable KDQOL-SF™ version 1.3 to make a general and specific assessment of QoL among CKD patients including hemodialysis patients (Taptagaporn *et al.*, 2021). According to a study done by Goh *et al.* (2019) involving 181 participants at the Nephrology clinic dialysis centers in Kuala Lumpur, has discovered that the Malay KDQOL-36 was shown to be a valid and reliable assessment tool to monitor HRQOL among CKD patients (Goh *et al.*, 2019).

2.4 Determinants of Quality of Life

Malnutrition is considered as one of the contributors that threaten health-related quality of life (QOL) because it is associated with a higher rate of hospitalizations (Almulhim *et al.*, 2022). A cross-sectional study was done among 60 hemodialysis patients in the In-Centre Haemodialysis in Al-Ahsa, Saudi Arabia with the aim to assess the nutritional parameters and the levels of the QOL using KDQOL-SF-36 questionnaire (Almulhim *et al.*, 2022). Based on the study by Almulhim *et al*. (2022), they found that the patients undergoing hemodialysis score a poor QOL.

Hemodialysis treatment may lead to a decrease in quality of life because of the side effects coming from the treatment (Ramatillah *et al.*, 2019). This is because hemodialysis treatment is both time-consuming and costly for patients, especially among the low to middle income groups (Shahrin *et al.*, 2019). Moreover, patients undergoing hemodialysis must be aware and adhere to the restrictions in term of dietary intake to effectively manage their serum potassium and phosphorus levels (Shahrin *et al.*, 2019). Eventually, individuals with hemodialysis will be more dependent on caregivers and lose their autonomy, job prospects, social interactions, and family involvement (Shahrin *et al.*, 2019).

Besides, the presence of comorbidities along with chronic kidney disease in the patients

is also one of the determinants of QOL among hemodialysis patients. Based on the study conducted by Wu, Hsu, and Tzeng (2022), the results showed that the total score of QOL among patients undergoing hemodialysis treatment with comorbidities were poorer if compared to the patients without comorbidities. Besides, their finding also indicates that patients had higher score of QOL when the hemodialysis patients with comorbidities do some regular exercises if compared the score of the patients who did not exercise regularly (Wu, Hsu, & Tzeng, 2022).

Another factor that can influence QOL among hemodialysis patients is psychological factors such as anxiety and depression. High levels of stress and depression negatively affect the QOL of patients receiving hemodialysis. A cross-sectional study was conducted by Rikos *et al*. (2023), where 63 participants were involved in their study and the data collection was done in 2021. They were using Hospital Anxiety and Depression Scale (HADS) and the kidney disease and Quality of Life-Short Form (KDQOL-SF™) as their research tools in their study. According to Rikos *et al*. (2023), they discovered that moderate to mild levels of anxiety and depression were found among hemodialysis patients. Throughout their study, they discovered that the patients that obtain result of moderate or severe levels of anxiety and depression had a poorer score QoL in the Physical and Mental Composite sections. Hence, it shows the patients' high dependency regarding the proper medical, nursing and social environment in order to attain higher levels of well-being, then leads to the improvement of patients' health (Rikos *et al.*, 2023).

Poor QOL among patients with hemodialysis is associated with increased rate of hospitalization and morbidity (Morsch, Goncalves & Barros, 2006). In addition, hemodialysis might lead to poor QOL because the treatment is consuming a lot of time and the price can be costly among the patients with low to middle income categories.