ASSESSMENT OF NUTRITIONAL KNOWLEDGE FOCUSING ON PROTEIN AND POTASSIUM AMONG THE NURSES AT NEPHROLOGY UNIT OF A TERTIARY HOSPITAL: A CROSS-SECTIONAL STUDY

A PROJECT REPORT

BY

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Submitted to the Department of Nutrition and Food Engineering in the partial fulfillment of B.Sc. in Nutrition and Food Engineering

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APPROVAL

This Thesis Titled **"Assessment of nutritional knowledge focusing on protein and potassium among the nurses: a cross-sectional study at nephrology unit of a tertiary hospital"**, Submitted by **Abida Zaman** to the Department of Nutrition and Food Engineering, Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Nutrition and Food Engineering and approved as to its style and contents.

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DECLARATION

We hereby declare that this thesis has been done by me under the supervision of **Akibul Islam Chowdhury, Lecturer**, Department of Nutrition and Food Engineering, Daffodil International University. We also declare that neither this thesis nor any part of this thesis has been submitted elsewhere for award of any degree or diploma.

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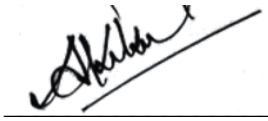

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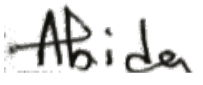

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ABSTRACT

Hypo and Hyperkalemia and also protein imbalance is an independent risk factor for a chronic kidney disease. Nutritional guidance is significant for patients with chronic kidney disease (CKD), particularly in balancing protein and potassium intake. This study aimed to evaluate the nutritional knowledge of nurses, specifically regarding protein and potassium management for chronic kidney disease (CKD) patients. The goal was to assess their understanding of dietary recommendations and the importance of balancing protein and potassium intake. A cross-sectional survey was conducted among 63 nurses at a kidney hospital to assess their knowledge of CKD-related nutrition, specifically focusing on protein and potassium intake. The survey used a standardized questionnaire and employed convenient sampling method. Chi-square test and multinomial regression were used to analyze the data. The study involved 63 female nurses with an average age of 26.38 years. Most were from the cabin unit and held diploma certificates. While many had general CKD knowledge, their understanding of protein and potassium was more varied. More experienced nurses showed significantly higher levels of nutritional knowledge, particularly regarding protein and potassium ($p<0.05$). Nurses with over 10 years of experience were significantly more likely to have good knowledge. Additionally, experience at the Kidney Foundation Hospital correlated with better protein and potassium knowledge. The study highlights the need for specialized training programs to improve the nutritional knowledge of nurses working in nephrology units. Such training is essential to optimize patient care, even for experienced nurses.

Keywords: Hyperkalemia, Hypokalemia, Nurse, Chronic Kidney Disease

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CHAPTER 1
INTRODUCTION

1.1 Introduction:

One of the biggest global public health issues is chronic kidney disease (CKD) (Montazeri & Sharifi, 2014). Concomitant with the rise in renal failure, cardiovascular disease, and premature mortality are a growing number of people with chronic kidney disease (CKD). In 1990, chronic renal illness was ranked 27th on the list of causes of all fatalities globally; by 2010, it was ranked 18th (Jha et al., 2013). Worldwide, CKD affects about 500 million people, with less developed nations—particularly those in South Asia and sub-Saharan Africa bearing a disproportionately large burden from the disease (Banik & Ghosh, 2021). A 2015 study found that the total number of patients with CKD in any stage was 387.5 million in low- and middle-income countries (men 177.4 million, women 210.1 million), compared to 110 million in high-income countries (men 48.3 million, women 61.7 million) (Mills et al., 2015). An increase in the annual prevalence of chronic renal disease is observed in Bangladesh, a very populous developing country in Southeast Asia. The overall prevalence of chronic renal disease was estimated to be 14% in a global analysis that covered six areas, including Bangladesh (Banik & Ghosh, 2021). The term renal disease refers to a broad category of conditions that impact the structure and function of the kidneys. A period of time longer than three months is referred to as chronic, whereas one that is less than three months is called acute. When renal illness worsens and becomes chronic, it is considered a life-threatening condition (Levey et al., 2013). Irrespective of the clinical diagnosis, chronic kidney disease is defined as having impaired kidney function (glomerular filtration rate [GFR] <60 mL/min per 1·73 m2) or kidney damage (albuminuria) for a minimum of three months (Yu, 2003). There is substantial electrolyte abnormalities linked to chronic kidney disease (CKD) (Belmar Vega et al., 2019). Normally, the kidneys help regulate potassium levels by excreting excess potassium through urine. However, in CKD, the kidneys may not function properly, leading to a buildup of potassium in the blood, known as hyperkalemia. Individuals suffering from chronic kidney disease (CKD) are more susceptible to hyperkalemia, which raises the possibility of cardiac arrest and arrhythmias as well as the death rate. For potassium homeostasis to be maintained, the kidneys are essential (Seliger, 2019). CKD patients are advised to monitor potassium intake and limit potassium-rich foods like bananas, oranges, potatoes, tomatoes, and certain beans. While protein is essential, excessive intake can burden impaired kidneys, worsening waste filtration and accelerating kidney decline. Research suggests that reducing dietary protein can help manage CKD by improving albuminuria, controlling uremia, and slowing disease progression. (Rhee et al., 2018). Hemodialysis is the most used form of renal replacement treatment (HD). Hemodialysis patients who lose amino acids from their treatments experience protein-energy malnutrition, which raises mortality rates when they consume insufficient amounts of protein and energy (Montazeri & Sharifi, 2014). Due to a number of circumstances, such as dietary limitations, nutrient loss during dialysis, and changed metabolism, people undergoing dialysis

are susceptible to nutritional deficiencies. Medications known as potassium binder are the mainstays of treating patients with hyperkalemia. Proteinuria, or excess protein in the urine, is treated in individuals with chronic kidney disease (CKD). However, an excessive consumption of protein and potassium in the diet significantly reduces their efficacy (Montazeri & Sharifi, 2014). Renal patients require education and information regarding recognized dietary sources of protein and potassium in order to reduce their intake of protein and potassium. 6-8 Dietary recommendations for dialysis patients are typically provided with the goal of minimizing dietary intake of fluids, sodium, potassium, phosphorus, and maintaining a sufficient amount of protein and calories. Despite this, CKD and dialysis patients had poorer nutritional awareness of potassium, protein, and how much of each to consume than they did of other nutrients (Montazeri & Sharifi, 2014). Nephrologists and renal dietitians have as their main goal improving the serum potassium and protein control in patients with chronic kidney disease (CKD) and dialysis patients due to the significant morbidity and mortality risk associated with abnormalities of mineral metabolism and accumulation of toxins in the body. Nurses are vital members of the hemodialysis team because they are in close proximity to the patients, are more understanding of their issues, and are able to offer pertinent opinions, advise, or suggestions (Cupisti et al., 2012b). Evaluations have already been conducted on the knowledge of adult hemodialysis patients and dialysis unit nurses, particularly in relation to phosphorus and other minerals important to dietary treatment of end-stage renal disease (Cupisti et al., 2012b). However, the assessment of renal nurses' focus on potassium and protein is still pending.

This study set out to evaluate the nurses' understanding of nutrition, particularly as it related to protein and potassium in relation to CKD and dialysis, while working in nephrology units.

1.2 Objectives of the research work:

1.2.1 General Objective:

To assess the nutritional knowledge of nurses considering protein and potassium intake necessary for effective patient care in a nephrology unit.

1.2.2 Specific Objectives:

- To evaluate the level of knowledge among renal nurses about dietary protein requirements for patients with kidney disease.
- To determine nephrology nurses' understanding of potassium intake guidelines for patients with different stages of kidney disease.
- To examine the correlation between nurses' knowledge of protein and potassium intake and their years of experience or antecedent training in nephrology.

These objectives give a focused framework for assessing and improving nephrology nurses' nutritional knowledge, ensuring better patient management.

CHAPTER 2
LITERATURE REVIEW

2.1 Effect of Potassium levels on Kidney Patients

As seen by the high prevalence of potassium problems in patients with reduced renal function, the kidneys are essential for maintaining potassium homeostasis and potassium balance. It is true that both hyperkalemia and hypokalemia can occur in people with end-stage renal disease (ESRD) and chronic kidney disease (Nakhoul et al., 2015).

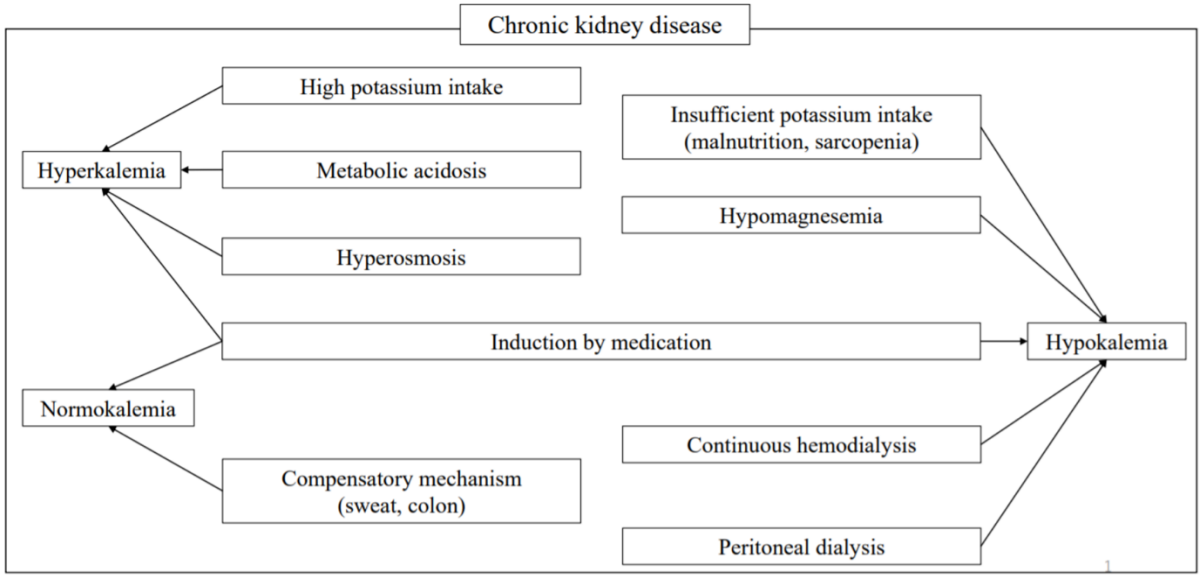

Figure 1: Effect of potassium in CKD (Yamada & Inaba, 2021)

An excessive concentration of potassium ions in the extracellular fluid compartment is known as hyperkalemia (Mahoney et al., 2005). It is identified by a plasma-potassium concentration greater than 5.5mEq/L (Nakhoul et al., 2015). As the kidneys fail, they are less effective at excreting potassium, leading to its accumulation in the blood. High-potassium foods, like bananas, oranges, tomatoes, and spinach, can exacerbate potassium levels if not controlled. A condition often associated with kidney disease that causes potassium to shift from the cells into the bloodstream. However, studies in patients with CKD have found notably higher frequencies of hyperkalemia often as high as 40–50%—especially in diabetic patients, those with advanced stages of CKD (Kovesdy, 2014). Persistent hyperkalemia is associated with increased mortality rates in patients on dialysis. The predicted death rate from hyperkalemia among hemodialysis patients is 3.1 per 1000 patient-years (Bello et al., 2019).

Hypokalemia is almost as common as hyperkalemia in CKD. The prevalence of hypokalemia is 12%-18% (Gilligan & Raphael, 2017). Hypokalemia, characterized by low potassium levels in the blood, is less common but still possible in kidney patients. Loop diuretics and thiazide diuretics, often used to treat fluid overload in CKD, can lead to excessive potassium loss. Some

forms of dialysis may remove more potassium than necessary, leading to hypokalemia. Malnutrition or restricted diets in CKD patients can sometimes lead to inadequate potassium intake. Hypokalemia is linked to a higher risk of arrhythmias, particularly in patients with heart disease, which is common in CKD patients (Gilligan & Raphael, 2017).

2.2 Effect of Protein levels on Kidney Patients

High-protein diets can induce renal hypertrophy and glomerular hyperfiltration in animal models and short-term human studies. These are early maladaptive responses to abnormal renal hemodynamics that can lead to kidney injury and disease progression. Dietary protein consumption increases serum creatinine level through protein catabolism rather than decreased clearance. A study found that a high-protein diet increased eGFR (Juraschek et al., 2013). On the other hand, it is known for a long time that patients with advanced CKD can maintain neutral or slightly positive N balance with protein intakes as low as 0.55e0.6 g/Kg (Garibotto Giacomo et al., 2010). Dietary protein restrictions reduced elevated glomerular capillary pressure and filtration in two renal disease models. This normalized glomerular hemodynamics, reduced urinary protein to normal levels, and prevented progressive glomerular destruction. Long-term studies in the subtotal nephrectomy model showed a marked reduction in the rate of progression to renal failure in rats on a low-protein diet. (Peter et al., 1999).

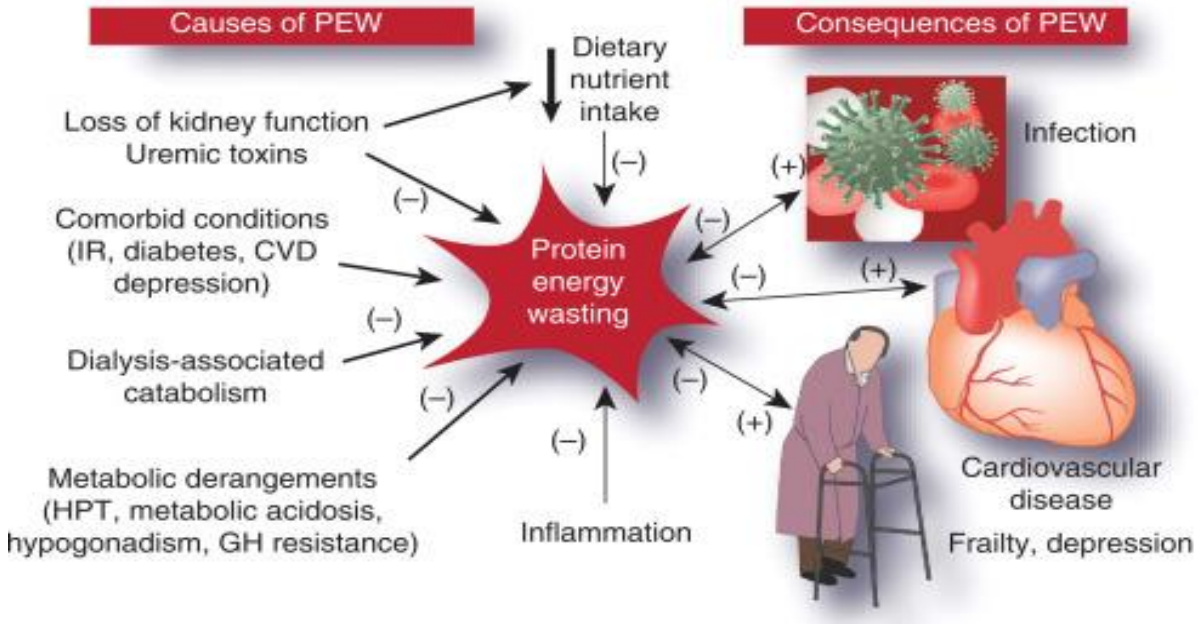

Figure 2: Causes and Consequences of PEW (Ikizler et al., 2013)

Protein-energy wasting (PEW) is prevalent in chronic kidney disease (CKD) patients and is linked to poor clinical outcomes, particularly in those on maintenance dialysis. Multiple studies now indicate that PEW is closely associated with major adverse clinical outcomes and results in increased rates of hospitalization and death in these patients (Ikizler et al., 2013).

2.3 Knowledge about potassium among nurses

Patient safety, a top priority in healthcare, can be compromised by various factors, including hospital environment, healthcare workforce, medical processes, technology, and teamwork. Despite these efforts, patients may still encounter medical errors. (Güneş & Celik, 2014). Many studies suggest that nurses are well-equipped to provide drug-nutrient interaction information to patients. This is partly because a nurse's daily patient load is manageable for this task (Gauthier & Malone, 1998).

Potassium is crucial for maintaining chemical and electrical balance, particularly in cardiac and skeletal muscle function (Bertrand et al., 2014). The kidneys primarily regulate serum potassium levels within a narrow range, with dietary intake playing a secondary role (John et al., 2011).

While nurses' understanding of warfarin and vitamin K interactions is well-studied, their knowledge of other common drug-nutrient interactions is less understood (Couris et al., 2000). Nurse educators believe that nursing curricula should include more pharmacology instruction (Couris et al., 2000; Dilles et al., 2011). (Couris et al., 2000) indicated that nurses were found to have lower dietary and drug interaction knowledge compared to physicians, pharmacists, and dieticians.

From a study we found that, nurses understood the purpose of ACE inhibitors but struggled with potassium's recommended daily intake and the categorization of low and high-potassium foods. Neither nursing education level nor ACE inhibitor patient load impacted their knowledge of ACE inhibitors or food potassium content. (Bertrand et al., 2014).

Another study found that most staff nurses (45%) had average knowledge of potassium imbalance in children, while only 4% had excellent knowledge (Hsaio et al., 2010). Athulya A. reported that most (93.3%) of the samples had average knowledge about hyperkalemia and its management (Gilligan & Raphael, 2017). Hsaio et al. found that 31.8% of participating nurses were unaware that potassium chloride should never be administered as an intravenous bolus. (Juraschek et al., 2013).

The highest knowledge deficit was found in the introduction to potassium and potassium imbalance (76%), followed by hyperkalemia (66%), hypokalemia (69%), and nursing responsibilities related to potassium imbalance (70%). These findings align with a study by Bahta S and Haile B, which assessed nurses' knowledge of potassium loss. (Güneş & Celik, 2014).

2.4 Knowledge about protein among nurses

Food is a fundamental human need, essential for growth, development, bodily repair, regulation, and energy production. Global nutrition, especially in developing nations, is a pressing concern. Studies indicate that many populations, particularly children, lack sufficient

food and calories, leading to malnutrition. This malnutrition stems from various factors, including inadequate food access, poor feeding practices, frequent illness, insufficient healthcare, inadequate care practices, poor sanitation, and poverty.

The study revealed that the majority of nurses demonstrated a poor understanding of protein-energy malnutrition in children under five years of age (Qasim Mohammed et al., 2017). Another study showed that the majority of health professionals had poor knowledge about case detection and appropriate management of malnutrition in children (Status et al., 2015).

According to a study, nurses are more knowledgeable about nutrition than patients or the broader population. However, it was discovered that they lacked sufficient information of phosphorus. Hemodialysis nurses could play a vital role in teaching patients about the possible repercussions of high serum phosphorus levels and in encouraging them to follow dietary phosphorus limitations. (Cupisti et al., 2012a). The other study showed that scoring a mean knowledge score of 12.13 (44% correct), their nursing knowledge on the nutritional management of diabetes was poor (Mogre et al., 2015).

CHAPTER 3
METHODS AND MATERIALS

3.1 Study Design:

The nutritional knowledge of renal nurses with an emphasis on managing protein and potassium was assessed using a quantitative cross-sectional methodology in this study conducted between 1st to 30th March, 2024.

3.2 Area of the study:

In Dhaka, Bangladesh, at the Kidney Foundation Hospital and Research Institute, this investigation was conducted.

3.3 Study population:

Nurses employed by the Kidney Foundation Hospital (KFH) who gave their consent to the study and worked in the renal ward, dialysis, ICU, or renal outpatient clinic were included in the study. Nurse leaders and technicians who worked in these departments but did not directly provide patient care were excluded.

3.4 Sample size and sampling framework:

Nurses with varying degrees of education participated in this study: enrolled nurses, HSC, diploma nurses, and master's degree holders in nursing. Sixty-two nurses in al. A number of research studies use the so-called Slovin's (or sometimes Sloven's) formula for obtaining the sample size (Tejada et al., 2012). Denoting by n the sample size, Slovin's formula is given by:

$$n = N \frac{N}{1+N\,e^2}$$

Where,

- n = Number of sample size
- N = Total population size (population size is 100 at CKD hospital)
- e = Marginal error (5%)

The estimated sample size for this study was approximately 80 participants, based on the calculated formula. A total of 80 samples were collected from the hospital; however, only 62 participants provided ethical consent to participate in the study.

3.5 Data collection procedure:

An organized English questionnaire was utilized to gather data for this study and evaluate nurses' expertise (Sumari et al., 2023). The first section of the questionnaire asked questions about the sociodemographic traits of the nurses who work at the Kidney Foundation, including their sex, age, educational background, professional specialty, length of nursing experience,

and length of time spent at KFH. The second section addressed nurses' understanding of CKD and its consequences. It comprises of eight questions—two multiple-choice and six short answer that assess nurses' knowledge of chronic kidney disease (CKD) and its effects (Rasheed et al., 2018)**.** The third section addressed nurses' understanding of managing potassium and protein in patients with chronic kidney disease. There are six short answer and seven multiple choice questions among the 13 total questions. The answers select the correct response. The responses choose the right answer got one number and choose the wrong answer got zero number and I don't know if the participant was not sure whether the answer was right or wrong.

3.6 Scoring:

Each nurse's responses to all questions were considered for scoring. The survey began with 7 demographic questions, where the mean age of nurses was calculated, and ages were categorized into a range from 19 to 62 years.

There were 8 questions assessing nurses' knowledge about chronic kidney disease (CKD). For these questions, each correct answer received one point, while incorrect answers received zero points. For multiple-response questions, one point was awarded per correct response. This scoring approach allowed nurses to earn up to seven points for questions with multiple correct answers. The total possible score for CKD knowledge ranged from 0 to 17.

To assess nurses' knowledge of nutritional sources of protein and potassium, there were 13 questions in total. However, questions 6 and 7 were excluded from analysis, and scoring was based on the remaining 11 questions. Scoring was similar: each correct answer received one point, with zero points for incorrect answers. For multiple-response questions, one point was awarded per correct response, allowing nurses to achieve full marks by selecting all correct answers. The total possible score for nutritional knowledge was also set from 0 to 17. Both CKD-related knowledge and dietary knowledge of protein and potassium sources were then classified into three categories: poor, average and good.

3.7 Statistical Analysis:

Data for this study were entered, cleaned, and analyzed using statistical tool for social sciences (SPSS) for Windows, version 25.0. Initially, data were collected from 80 participants; however, only 62 provided ethical consent for their data to be included in the analysis. For these 62 participants, the response rate was 100%. A descriptive statistical analysis was conducted, and the Chi-squared (X^2) test was employed to ascertain the relationship between the participants' knowledge level and their demographic and work experience as nurses. The statistical significance was determined using an alpha p-value<0.05**.** Regression analysis was also performed. a comparison of general nursing experience and experience at KF as part of a logistic regression analysis looking at the association between nurses' knowledge levels and their nursing experience.

3.8 Ethical Consideration:

This research was adhered to ethical guidelines, ensuring informed consent from participants and maintaining confidentiality. Ethical approval for the study was obtained from the Department of Nutrition and Food Engineering at Daffodil International University and the Kidney Foundation Hospital and Research Institute.

CHAPTER 4
RESULTS

4.1 Demographic information of the Respondents:

The table provides a demographic overview of nurses working in a kidney hospital and their knowledge levels regarding chronic kidney disease (CKD) and Protein and Potassium Knowledge (PKK).

Table 1: Sociodemographic Characteristics of Respondents

Variables		N (%)
Gender	Male	7 (11.3)
	Female	55 (88.7)
Age	Mean ± SD	26.38 ± 5.81
Department Type	Ward	6 (9.7)
	Dialysis	2 (3.2)
	ICU	20 (32.3)
	Cabin	34 (54.8)
Experience in Nursing	Less than 5 years	41 (66.1)
	5-10 years	15 (24.2)
	Greater than 10 years	6 (9.7)
Experiencing in Nursing at KF	Less than 5 years	47 (75.8)
	5-10 years	10 (16.1)
	Greater than 10 years	5 (8.1)
Education	Primary	3 (4.8)
	HSC	3 (4.8)
	Diploma	54 (87.1)
	Masters	2 (3.2)
Type of specialty	Hemodialysis Nursing	2 (3.2)
	Acute Nephrology Nursing	14 (22.6)
	Renal Nursing	2 (3.2)
	General Nursing	44 (71)
Percentage of CK cat	Poor	13 (21.0)

	Average	7 (11.3)
	Good	42 (67.7)
	Poor	13 (21.0)
Percentage of PKK cat	Average	28 (45.2)
	Good	21 (33.9)

The Table 1 shows that the study involved 62 nurses, primarily female (88.7%) with a mean age of 26.38 years. Most nurses (54.8%) were from the cabin unit, followed by the ICU (32.3%) and ward (9.7%), with a small number (3.2%) from the dialysis unit. A majority (66.1%) had less than 5 years of nursing experience, 24.2% had 5-10 years, and only 9.7% had over 10 years. In terms of experience at the Kidney Foundation Hospital (KFH), 75.8% had less than 5 years, 16.1% had 5-10 years, and 8.1% had over 10 years. Most nurses (87.1%) held a diploma, while a few had HSC/primary (9.6%) or a master's degree (3.2%). Regarding specialty, 71% were general nurses, 22.6% specialized in acute nephrology, and only 3.2% in renal nursing or hemodialysis. In the knowledge assessment, most nurses (67.7%) demonstrated good CKD-related knowledge, while their protein and potassium knowledge were more evenly distributed: 45.2% average, 33.9% good, and 21.0% poor.

4.2 Factors associated with CKD related knowledge of nurse:

Table 2 presents a detailed breakdown of the relationship between various demographic and professional characteristics of nurses and their knowledge level regarding chronic kidney disease (CKD).

Table 4.2: Relationship between Demographic and Professional Characteristics and CKD-Related Knowledge

		CKD related Knowledge			
		Poor N (%)	**Average N (%)**	**Good N (%)**	**p-value**
Experience in Nursing	Less than 5 Years	13 (31.7)	3 (7.3)	25 (61.0)	0.015
	5-10 Years	0	4 (26.7)	11 (73.3)	
	Greater than 10 years	0	0	6 (100)	
Experience in Nursing at KF	Less than 5 Years	13 (27.7)	5 (10.6)	29 (61.7)	0.156
	5-10 Years	0	2 (20)	8 (80)	
	Greater than 10 years	0	0	5 (100)	
Gender	Male	1 (14.3)	0	6 (85.7)	0.488
	Female	12 (21.8)	7 (12.7)	36 (65.5)	

Age	Less than 30	13 (23.6)	7 (12.7)	35 (63.6)	0.440
	31-40	0	0	6 (100)	
	Greater than 40	0	0	1(100)	
Department	Ward	2 (33.3)	1 (16.7)	3 (50)	0.835
	Dialysis	1 (50)	0	1 (50)	
	ICU	4 (20)	3 (15)	13 (65)	
	Cabin	6 (17.6)	3 (8.8)	25 (73.5)	
Level of Education	Primary	0	0	3 (100)	0.626
	HSC	0	0	3 (100)	
	Diploma	13 (24.1)	7 (13)	34 (63)	
	Masters	0	0	2 (100)	
Type of Specialty	Hemodialysis	0	0	2 (100)	0.834
	Acute Nephrology Nursing	2 (14.3)	2 (14.3)	10 (71.4)	
	Renal nursing	0	0	2 (100)	
	General nursing	11 (25)	5 (11.4)	28 (63.3)	

The Table 2 presents the distribution of Nutritional Knowledge (NK) ratings (Poor, Average, Good) across various demographic and professional characteristics of nursing staff. Among nurses the percentage of good knowledge who has less than 5years experience in nursing(61%), 5-10 years' experience (73.3%), greater then 10years experience(100%), Experience in nursing at KF who has less than 5years experience (61.7%), 5-10years experience (80%), greater than 10 years (100%), male (85.5%), female (65.5%), nurses who's age is less than 30 years (63.6%), 31-40years(100%), greater than 40years(100%), nurses who served in ward (50%), dialysis (50%), ICU (65%), cabin (73.5%), who are passed primary (100%), HSC (100%), Masters (100%), diploma in nursing (63%), who has specialty in Hemodialysis (100%), Acute Nephrology Nursing (71.4%), renal nursing (100%) and general nursing (63.3%). The table explores the relationship between various factors (such as experience, gender, age, department, level of education, and type of specialty) and the level of CKD related Knowledge among nursing staff. There is a significant relation (p-value = 0.015), with more experienced nurses showing higher levels of nutritional knowledge. No significant difference (p-value = 0.156), suggesting at KFH the experience might not significantly affect CKD related knowledge. No significant difference (p-value = 0.488) indicating gender, (p-value = 0.440), implying age, (p-value = 0.835), suggesting department placement, (p-value = 0.626), indicating that higher education levels, (p-value = 0.834), suggesting that the type of nursing specialty does not significantly affect nutritional knowledge.

So, the table (Table 2) shows that there is a significant positive correlation between years of nursing experience and knowledge of chronic kidney disease (CKD). Nurses with more experience demonstrated higher levels of CKD knowledge. However, experience at the Kidney Foundation Hospital (KFH) did not significantly influence knowledge. Other factors such as gender, age, department, education level, and nursing specialty had no significant impact on CKD knowledge.

4.3 Factors associated with Protein and Potassium related knowledge of nurse:

The Table 3 shows the distribution of Protein & Potassium Knowledge (PKK) is classified into three categorized (Poor, Average, Good) across various demographic and professional characteristics of nursing staff.

Table 3: Relationship between Demographic and Professional Characteristics and Protein and Potassium Knowledge

		Protein and Potassium Knowledge			
	Category	**Poor N (%)**	**Average N (%)**	**Good N (%)**	**p-value**
Experience in Nursing	Less than 5 Years	10 (24.4)	24 (58.5)	7 (17.1)	0.002
	5-10 Years	3 (20)	3 (20)	9 (60)	
	Greater than 10 years	0	1 (16.1)	5 (83.3)	
Experience in Nursing at KF	Less than 5 Years	12 (25.5)	24 (51)	11 (23.4)	0.035
	5-10 Years	1 (10)	3 (30)	6 (60)	
	Greater than 10 years	0	1 (20)	4 (80)	
Gender	Male	0 (0)	5 (71.4)	2 (28.6)	0.232
	Female	13 (23.6)	23 (41,8)	19 (34.5)	
Age	Less than 30	13 (23.6)	26 (47.3)	16 (29.1)	0.206
	31-40	0	2 (33.3)	4 (66.7)	
	Greater than 40	0	0	1 (100)	
Department	Ward	2 (33.3)	2 (33.3)	2 (33.3)	0.937
	Dialysis	0	1 (50)	1 (50)	
	ICU	3 (15)	10 (50)	7 (35)	
	Cabin	8 (23.5)	15 (44.1)	11 (32.4)	
Level of Education	Primary	1 (33.3)	1 (33.3)	1 (33.3)	0.304
	HSC	0	0	3 (100)	
	Diploma	12 (22.2)	26 (48.1)	16 (29.6)	
	Masters	0	1 (50)	1 (50)	
Type of Specialty	Hemodialysis	0	2 (100)	0	0.153

	Acute Nephrology Nursing	1 (7.1)	10 (71.4)	3 (21.4)
	Renal Nursing	0	1 (50)	1 (50)
	General Nursing	12 (27.3)	15 (34.1)	17 (38.6)

This table shows that the percentage of good knowledge who has less than 5years experience in nursing(17.1%), 5-10 years' experience (60%), greater then 10years experience(83.3%), Experience in nursing at KF who has less than 5years experience (23.4%), 5-10years experience (60%), greater than 10years (80%), male (28.6%), female (34.5%), nurses who's age is less than 30years (29.1%), 31-40years (66.7%), greater than 40years (100%), nurses who served in ward (33.3%), dialysis (50%), ICU (35%), cabin (32.4%), who are passed primary (33.3%), HSC (100%), Masters (29.6%), diploma in nursing (50%), who has specialty in Hemodialysis (0%), Acute Nephrology Nursing (21.4%), renal nursing (50%) and general nursing(38.6%) has good knowledge. Also, the table explores the relationship between various factors (such as experience, gender, age, department, level of education, and type of specialty) and the level of Protein and Potassium Knowledge among nursing staff. There is a significant difference (p-value = 0.002) and (p-value = 0.035) consecutively with more experienced nurses and, indicating that more years of experience specifically at KF correlate with better protein and potassium knowledge. No significant difference (p-value = 0.232), suggesting gender, no significant difference (p-value = 0.206), implying age, no significant difference (p-value = 0.937), suggesting department placement, no significant difference (p-value = 0.304), indicating that higher education levels, no significant difference (p-value = 0.153), suggesting that the type of nursing specialty does not significantly affect protein and potassium knowledge. Overall nursing experience and experience at the Kidney Foundation Hospital (KFH) are the most significant factors influencing protein and potassium knowledge.

4.4 Multinomial Regression of knowledge regarding protein and potassium with nursing experience

This table presents the Odds Ratios (OR) and their 95% Confidence Intervals (CI) for different levels of Protein and Potassium Knowledge, comparing the effects of experience in nursing and experience at the Kidney Foundation Hospital (KF).

Table 4: Association of Protein and Potassium Knowledge with Experience in Nursing

	Experience in nursing		Experience in nursing at KF	
Knowledge	**OR**	**95%CI**	**OR**	**95%CI**
Poor	1		1	
Average	0.769	0.18-3.29	2.138	0.273-16.743
Good	4.969*	1.29-19.06	7.355	0.987-54.795

*p<0.05; OR, odd ratio; CI, confidence interval.

The table (Table 4) shows that nurses with less than 5 years of experience were less likely to have good knowledge compared to those with more than 10 years (OR = 4.969, 95% CI: 1.29-19.06). There was no significant difference in the likelihood of having poor or average knowledge based on nursing experience. Nurses with more experience at KF were more likely to have average knowledge compared to those with less than 5 years of experience (OR = 2.138, 95% CI: 0.273-16.743). There was no significant difference in the likelihood of having poor or good knowledge based on experience at KF. Overall, the table suggests that overall nursing experience, rather than specific experience at KF, is a stronger predictor of good knowledge of protein and potassium. It appears that the good knowledge about CKD 4.9 times significantly higher in nurses who are experienced for more than 10 years compared with nurse who have experienced less than 5 years.

CHAPTER 5
DISCUSSION

5.1 Discussion:

Effective potassium management is essential, as dietary potassium restriction has traditionally been a core strategy for managing hyperkalemia in CKD patients (Emmanuel Gapira et al., 2020; Yamada & Inaba, 2021). Higher educational qualifications and greater work experience were associated with better nutritional knowledge among nurses. A study in Bangladesh found that nurses scored an average of 63.4% on nutritional knowledge assessments, indicating a low to moderate understanding of nutrition (Reza et al., 2023).

The study involved 63 predominantly female nurses with an average age of 26. Most worked in the cabin unit and held diploma certificates. While many had good general CKD knowledge, their understanding of protein and potassium was more varied.

The study result shows that there is a significant difference (p-value = 0.015), with more experienced nurses showing higher levels of nutritional knowledge. And also, the findings of the research demonstrated a significant difference (p-value = 0.002) and (p-value = 0.035) consecutively with more experienced nurses and, indicating that more years of experience specifically at KF correlate with better protein and potassium knowledge. A similar results also find where maximum of nurses believed a low potassium diet should be prescribed to all chronic renal failure patients, indicating a lack of understanding of individualized dietary needs (Sik Yin & Cheong, 2012).

Multinomial Regression analysis shows a link between good knowledge and less than 5years experience and greater than 10 years of experience, indicating that nurses' knowledge related with their experience. Study shows that who has more experience are more likely to have higher nutritional knowledge. A similar result also shows that nurses must recognize the balance between potassium intake and excretion, tailoring management strategies to individual patient needs (Yamada & Inaba, 2021). Research shows good knowledge about CKD 4.9 times higher in nurses who are experienced for more than 10 years compared with nurse who have experienced less than 5 years. Continuous training and curriculum reforms are recommended to enhance the nutritional competencies of nursing staff (Reza et al., 2023).

Protein necessity for nephrology patients, which is concerning given that protein intake plays an important role in balancing kidney function. While some nurses illustrated an ample understanding of protein needs, others lacked clarity on the difference between low, moderate, and high protein necessity based on a patient's stage of CKD. This lack of consistency could lead to potential challenges in the clinical guidance of patients. Previous studies have emphasized that nurses' nutritional knowledge directly impacts patient obedience with dietary

restrictions, emphasizing the need for more targeted education in this area. Increasing the understanding of protein guidelines, such as differentiating between protein sources (e.g., animal vs. plant proteins) and the protein intake adaptations needed for patients on dialysis versus those not on dialysis, may help bridge this knowledge gap. Potassium guidance is another key area in nephrology care due to the risks of hyperkalemia, particularly in patients with decrease kidney function. The study disclosed that while nurses generally acknowledge the importance of potassium management, there was limited knowledge on specific high- and low-potassium foods, relevant dietary modifications, and the impact of cooking techniques on potassium content. This aligns with findings from similar studies, which suggest that nurses often depend on general rather than specialized knowledge in dietary balance for CKD patients.

Hence, there exists a link between nurses' experience and nutritional knowledge and protein potassium knowledge. In practical terms, it suggests that more experienced nurses at KF tend to have a deeper understanding of protein. Similar study also said experience in renal units and specialized training significantly improved knowledge scores, indicating the importance of targeted education (Emmanuel Gapira et al., 2020).

The findings of the research indicated no statistically significant association was seen among the male, female, age, education, department. It seems shocking that there is no significant association with education. A study revealed that, most of participants had poor nutrition knowledge (Adeline E. Munuo1, Beatrice W. Mugendi2, 2016) . This may seem shocking, as one might assume that nurses through years of patient care would surprisingly strengthen their understanding of nutrition. The study shows that nurses often receive least possible nutrition education during their initial training without structured, ongoing education. Similar study shows that most nurses had moderate knowledge about CKD care, with only a small percentage demonstrating high levels of knowledge (Emmanuel Gapira et al., 2020). Another study shows that their basic knowledge of nutrition is unclear (Cass et al., 2014; Mitchell et al., 2011). Again, a study reported that they are unsure about when providing nutrition care will be most effective (Martin et al., 2014). Nursing work environments are often fast-moving, categorize acute care skills, medication management, and other instant needs over nutritional education. Nurses are typically focused on managing symptoms and executing hands-on tasks, leaving little time for nutrition education unless it is unquestionably part of their role. Nurses may depend on dietitians and nutritionists for detailed nutritional evaluation and interventions. This can create a gap in their own knowledge if nutrition is seen as "someone else's specialty". There is an evaluation study in the United States explained a similar observation by stating that clinical experience did not raise the level of nutritional knowledge among licensed nurses employed in nursing homes. Additionally, the study demonstrated a correlation between the nutrition knowledge score and the educational substructure. Long-term clinical experience without any specialized nutrition education or job experience in this field does not boost nutrition knowledge, according to another report on the nutrition knowledge level of nurses in Zonguldaki, Turkey (Adeline E. Munuo1, Beatrice W. Mugendi2, 2016). Educational

programs, such as the introduction of the phosphorus pyramid, have shown to increase nurses' knowledge about dietary management, suggesting that similar interventions could enhance understanding of potassium management (Somuah, 2018).

5.2 Strengths and limitations of the study:

Nurses are the pillar of the healthcare system, playing a vital role in patient care. They are often the first person of contact for patients and families, giving not only medical care but also emotional support and education. My study addresses an important gap, as nutritional knowledge among healthcare contributors can directly affect patient outcomes. By concentrating on protein and potassium, two crucial nutrients for nephrology patients, your study is both targeted and practical. This focus allows a detailed examination of knowledge related to nutrients that have a remarkable impact on kidney health, reducing the risk of complications like hyperkalemia and protein-energy malnutrition in patients.

In my study has some limitations. It is a self-reported questionnaires this may introduce response bias. The sample size is small and limited to a single hospital the results may not be generalizable to all nurses working in renal-units in others hospitals or geographical areas. Results may vary in larger or more diverse nurse populations. My study focusses on nephrology, other significant nutrients in renal health, such as phosphorus, sodium, and calcium were not included.

CHAPTER 6
CONCLUSION

6.1 Conclusion:

This study highlights the critical role of nutritional knowledge in nurses working in nephrology units and they need to enhance their expertise in this area. Our findings indicate that in general more experienced nurses possess higher levels of nutritional knowledge particularly in managing protein and potassium intake for patients with chronic kidney disease (CKD). However, experience alone does not uniformly correlate with higher CKD-related knowledge at all institutions at Kidney Foundation Hospital (KFH), experience did not show a statistically significant impact on overall CKD knowledge. In contrast, at Kidney foundation (KF) Hospital, a significant positive correlation was found between years of experience and knowledge specifically in areas related to protein and potassium. Moreover, nurses with over 10 years of experience demonstrated a 4.9 times higher likelihood of having strong CKD-related knowledge than those with less than 5 years of experience. These results emphasize the importance of tailored nutritional training programs to improve knowledge among nurses with varying levels of experience in nephrology care.

6.2 Recommendation:

Nurses plays a vital role in managing patients. They need proper knowledge about nutrients especially for chronic kidney diseases patients. It is important to implement regular training sessions and workshops focused on nutritional management in renal patients, emphasizing the roles of protein and potassium. Some recommendations are:

1. Develop and disseminate clear, evidence-based dietary guidelines for nurses to reference when advising patients on protein and potassium intake.
2. Introduce assessment tools or quizzes to regularly evaluate the nutritional knowledge of nursing staff, ensuring they remain informed about best practices in renal nutrition.
3. Foster collaboration between dietitians, nephrologists, and nursing staff to enhance the overall knowledge base and ensure cohesive patient education strategies.
4. Create accessible educational materials for patients that nurses can use to reinforce learning about protein and potassium management.

CHAPTER 7
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APPENDICES

Appendix 1: Synopsis of Research

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1. **Project Title: Assessment of Nutritional Knowledge Focusing on Protein and Potassium Among the Nurses at Nephrology Unit of a Tertiary Hospital: A Cross-Sectional Study**

2. **Introduction:**

A good and nutritious diet is determined by a number of factors, one of which is awareness and knowledge of nutrition. According to an evaluation by the World Health Organization, around eighty percent of the burden of mentioned chronic diseases is attributed to lifestyle and dietary factors (WHO, 2009). Compelling evidence suggests that chronic kidney disease (CKD) is a substantial global health concern, marked by the gradual loss of kidney function as well as the incidence of CKD is on the rise, driven by factors such as an aging population and an increased prevalence of cardiovascular disease, diabetes, and hypertension (Kent et al., 2014). As CKD becomes more prevalent, healthcare professionals are vibrant in managing and preventing associated complications. The nephrology unit within a tertiary hospital is a specialized department dedicated to diagnosing, treating, and managing kidney-related disorders. This unit serves as a crucial hub for patients with various CKD stages, from mild impairment to End-stage renal disease (ESRD) requiring treatments like dialysis or kidney transplantation. In this situation, nurses and other healthcare professionals play crucial roles in managing and preventing complications related to CKD. Nurses, in particular, are well-positioned to assess the nutritional status of patients, often being the first point of contact for hospitalized individuals on a daily basis. A study revealed that 86% of nurses focused on nutritional problems in their clinics in which they worked, with 27% said that doctors had this

responsibility (Eraslan Doğanay et al., 2022; Rasmussen et al., 1999). On the other hand, managing nutrition in CKD patients involves early disease recognition, interpreting markers and stages of CKD appropriately, and collaborating with other healthcare consultants. Effective CKD management can slow progression, prevent metabolic complications, and decrease cardiovascular-related consequences (Plantinga et al., 2010). Given the increasing prevalence of CKD, caring for these patients requires specialized knowledge and skills to address the challenges posed by this growing epidemic (Munuo et al., 2016). Recognizing the indispensable role of nurses in patient care, this research aims to assess the extent of their understanding of essential nutrients. Specifically, this study focuses on investigating the nutritional knowledge of nurses in the nephrology unit, with an emphasis on their grasp of protein and potassium.

3. Objectives:

To evaluate the nutritional knowledge among the nurses working at nephrology unit with focusing on protein and potassium.

4. Methodology:

A cross-sectional, descriptive, questionnaire-based survey method will be carried out to assess the nutritional knowledge focusing on protein and potassium among the nephrology nurses at kidney foundation in Bangladesh. Study population will be selected by simple random sampling. Approximately 62 nephrology nurses will be enrolled to form the cohort for the final analyses. Participants will be given a consent form ahead of the data collection process, along with a set of questionnaires. Ethical approval for the study will be taken from kidney foundation in Bangladesh.

5. Self-administered Questionnaire:

A validated self-administered questionnaire will be used to collect socio-demographic information and evaluate basic knowledge specifically concentrating on CKD and CKD diets, particularly in relation to potassium and protein.

6. Statistical analysis:

Data analysis will be conducted using the Statistical Package for Social Sciences (SPSS), version 27.0 software.

7. Expected Outcomes:

This study aims to improve the care of CKD patients by assessing the nutritional knowledge of nurses. By determining the nurses' understanding of protein and potassium intake, the study aims to ensure that CKD patients receive accurate and personalized dietary guidance. This can help prevent complications like malnutrition, electrolyte imbalances, and kidney disease progression. The study's simple, quick, cost-effective, and reliable evaluation protocol can

empower CKD patients by enabling them to actively participate in their care and improve their quality of life.

8. Socio-economic Impact:

This study highlights the importance of improved nutritional knowledge among healthcare professionals, especially nephrologists. This can lead to better patient care, reduced hospitalizations, lower healthcare costs, and improved overall health outcomes. These benefits can contribute to a more sustainable healthcare system and a healthier population, ultimately leading to increased productivity and reduced economic burden

8. Time Schedule of Activities of the Research:

Tasks	Activities by Months (Starts to Ends)					
	1	2	3	4	5	6
Literature research	⟷					
Study protocol and questionnaire development		⟷				
Ethical approval						
Training of anyone			⟷			
Pretesting of study protocols, questionnaire			⟷			
Data and sample collection phase				⟷		
Data analysis and report writing					⟷	
Report submission and article publication					⟷	⟷

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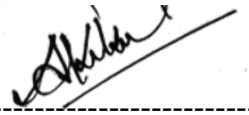
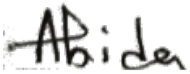
10. Signature of Supervisor and Fellow:

Signature of the Supervisor



Akibul Islam Chowdhury
Lecturer
Department of Nutrition and Food Engineering
Faculty of Health and Life Sciences
Daffodil International University

Signature of the Student



Abida Zaman
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Appendix 2: Questionnaire

Title: Assessment of Nutritional Knowledge Focusing on Protein and Potassium Among the Nurses at Nephrology Unit of a Tertiary Hospital: A Cross-Sectional Study

Consent form:

Details of Head Researcher: Akibul Islam Chowdhury, Lecturer, Department of Nutrition and Food Engineering, Daffodil International University, Dhaka, Bangladesh.

Details of Co-researcher: Abida Zaman, Undergraduate Student, Department of Nutrition and Food Engineering, Daffodil International University, Dhaka, Bangladesh.

Duration: 6 months.

Confidentiality: The data provided by the participant will be considered strictly confidential and will not be given to others without written permission from the participant.

Right to Refuse or Discontinue: The participant has the right to discontinue or decline the participation in the research anytime he/she feels to do so.

☐ I confirm that my participants in this research project is voluntary

☐ I acknowledge that I will not be receiving any payments in regard to my participants

☐ I confirm that I have the right to decline or discontinue my participants in this research when I have a valid reason to do so.

☐ I have read and understand what the research is all about.

☐ I understand that the researcher will not identify me by my name in any reports and will publish it in books, newspaper, journals and other research-related projects.

X _____

Questionnaire

ID No : **Date :**

Name : **Contact No :**

Part A: Demographic Information

1. **Department Type:**

☐ Ward ☐ Dialysis ☐ ICU ☐ Cabin ☐ HDU

2. **Age:** _____

3. **Gender:**

☐ Male ☐ Female

4. **Duration of Experience:** _____
5. **Duration of Experience at Kidney Foundation:** _____
6. **Level of Education:**

☐ Masters ☐ Bachelor ☐ Diploma ☐ Others _____

7. **Type of specialty:**

☐ Hemodialysis Nursing ☐ Peritoneal Dialysis Nursing ☐ Transplantation Nursing
☐ Nephrology Nursing ☐ General Nursing

Part B: CKD related Knowledge Questions:

1. When can we call a kidney disease CKD?

Ans: 1 = After 1 month **2 =** After 3 months **3** = After 6 months

2. Are you familiar with CKD impacts on patients?

Ans: 1 = Yes **2 =** No

3. What do you think about CKD impact on patients' health?

Ans: 1 = Kidney function decline **2** = Electrolyte and Fluid imbalance

3 = Anemia **4** = Bone and mineral disorder **5** = Edema

6 = Nausea and vomiting **7** = All

4. Do you know the risk factors of CKD?

Ans: 1 = Yes **2** = No

5. What are the risk factors of CKD?

Ans: 1 = Diabetes **2** = HTN **3** = Inflammation in Glomerulonephritis

4 = Family History **5 =** All **6 =** Others _____

6. Do you think that Glomerular filtration rate (GFR) and creatinine clearance are appropriate marker of kidney function?

Ans: 1 = Yes **2** = No

7. Is it important to measure dry weight after dialysis?

Ans: 1 = Yes **2** = No

8. Have you received any education about CKD diet and dietary implication?

Ans: 1 = Yes **2** = No

Part C: Nutritional knowledge of dietary sources of Protein and Potassium:

1. Do you know about the function of protein?

Ans: 1 = Yes **2** = No

2. What are the primary goals for low protein diet in CKD?

Ans: 1 = To slow progression **2 =** Minimize accumulation of uremic toxins

3 = All of the above **4 =** Others _____

3. Do you think a low protein diet recommended for all renal patients?

Ans: 1 = Yes **2** = No

4. What kind of diet should be recommended for dialysis patient?

Ans: 1 = Low protein **2 =** High protein

5. Do you know about high biological value and low biological value of protein?

Ans: 1 = Yes **2** = No

6. What do you think which have the low biological value of protein?

Ans: 1 = Rice **2** = vegetables **3 =** lentils **4 =** spinach **5 =** All

7. What do you think which have the high biological value of protein?

Ans: 1 = Egg **2** = Chicken **3** = Fish **4** = All

8. Do you know about Hyperkalemia and Hypokalemia?

Ans: 1 = Yes **2** = No

9. What do you think managing potassium is important for CKD patient?

Ans: 1 = Yes **2** = No

10. For stages 3, 4 & 5 which levels of potassium are considered high?

Ans: 1 = 3.5 mEq/L **2** = 4 mEq/L **3** = 4.5 mEq/L **4** = 5.5 mEq/L

11. Do you know the amount of Daily potassium intake for CKD?

Ans: 1 = Less than 3000mg **2** = Less than 2000mg **3** = Less than 1000mg

4 = Others _____ 5 = Don't know

12. What do you think which fruits and vegetables have high potassium?

Ans: 1 = Potatoes **2** = Deep fried bitter gourd **3** = Cauliflower **4** = All

13. What do you think which fruits and vegetables have low potassium?

Ans: 1 = Snake gourd **2** = pointed gourd (potol) **3** = Eggplant **4** = carrot **5** = All

ASSESSMENT OF NUTRITIONAL KNOWLEDGE FOCUSING ON PROTEIN AND POTASSIUM AMONG THE NURSES AT NEPHROLOGY UNIT OF A TERTIARY HOSPITAL: A CROSS-SECTIONAL STUDY

ORIGINALITY REPORT

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SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

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