



Daffodil
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University

An Internship Report

**NUTRITIONAL MANAGEMENT OF CHRONIC KIDNEY DISEASE PATIENTS
AT KIDNEY FOUNDATION HOSPITAL AND RESEARCH INSTITUTE**

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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 internship, “**Nutritional management of chronic kidney disease patients at Kidney Foundation Hospital and Research Institute**”, has been turned in by **Ashika Akter Lisha** to the Department of Nutrition and Food Engineering at Daffodil International University. It has been accepted as a partial fulfillment of the requirements for the degree of B.Sc. in Nutrition and Food Engineering and approved for its style and content. The date of the presentation was October 2023.

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DECLARATION

The project was completed under the supervision of **Ms. Tasmia Tasnim, Assistant Professor**, Department of NFE at Daffodil International University. I also affirm that neither this project nor any portion of this project has been submitted elsewhere to earn a degree or certificate.

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First of all, I want to sincerely thank Allah for giving me the willpower to complete my internship report.

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I had a great opportunity to study and develop my practical skills during my internship with Kidney Foundation. I met several knowledgeable and skilled individuals who were helpful to me during this process.

I'm quite appreciative that the director of "The Kidney Foundation" approved my application for an internship.

EXECUTIVE SUMMARY

The internship program at the Kidney Foundation has facilitated a significant and profound educational opportunity spanning three months, commencing in June 2022 and concluding in August 2022. The Kidney Foundation, a well-regarded non-profit organization committed to promoting kidney health and providing assistance to persons impacted by renal illness, has provided an engaging and informative forum for professional development. During the duration of the internship, I have had the opportunity to collaborate with a group of dedicated professionals who possess a profound enthusiasm for their organizational objectives. During my tenure, I was entrusted with a diverse array of responsibilities, which allowed me to acquire valuable experiential knowledge in multiple facets of kidney health and healthcare administration. One of the notable aspects of this internship has been the opportunity to gain firsthand experience and knowledge regarding the extensive range of healthcare services offered by the Kidney Foundation.

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CHAPTER 1

Introduction

1.1 Introduction

Chronic Kidney Disease (CKD) has emerged as a significant global public health concern (Kurniawan et al.; 2019). The prevalence of kidney illnesses among patients is steadily rising. Within the realm of renal disorders, individuals afflicted with chronic kidney disease, characterized by a prolonged period of diminished kidney function lasting over three months, exhibit the most elevated prevalence (YK Seo et al. 2020). Annually, a staggering number of over 850 million individuals worldwide receive a diagnosis of various types of renal disease. In Bangladesh, the prevalence of various kidney ailments affects approximately 18 million individuals. According to Sarkar MHR et al. (2021) studies, In Bangladesh, the mortality rate among patients stands at 40%. Additionally, there exists a condition known as acute kidney injury (AKI) or acute renal failure (ARF), characterized by the fast onset of kidney dysfunction. This acute impairment has the potential to progress into chronic kidney disease over time. Chronic renal illness currently affects approximately 10% of the global population. The 16th Annual Convention and Scientific Seminar of the Kidney Foundation, Bangladesh. The prevalence of chronic kidney disorders is more pronounced in developing nations, particularly in Asia and Sub-Saharan Africa. These regions have also witnessed a rise in the burden of chronic illnesses, transitioning from a predominant focus on infectious diseases. This shift can be attributed to declining birth rates and an increased life expectancy (MHR et al. (2021).



Figure 1.1: Kidney Foundation

Taiwan, Japan, South Korea, Malaysia, and India consistently rank in the top 20 countries worldwide in terms of chronic kidney disease (CKD) incidence on an annual basis. Bangladesh is also included among the countries experiencing a rising prevalence of Chronic Kidney

Disease (CKD), or renal insufficiency. A comprehensive examination of six regions, including Bangladesh, revealed a prevailing prevalence of chronic kidney disease (CKD) at a rate of 14% (MHR Sarker et al., (2021)). A study conducted in Dhaka, Bangladesh, focusing on those aged 30 years and above, unveiled a prevalence rate of 26% for chronic kidney disease (CKD). According to findings from community-based research, it was determined that around one-third of rural people were vulnerable to chronic kidney disease (CKD), with a significant proportion of these cases remaining mostly untreated. Nevertheless, the absence of a comprehensive nationwide health database has resulted in a dearth of information regarding the evolving prevalence of chronic kidney disease (CKD) within the Bangladeshi population. The incidence of chronic kidney disease (CKD) exhibits variations across many demographic factors, including age cohorts, gender, socioeconomic standing, and degree of urban development. In addition, the presence of health risk factors such as diabetes and hypertension significantly augments the likelihood of developing chronic kidney disease (CKD). Title: A Decade of Laboratory-Based Observation on Renal Insufficiency in Urban Populations of Bangladesh The prevailing risk factors for chronic kidney disease (CKD), such as diabetes and hypertension, exhibit a notably elevated prevalence, hence contributing to the existing burden of CKD. Among the surveyed population, it is observed that 18% are afflicted with hypertension, 5% with diabetes, and 7.7% with proteinuria. A majority of the individuals exhibited a lack of awareness of their respective medical conditions.

The incidence of renal illness among the Bangladeshi population is above the global average, with a notable gender disparity in Bangladesh, where women exhibit a higher susceptibility to kidney disease compared to males. Based on data provided by the Bangladesh Bureau of Statistics (BBS), there has been a threefold increase in the mortality rate associated with kidney disease from 2019 to 2020. According to recent research, a global prevalence rate of 10-12 percent has been reported for chronic renal disease. The prevalence of this rate is comparatively greater in developing nations as opposed to wealthy nations. Presently, the number of individuals afflicted with various manifestations of renal ailments in Bangladesh exceeds 20 million. The primary factor contributing to this issue is the high cost associated with treating end-stage kidney disease. Additionally, there is a significant lack of suitable specialized facilities that offer such treatment. Moreover, the expenses related to dialysis and kidney transplantation exceed the financial means of the majority of patients. Based on the findings of the Kidney Foundation's study, it has been determined that a considerable proportion of patients can initiate dialysis treatment. However, it is noteworthy that a significant majority, approximately 75%, are compelled to discontinue dialysis within a period of three to six months. This cessation is primarily attributed to financial constraints, resulting in the liquidation of their assets, including properties (MHR Sarker et al., (2021)).

Currently, chronic kidney illnesses pose a significant global health concern. There is now no definitive remedy available for achieving full recuperation. Irrespective of the etiology of kidney disorders, the significance of diet and nutrition becomes paramount in conjunction with patient therapy as renal function deteriorates. A regulated dietary regimen is employed as a preventive measure against the advancement of renal disorders and to uphold a suitable equilibrium of diverse constituents inside the organism (MHR Sarker et al., (2021)).

CHAPTER 2

Kidney Foundation

2.1 History

The Kidney Foundation is a non-profit organization that focuses on promoting kidney health and supporting individuals affected by kidney disease. The hospital and research institute were formally established in June 2002, and the facility commenced operations in October 2003 with a modest initial capital investment of 75,000 taka. The organization's inception took place within a rented facility, staffed by a mere seven individuals and equipped with a temporary allocation of six dialysis machines. The organization offers diagnostic facilities and outpatient treatments at cheap rates, with a focus on non-profit operations. The organization commenced its extended operations in July 2011, establishing a hospital with a capacity of 150 beds and a workforce of 140 personnel. This facility provides advanced medical care with cutting-edge technology, encompassing cost-effective dialysis, kidney transplantation, interventional nephrology, a laboratory facility, as well as both inpatient and outpatient services. Presently, it has emerged as the preeminent healthcare facility in Bangladesh specializing in the provision of medical services for renal and urological ailments, including dialysis and transplantation. Through the unwavering commitment and diligent efforts of its members, the Kidney Foundation has evolved into an esteemed institution that delivers exceptional healthcare services and instills optimism among individuals afflicted with kidney illnesses and renal failure. Individuals lacking sufficient money were provided with complimentary medical treatment.

2.1.1 Location of kidney foundation

Plot No. - 5/2, Road No.- 1 (Main Road), Section 2, Mirpur, Dhaka, 1216.

Other Branches of the Kidney Foundation:

Kidney Foundation Hospital and Research Institute, Bono-gram Pabna

Kidney Foundation, Sirajganj.

Kidney Foundation, Sylhet.

2.2 Activities of Kidney Foundation

The Kidney Foundation Hospital currently operates a network of hospitals with an average bed capacity of 300 and a total staff count of 287. Our institution provides comprehensive and cost-effective treatment options for individuals suffering from acute and chronic kidney disease. We offer state-of-the-art facilities that cater to various needs, including dialysis, kidney transplantation, interventional nephrology, and laboratory services, as well as both inpatient and outpatient care. This study aims to investigate the characteristics of both rural and urban populations about the identification, prevention, and management of Acute Kidney Injury (AKI) and chronic kidney disease (CKD). The organization offers training programs for medical professionals such as doctors, nurses, technologists, and other paramedical staff.

Additionally, it engages in research collaborations with Wayne State University in Michigan, USA, and the Royal London Hospital in the United Kingdom. Given the significant level of public demand and the rising prevalence of individuals suffering from renal disease, the Renal Foundation has made a steadfast commitment to improving and expanding its range of services. There has been a notable rise in academic activity, accompanied by the initiation of training programs targeting renal nurses and renal dietitians.

2.2.1 International Recognition

Over the previous two years, the International Kidney Association (ISN) has been engaged in the implementation of advanced training programs encompassing dialysis, kidney transplantation, kidney biopsy, and the training of nurses. These activities have been carried out in collaboration with the Kidney Foundation Hospital and Research Institute in Dhaka, Bangladesh, specifically through the Renal Sister Center. The Royal London Hospital has provided valuable support throughout this endeavor. In the present scenario, the Kidney Foundation Hospital and Research Institute has attained recognition at the C to B and B to A levels. Upon successful completion of the training and research operations in the designated period of 2022-2023, the Kidney Foundation Hospital and Research Institute will attain the status of an internationally recognized research and training institution, according to the highest standards.

2.3 Aim and Objective of the Kidney Foundation

- Offering treatment with state-of-the-art facilities at an affordable price in clinical nephrology, dialysis, and transplantation.
- conducting academic activities and research.
- Providing training to doctors, nurses, technologists, and other paramedical staff.

2.3.1 Facilities

- Clinical Nephrology Facilities
- Clinical Urology Facilities
- Dialysis Facilities
- In-door Facilities
- Out-door Facilities
- CAPD Facilities
- Laboratory Facilities
- Radiology and imaging Facilities
- ICU Facilities
- Home Kitchen Facilities
- Pharmacy
- Nutrition Department
- A book of nutritional guidelines.

2.3.2 Academic Activities

- ✓ Continued Medical Education (CME)
- ✓ Diploma in Renal Nursing.
- ✓ Annual Convention & Scientific Seminar.
- ✓ Research Activities.
- ✓ Training On Renal Nutrition.

2.3.3 Long-term Planning & programs

1. Provision of financial support.
2. Various activities for generating awareness and imparting training for health care professionals involved in organ transplantation, including transplant coordinators and grief counselors.
3. Setting up six divisional organ and tissue typing centers.
4. Training of the organ retrieval committee in all solid organs, particularly the heart, lungs, and pancreas.
5. Provision of transplant coordinators and grief counselors in all medical colleges and trauma centers.
6. Management of deceased donors.
7. Mandatory to declare brain death for all ICU patients.

2.4 SWOT Analysis

STRENGTHS	WEAKNESS
<ul style="list-style-type: none">❖ Low cost with excellent health care❖ Special Renal expertise	<ul style="list-style-type: none">❖ A limited number of nutritionists❖ Lack of Online Service
OPPORTUNITIES	THREATS
<ul style="list-style-type: none">❖ Collaboration work❖ Providing training	<ul style="list-style-type: none">❖ Financial sustainability❖ Insufficient space

2.5 Summary

The Kidney Foundation of Bangladesh is dedicated to delivering cost-effective healthcare services to individuals suffering from kidney-related ailments while upholding high standards of quality. Furthermore, it plays a significant role in the facilitation of education and training programs for medical professionals such as doctors, nurses, dieticians, and paramedics, while also fostering a culture of research and innovation. The organization has formulated plans to extend its infrastructure throughout several regions inside the nation.

2.6 Learning Outcomes

The inclusion of an internship is a crucial component within the educational journey of those who have completed a degree in nutrition. As a student pursuing a degree in Nutrition and Food Engineering, I have developed a keen interest in the field of Renal Nutrition. I visited the Kidney Foundation Hospital & Research Institute due to its reputation as a premier institution for acquiring a comprehensive understanding and practical experience in the field of renal nutrition. The internship spanned a period of three months, specifically from June to September.



During my internship period, I learned the following things:

1. Assessment of a CKD patient
2. Ma'am, please provide me with lecture sheets and guidelines that help me a lot to understand the nutritional management of CKD patients.
3. I learned about different biochemical markers (sodium, potassium, chloride, uric acid, phosphorus, creatinine, eGFR, Albumin, and hemoglobin) that can help me understand a patient's health conditions.
4. I visited Indoors (the Ward and Dialysis Unit) with Ma'am, where I gained practical knowledge on how to deal with an admitted patient.
5. In the outdoor chamber, Ma'am took me with her, where I observed how to counsel a patient properly and how to make a diet chart according to a patient's requirements.
6. I wrote in my notebook about things I didn't fully understand. Then, when I met Tazreen, Ma'am, I told her about those topics that I didn't understand. After that, Ma'am patiently heard those problems and made them clear by delivering a speech about them.

2.6.1 Overview of the internship experience:

During my internship at Kidney Foundation Hospital, I had the opportunity to cultivate a high degree of interpersonal communication with patients, thereby enhancing my proficiency in counseling. I am now able to provide a suitable dietary plan for those with kidney issues based on their specific health circumstances. I am fortunate to have acquired knowledge of renal nutrition from my esteemed instructor, Tazreen.



I was astounded by the efficacy of her instructional approach. I express deep gratitude towards her for rendering the three-month expedition delightful and unforgettable. In summary, the Kidney Foundation Hospital played a pivotal role in fostering my professional growth as a Renal dietitian. I intend to acquire knowledge and develop competencies. I acquired knowledge of these principles and subsequently implemented them in my subsequent professional role. Due to my keen interest in the field of renal nutrition, I had the privilege of undertaking an internship with the esteemed Kidney Foundation. As a consequence of my internship experience, I have gained a heightened awareness of the suitable professional setting.

CHAPTER 3

About Kidney

3.1 Kidney

The kidneys assume a vital function in the elimination of several metabolic byproducts, such as ammonia and urea derived from protein metabolism, creatinine originating from muscle tissue, uric acid resulting from nucleic acid breakdown, as well as various medications and poisons.

The kidneys serve as the primary organs within the urinary system. The renal system is responsible for the filtration of around 200 quarts of blood daily, resulting in the production of approximately 2 quarts of waste and excess fluid. The urine is transported via anatomical structures known as ureters to the urinary bladder. The urinary bladder retains urine within the body until it is eliminated through excretion. The kidneys are a pair of organ structures that exhibit a bean-like form, with dimensions about equivalent to that of a human fist. The kidneys are situated inferior to the rib cage, bilaterally next to the spinal column.

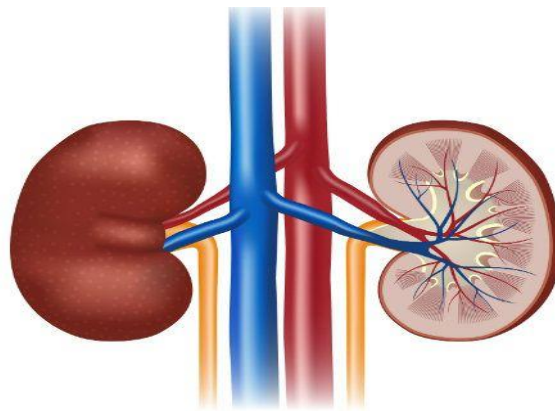


Fig 3.1: Diagram of kidney

3.2 Kidney Function

- Remove waste products through urine.
- Balance body fluid.
- Control the amount of potassium, salt, and uric acid in the body.
- Release a hormone that controls blood pressure.
- Developing an active form of Vitamin D may help in the development of strong bones.
- Control the production of red blood cells.

3.3 Types of Kidney Disease

- Nephritis – kidney inflammation that affects the tissues, tubules, or glomeruli (glomerulonephritis)

- Polycystic kidney disease – an inherited disorder that damages the kidney and causes kidney cysts to grow.
- Kidney stones – Excess calcium absorption from meals and urinary tract infection.
- Urinary tract infection – Usually affects the bladder but may spread to the kidney.
- Drugs and toxins – Long use of particular gout medicine may harm the kidneys.

3.4 Stages of Kidney Diseases

Stage	Definition	Description	Prevalence
1	Kidney damage ³ with normal or high GFR (> 90)	Normal function	3.5%
2	Kidney damage and GFR 60-89	Mild CKD	3.9%
3A	GFR 45-59	Mild to moderate CKD	7.6% (3A and 3B combined)
3B	GFR 30-44	Mild to severe CKD	7.6% (3A and 3B combined)
4	GFR 15-29	Severe CKD	0.4%
5	GFR < 15 or on dialysis	Kidney failure	0.1%

3.5 Diagnosis (test to find out kidney diseases)

The majority of people in the early stages of CKD go undiagnosed. Kidney disease often improves silently, losing the majority of kidney function before producing any symptoms. Doctors suggested Laboratory tests according to these symptoms, such as;

3.5.1 Serum creatinine

Serum creatinine test results are measured in milligrams per deciliter(mg/dl). Normal creatinine levels vary based on sex, age, and amount of muscle.

The normal level is:

0.7-1.3 mg/dl for male

0.6-1.1 mg/dl for female

3.5.2 Urine albumin

The normal amount of albumin in the urine is less than 30 mg a day. If tests show that rise in urine albumin, it could mean kidney disease.

3.5.3 Glomerular filtration rate(GFR)

normal range of eGFR (>90). When this range is lower, we will observe that the kidney will be damaged.

3.5.4 Electrolyte test (Na⁺, k⁺, Cl⁻)

The normal range for blood sodium levels is 135-145 mmol/l.

The normal potassium level for adults ranges from 3.5-5.2 mmol/l. Potassium levels between 3-3.5 mmol/l are considered mild hypokalemia.

A typical normal range for a chloride blood test for an adult is 96-106 mmol/l.

3.5.5 Urea

The Normal range of urea in blood or serum is 5-20 mg/dl/ 1.8-7.1 mmol/dl.

3.5.6 Ultrasound of W/A

A kidney ultrasound is a safe and painless test that uses sound waves to make images of the kidney. Blood flow to the kidneys. Any damage in kidneys. Abnormal sizes or shape of kidneys. Kidney stones, cysts, or tumors. Ultrasound can show that.

3.5.7 Diagnosis

The identification and monitoring of kidney disease are accomplished through the utilization of urine and blood testing. The primary indicators presently employed are atypical amounts of urine albumin and a persistent decline in the estimated glomerular filtration rate (eGFR). Diabetes and hypertension are recognized as the primary etiological factors contributing to the development of chronic kidney disease (CKD) in the adult population. Several disorders that might lead to renal failure may have their roots in early childhood. The timely identification and subsequent administration of suitable interventions have the potential to enhance the predicted outcome across various age cohorts.

CHAPTER 4

Management of CKD

4.1 Chronic kidney disease

Chronic kidney disease (CKD) refers to a progressive and permanent deterioration in renal function, which is sometimes categorized into distinct stages. The initial manifestation of this condition is observed as a biochemical anomaly, which subsequently leads to impaired excretory and metabolic functions. The symptoms experienced are primarily attributed to the endocrine processes of the kidneys. The clinical manifestations of renal illness are commonly referred to as uremia. The term "end-stage chronic kidney disease" refers to the stage of the disease in which mortality becomes probable in the absence of renal replacement therapy (RRT).

The significant implications of chronic kidney disease (CKD) on both societal and economic aspects are noteworthy. The prevalence of chronic kidney disease (CKD) stages 3-5 (eGFR<60ml/min/1.73 m²) is estimated to be approximately 5-7% in numerous countries, with a higher incidence observed among individuals aged 65 years and older. The occurrence of chronic kidney disease (CKD) is significantly more common in individuals with hypertension, diabetes, and vascular illnesses. Consequently, it is advisable to implement focused screening measures for CKD in these specific high-risk populations, as well as other groups with similar risk profiles. Numerous primary kidney illnesses exhibit a higher prevalence in the aged population, thereby necessitating further examination in individuals experiencing a decline in renal function or presenting proteinuria as shown by the dipstick test.

4.2 Cause of CKD

Disease	Proportion
Diabetes mellitus	20-40%
Interstitial disease	20-30%
Glomerular disease	10-20%
Hypertension	5-20%
Systemic inflammatory disease	5-10%
Renovascular disease	5%
Inherited	5%
Unknown	5-20%

4.3 Signs and symptoms

Many people may not Have any Severe symptoms until their kidney disease is advanced. However, notice that:

- Feel more tired and have less energy.
- Fluid retention.
- Fatigue.
- a poor appetite.

- Trouble to sleep
- Lower back pain.
- Muscle cramping at night.
- Puffiness around the eyes, especially in the morning.
- Dry, itchy skin.
- Increase in urination, especially at night.
- Swelling of arms and legs.
- High blood pressure.

Many kidney diseases may not show symptoms until a later stage of the disease, but some signs to look out for include:

- High blood pressure.
- Protein or blood in the urine.
- Creatinine above the normal range.
- A measure of kidney function - GFR below 60.
- Painful urination.
- Swelling in hands, feet, and around of eyes.

4.3.1 Things should not forget:

- Early chronic kidney disease has no signs or symptoms.
- Chronic kidney disease usually does not go away.
- Kidney disease can be treated. In the earlier stage, received effective treatment.
- Blood and urine tests are used to check for kidney disease.
- Kidney disease can progress to kidney failure.

4.4 Prevalence of CKD

Approximately 10% of the population exhibits varying degrees of Chronic Kidney Disease (CKD). Chronic kidney disease (CKD) has the potential to manifest at any stage of life, and its onset can be attributed to a multitude of underlying factors and medical problems.

Kidney illness has the potential to impact individuals across many age groups and ethnic backgrounds. Individuals of South Asian descent, namely those originating from India, Bangladesh, Sri Lanka, or Pakistan, exhibit an increased susceptibility to chronic kidney disease (CKD). This risk can be attributed, at least in part, to the prevalence of diabetes and hypertension within these areas.

Chronic kidney disease (CKD) has the potential to manifest at any stage of life, however, its prevalence tends to rise significantly with advancing age, and it exhibits a higher incidence among the female population. Approximately 50% of individuals aged 75 or above exhibit varying degrees of chronic kidney disease (CKD). However, it is important to note that a significant proportion of these individuals do not suffer from kidney-related ailments, but rather experience the natural effects of aging on their kidneys. The detection of chronic kidney disease (CKD) can be facilitated by the utilization of uncomplicated blood and urine tests. Furthermore, the implementation of straightforward and cost-effective treatments has the potential to decelerate the advancement of the disease, diminish the likelihood of concomitant heart attacks and strokes, and enhance overall quality of life.

4.5 Management goals at each CKD stage

Stage	GFR(ml/min/1.73m2)	Management goals
1	>90	Diagnosis, treat slow progression, reduce CV risk.
2	60-89	Slow progression, reduces CV risk.
3	30-59	Manage complications
4	15-29	Prepare for renal replacement therapy
5	<15	Renal replacement therapy.

If one is diagnosed with chronic kidney disease (CKD), some steps can be taken to safeguard the kidneys from further harm. It is important to detect kidney disease early on for better outcomes. The measures one can take to shield their kidneys from damage can also contribute to the prevention of heart disease and an overall improvement in health. The steps you take to protect Your kidneys from damage:

4.5.1 Diabetes

- Diabetes is one of the most common causes of kidney disease, and it is the number one cause of kidney failure. There are many medicines to treat diabetes, including:
- For type 1 diabetes, insulin injections are an important therapy. They take the place of the insulin in the patient's body that is unable to produce.
- For type 2 diabetes, doctors also prescribe several blood sugar-lowering medications.

4.5.2 High blood pressure

High blood pressure can cause more damage to the kidneys. Doctors may give medicine to lower blood pressure and keep it in a healthy range, including;

- **ACE inhibitors (Angiotensin-converting inhibitors):** There are medicines available that can help to lower blood pressure.
- **Angiotensin receptor blockers (ARBs):** Some medications can reduce blood pressure by widening the blood vessels.
- **Beta-blockers:** These are medications that reduce blood pressure by obstructing the hormone adrenaline, which aids the heart in beating more slowly and with less force.
- **Diuretics (water pills):** Certain medications can increase the frequency of urination, which in turn helps the kidneys remove excess salt and water that may contribute to high blood pressure.
- **Potassium binders:** These are medications available to aid the body in eliminating excess potassium. An excessive amount of potassium in the bloodstream can lead to complications with the heart and other muscle groups.

4.5.3 Heart disease

If the kidneys are not functioning properly, they may not be able to adequately assist other bodily organs, leading to potential heart issues. In such cases, a physician may recommend medication to manage heart disease.

4.5.4 High cholesterol

Cholesterol is a substance that is similar to fat and has a waxy texture. If there is an excessive amount of cholesterol in the bloodstream, it can accumulate in arteries, hindering blood flow to various parts of the body, such as the kidneys. In such cases, doctors may prescribe a type of medication known as statins. The purpose of these drugs is to decrease cholesterol levels, which, in turn, helps blood circulate more smoothly throughout the body.

4.5.5 Anemia

Anemia is not having enough red blood cells in the body. When kidneys are not working well, they do not make enough of a hormone called erythropoietin(EPO), which sends a signal to the body to make more red blood cells. This leads to anemia. If the patient has anemia, a doctor may prescribe:

- **Erythropoiesis-stimulating agent(ESA):** There is an injection available that can aid in the treatment and prevention of anemia. It works by sending a signal to the body to produce more red blood cells.
- **Iron supplements:** Iron is a mineral that aids in the production of red blood cells within the body. If iron is deficient, ESA treatment may not be as effective in generating more blood cells.

4.5.6 Bone disease

If kidneys are not functioning properly, may have an increased risk of developing bone disease. In such cases, a doctor may prescribe appropriate medication or treatment.

- **Phosphate binders:** This medicine helps the body remove extra phosphorus from the blood.
- **Calcium and vitamin D:** Supplements are available that can help balance calcium and vitamin D levels in the body.

4.6 Treatment

Although there is no known cure for chronic kidney disease(CKD), there are treatments available that can alleviate the symptoms and prevent the condition from progressing. The course of treatment will be based on the stage of CKD that you are in. The primary treatments are:

- **Lifestyle changes-** to help stay as healthy as possible.
- **Medicine** – Controlling associated problems such as high blood pressure and high cholesterol is important.
- **Dialysis** – In advanced stages (stage 5) of CKD, it may be necessary to use treatment to mimic some of the functions of the kidney.
- **Kidney transplant** – In advanced stage 5 CKD, this may also become necessary.

4.6.1 Controlled lifestyle

It is crucial to adhere to certain lifestyle practices to ensure optimal health for individuals with kidney disease. Here are some invaluable recommendations for self-care;

- Quit smoking to improve overall health.
- Maintain a balanced and nutritious diet that includes a variety of foods.
- Keep salt intake under 6 gm per day, which is equivalent to approximately 1 teaspoon.
- Get regular exercise and aim to reach at least 150 minutes of physical activity per week.
- Limit alcohol consumption to no more than 14 units per week.
- If are overweight or obese, consider losing weight to improve your weight.
- Be cautious when taking over-the-counter non-steroidal anti-inflammatory drugs.

4.7 Supportive treatment

If persons choose not to undergo dialysis or a transplant for kidney failure, or if they are not viable options for him/her, he/she can opt for supportive treatment. This type of care is also referred to as palliative or conservation care, and it focuses on managing the symptoms of kidney failure. Supportive treatment encompasses medical, psychological, and practical care for both the individual with kidney failure

4.7.1 Reason behind choosing supportive treatment

- They are unlikely to benefit from or have a good quality of life with treatment.
- Do not want to go through the inconvenience of treatment with dialysis.
- Are advised against dialysis because they have other serious illnesses, and the negative aspects of Treatment outweigh any likely benefits.
- Have been on dialysis, but have decided to stop this treatment.
- Are being treated with dialysis, but have another serious illness, such as severe heart disease or stroke, that will shorten their life.
- Supportive care through the kidney unit can still help you to live for some time with a good quality of life.

4.7.2 Duties of doctors and nurses

- Medicines to protect remaining kidney function for as long as possible.
- Medicines to treat other symptoms of kidney failure, such as feeling out of breath, anemia, loss of appetite, or itchy skin.
- Help to plan home and money affairs.
- Bereavement support for the patient's family Supportive treatment.
- Patients will be offered supportive treatment if doctors decide not to have dialysis or a transplant for kidney failure, or if they are not suitable for patients. This is also called palliative or conservative care.
- The aim is to treat and control the symptoms of kidney failure. It includes medical, psychological, and practical care for both the person with kidney failure and their family, including discussion about how you feel and planning for the end of life.

CHAPTER 5

Nutritional Management

5.1 Diet of kidney patient

Diet plays an important role in kidney disease. Adequate amounts of energy (calories), protein, vitamins, minerals, and water intake are important to maintain good health and a normal weight. Kidney diseases include nephritis, calculus kidney disease, acute kidney failure, and slow-paced kidney failure. Foods that kidney patients should be aware of include water or starchy foods, protein or non-vegetarian foods, fatty foods, salt, potassium, calcium, phosphate, pureed foods (uric acid), vitamins, and iron.

5.1.1 Energy requirement of Kidney patients

The energy requirement estimates how many calories a person needs to consume, on average, each day to stay healthy, based on their age, sex, height, weight, and physical activity level.

Kidney patients have other energy requirements, such as:

- Normal requirement = 30 - 35 calories per kg body weight (Cal/kg/w)
- Above 60 years = 30 calories per kg body weight (Cal/kg/w)
- Below 60 years = 35 calories per kg body weight (Cal/kg/w)

5.1.2 Protein requirement of Kidney patients:

Every kidney patient needs a limited amount of protein to intake in a whole day. An assigned registered dietitian will estimate how many grams of protein you need each day.

For Stages 3-5:

- CKD patients in stage 3-5 (no dialysis & without diabetes): 0.55-0.60 g/kg/w/day
- CKD patients in stage 3-5 (with diabetes): 0.6-0.8 g/kg/w/day

For Dialysis:

- Dialysis patients with/without diabetes: 1-1.2 g/kg/w/day
- In obese: 1.0 g/kg/w/day
- Malnutrition: 1.2 g/kg/w/day
- Severe malnourished: more than 1.2 [depends on IBW]
- Potassium requirement of kidney patients: > 2000 mg per day.
- Phosphate requirement of Kidney patients: > 800 mg per day.
- Sodium requirement of kidney patients: < 2000 mg, (<2gm) salt, (<5gm) sodium chloride.
- Uric acid requirement of Kidney patients: < 400 mg per day.

5.1.3 Fluid requirements of Kidney patients:

- **Stage 3:** 1.5-2 liter. (Depends on body condition, if water retention is shown intake of 1.5 liters per day. [tea, coffee, and gravy all are included here])
- **Stage 4 & 5:** not more than 1-1.5 liters per day. (Depends on body condition). Sometimes 700 ml can be taken.
- **During Dialysis:** 1.5-2 liters per day. [if water retention is here, not more than 1.5 liters]

5.1.4 Micronutrients Fruits and Vegetables

Very high potassium-rich fruits and vegetables: >300 mg	Fruits: Chinese Date, Sourwood apple, Custard apple, Date, Banana, Stone apple, Tamarind, Date palm.	(Fruits and vegetables with too much potassium are not suitable for kidney patients)
	Vegetables: Bitter cucumber, Asparagus Bean, Beet, Pumpkin, Garlic, Arum, Bulbous root of arum.	
High potassium-rich fruits and vegetables:200-300 mg.	Fruits: Mango Fazli, Melon (Cucumis melo), Amla, Fig Leaf, Grapefruit, Plum fruit, Guava, Jackfruit.	(Kidney patients can eat limited portions of high-potassium fruits and vegetables - not more than 50 grams)
	Vegetables: Onion, Cauliflower, Bean, Pea, Drumsticks, Pepper, Water spinach, Spinach, Potato.	
Low/moderate potassium-rich fruits and vegetables:< 100-200 mg	Fruits: Apple, Java apple, Watermelon, Melon, Pear, Lychee, Orange, Orange juice, Blackberry, Hog plum, Pineapple, Velvet apple, Song, Malta, Mango (Lengra), Ripe papaya, Green-grapes.	(Low and moderate potassium fruits and vegetables are suitable for kidney patients till 100g)
	Vegetables: Carrot, Radish, Green papaya,	

	cabbage, Lady's Finger, Cucumber, Pointed Gourd, Brinjal, Wax Gourd, Luffa, Sponge Gourd, Boiled bitter gourd, Spiny gourd, Cucurbit, Tomato, Green banana, Malabar spinach, red amaranth, green stem amaranth, sweet potatoes	
High uric acid-rich foods	Spinach, beans, sunflower seeds, jackfruit seeds, cauliflower, cabbage, asparagus, tofu, lentils and mung beans, eggplant, mushrooms, broccoli, corn, coffee raisins, yeast, fish Eggs, liver, sea fish, meat extract, soup, crispy fish.	(Do not eat the following foods if your blood phosphate level is high)
Foods that are high in "Phosphate" 200-450ml/100g	<p>Plant Based: Parboiled rice, barley, Flattened and Fried Rice, wheat flour, corn, Chickpeas, Pulses, Vigna mungo, Indian Pea, Peas, Kidney beans, Coconut, Drum sticks, cauliflower.</p> <p>Animals Based: Duck eggs, Powder milk, cheese, liver, Butterfish, hilsa fish, Shrimp fish, chital fish, Helicopter catfish</p>	

Methods to Reduce Potassium Levels in Low, Medium, and High Potassium Vegetables:

- Firstly, wash and cut the vegetables

- Boil the vegetables in a pot.
- Drain the boiling water and fill the pot again with water
- Boil the vegetables a second time and drain the water
- Now cook the vegetables as required
- All types of pulses contain high levels of potassium – >more than 250 mg
- Chickpeas, Mung beans, White Peas, Peas
- Red lentils are low in potassium: <230
- Understand how to cook pulses to reduce potassium levels by 80%

Foods that are high in "Phosphate" 200-450ml/100g

Plant Based: Parboiled rice, barley, Flattened and Fried Rice, wheat flour, corn, Chickpeas, Pulses, Vigna mungo, Indian Pea, Peas, Kidney beans, Coconut, Drum sticks, cauliflower.

Animals Based: Duck eggs, Powder milk, cheese, liver, Butterfish, hilsa fish, Shrimp fish, chital fish, Helicopter catfish.

"Phosphate" is less in all the foods 100-150ml gm/100g

(Those who have high levels of "phosphate" in their blood can eat)

- **Plants Based:** Sago, Vermicelli, Flour, atop rice, rice, puffed rice, Semolina, milled boiled rice, chickpea, beets, turnips, beans, sweet potatoes, gourds, rice pumpkins, bitter gourds, brinjals, sweet potatoes, raw mangoes, raw bananas, cucumbers, Egyptian luffa Fruit, Inside stem of banana tree, pumpkins.
- **Animals Based:** Milk, curd, shrimps. Batasio, pangas fish, Olive barb, putty fish, shoal fish, chicken meat.

5.2 Additional information about renal nutrition

5.2.1 How to maintain a normal and healthy weight in kidney disease

Those who are overweight:

- Maintaining a normal weight is very important for health. Excess weight can lead to diabetes, high blood pressure, and even complex diseases such as cancer and increase the risk of kidney disease.
- First, see if your weight is normal in BMI measurement [B. M. I = Weight (kg)/ Height (meters)²]. The ideal BMI is 18.5-23 kg/m². If your B.M.I am greater than 23, weight loss is necessary. Along with weight, waist circumference should also be measured. Waist circumference should be below 90 cm for men and below 80 cm for women. If it is more than this, the risk of serious diseases will increase.
- Patients' current weight cannot be used to measure protein and calories if their BMI is higher than normal. In that case, by measuring the ideal weight of the patient, he/she

should consume calories and protein accordingly. Ideal body weight = Ideal BMI x height (meters)².

5.2.2 Ways to lose weight for kidney patients

- Eat breakfast, lunch, and dinner at the right times which are full of carbohydrates, proteins (meat), good fats (unsaturated fats), vegetables, and fruits.
- Eat 5 servings of vegetables and fruits daily (those with high blood potassium levels should eat low potassium vegetables)
- Contains fat, eat less added, sugary, and salty foods like cakes, biscuits, fast food, oily food, soft drinks, sweets, etc. Remove the fat and skin from the meat. You can eat low-fat milk and yogurt, but not more than 150 milliliters (1 teacup).
- Fill your meals with vegetables instead of high-carb foods (rice, bread).
- Food is best boiled, steamed, poached, or cooked with little oil.
- Physical activity and exercise are very important for weight loss. Any exercise like brisk walking, running, swimming, bicycling, playing sports, etc. is good for health. Exercise for 150 minutes a week or 5 days a week for 30 minutes. Do not sit in one place for more than 1 hour and light exercise is good.

5.2.3 Those who are malnourished or who are losing weight

Some kidney patients lose weight due to dietary changes and restrictions. If the patient is underweight (BMI < 18.5 kg/m²) or has unintentional weight loss (>5-10% or 13-7 kg of weight over 3-6 months) then current weight for protein and calorie measurement. Cannot be used. In that case, calculate the patient's ideal weight (according to the equation above) and calories and protein accordingly

- (Meat) should be eaten. Kidney patients who have protein diet restrictions, mainly carbohydrates and fats-rich foods should be taken for calories.
- How can extra calories be added to food?
- 1 tablespoon vegetable oil such as olive oil, sunflower oil, canola oil, soybean oil
- Oil, mustard oil (100 calories, 0 g protein/meat)
- 1 tablespoon butter or ghee (90 calories)
- 1 tablespoon mayonnaise (100 calories, 0.2 g protein/meat)
- 1 tablespoon margarine (50 calories)
- 1 tablespoon or 30 grams of low-salt cottage cheese (desi cheese) (30 calories, 3 grams of protein/meat) - just once a day.
- 150 ml of milk (100 Cal, 4 gm protein/meat) (can be eaten with sago, semolina, or Indian rice pudding), just once a day. However, it is not suitable if potassium levels are high.
- 1 teaspoon honey (50 calories), jam (50 calories), sugar (20 calories)

5.2.4 Not suitable for diabetic patients (Ways to relieve constipation in kidney patients)

Generally, kidney patients suffer from constipation because they have dietary restrictions and cannot consume enough fiber and fluids. Other causes include reduced digestion and reduced walking and exercise. If you follow the rules below, you can get rid of constipation.

- Eat fiber-rich foods regularly such as red rice, red flour (red flour bread, brown bread), oats, green vegetables, and fruits. For example, 160 grams (1/4 plate) of red rice at noon, 2 Red flour bread, oats 40 grams (without milk) in the morning.
- Eat 2 fiber-rich fruits daily such as apple 100g (medium 1), guava 50g (half seedless), or ripe papaya 100g (small pieces 12-14) (low potassium fruit)
- Eat 3 types of fiber-rich vegetables daily, at least 300 grams. For example, raw papaya fried, carrot, gourd, and fried pointed gourd (vegetables with low and medium potassium can be eaten.
- Water or liquid food should be consumed as per doctor's advice.
- Medicines for constipation can be taken on the doctor's advice.
- 30 minutes of regular physical activity and exercise (such as walking, and running) is important.
- Sit in the correct position while using the toilet. Bring your knees up and one under the foot using the (squat position) tool.

5.3 Diet plan for patients with nephrotic syndrome

5.3.1 Calories

- 30-35 kcal/kg daily for adults
- 100 kcal/kg daily for children

5.3.2 Protein/meat

- 0.8 - 1 g/kg daily + 1 g of protein (meat) for every gram of protein (meat) excreted in urine (if urine protein/meat is more than 3 g)
Example: If a child weighing 30 kg excretes 5 g of protein in the urine, the amount of protein (meat) in the diet will be $30 \times 0.8 = 24 + 5 = 29$ grams of protein.

5.3.3 Salt (Sodium Chloride)

Eat less than 2 grams of salt per day.

5.3.4 Water

If there is excess water in the body or if the feet are swollen, drink less than 1 liter of water per day. Tea, coffee, or any other liquid should be counted as water.

5.3.5 Cholesterol

- Should eat less than 200 mg of cholesterol daily. Avoid chicken/beef liver, beef, lamb, chicken skin, shrimp, egg yolks, butter, full-fat milk, and foods made with full-fat milk.

- Generally, patients with nephrotic syndrome are deficient in iron, copper, zinc, calcium, and vitamin D. So, eat all the foods that contain the above ingredients.

5.3.6 Iron-rich foods

Chicken, fish, greens, beans, lentils, broccoli, watermelon. Foods rich in vitamin C that help iron absorption are lemons, grapefruit, oranges, tomatoes, white potatoes, capsicum, broccoli, cabbage, and cauliflower.

5.3.7 Calcium

The body needs 500 mg of calcium daily. Calcium-rich foods such as low-fat milk and milk products, green vegetables, oranges, pineapple, lychee, papaya, pumpkin, radish, sweet potato, broccoli, sunflower seeds, and nuts (unsalted).

5.3.8 Vitamin D

The body needs 1000 IU of vitamin D daily. Foods containing vitamin D are limited. Eat oily fish (carp, carp, cuttlefish, trout) 2 days a week for vitamin D. every day, In the morning apply sun on the body for 15 to 20 minutes.

5.3.9 Foods rich in zinc

Chicken, greens, broccoli, garlic, lentils, pumpkin seeds, pomegranate, guava.

5.3.10 Foods rich in copper

Unsalted nuts and seeds, dark green vegetables, potatoes, guava, pineapple, pomegranate, Mango, banana.

5.4 Diet Plan for Kidney Addition/Kidney Transplant Patients

Kidney transplant patients can eat like a healthy and normal person. The risk of infection after surgery is high. The main way to reduce this risk is to cook food thoroughly such as avoiding raw fish, raw meat, and raw eggs, always washing food such as fruits and vegetables thoroughly, and eating unpasteurized foods such as pasteurized milk, cheese, and yogurt.

In the long term, proper nutrition is essential to prevent kidney failure. Proper nutrition helps prevent high blood pressure, diabetes, excess weight gain, cholesterol, anemia, and bone disease.

will do

5.4.1 Measurement of protein (meat)

For the first 4-6 weeks after kidney transplantation, a higher amount of protein (meat) (1.4 g per kg of body weight) and calories (30-35 kcal per kg of body weight) should be consumed. After 6 weeks, the normal amount of protein (0.8-1 g per kg body weight) and calories should

be taken as per body weight. If the creatinine level in the blood of kidney transplant patients is high then protein (meat) and phosphate food should be eaten less.

5.4.2 Maintaining a normal weight

Many people have an increased appetite after a transplant and are likely to gain more weight. Eating the right amount and exercising regularly every day is important to maintain a normal weight.

5.4.3 Cholesterol and Heart Disease

High-calorie foods such as fatty foods, sweets, pastries, and other fatty or sugary foods should be eaten in limited quantities as these foods can raise blood cholesterol which increases the risk of heart disease.

5.4.4 High blood pressure

Salt intake should be limited after transplant. Salt helps the body retain water and water retention increases blood pressure. So, eat less salty food and cook with less salt.

5.4.5 Diabetes

High-sugar foods such as cakes, pastries, soft drinks, biscuits, etc. should be avoided and sugary foods such as rice, bread, and potatoes should be eaten in moderation as these foods can increase diabetes.

Water and liquid foods can be consumed in normal amounts but if there is water in the body due to any reason then a doctor should be consulted. If your new kidney is working well, you are normal and you can eat normal amounts of potassium in food.

5.5 Measurement of protein intake

5.5.1 Amount of protein (meat) in food

Animal protein (meat) (meat, poultry, fish, seafood, eggs)

- 30 grams = 6-8 grams of protein
- 1 egg = 6-8 grams of protein
- 1 egg white = 4 grams of protein

5.5.2 Dairy (milk, yogurt, cheese)

- 150 ml of milk = 4-5 grams of protein
- 28 grams of cheese = 6-8 grams of protein

5.5.3 Vegetable protein (meat)

- A variety of pulses, grains, peas, nuts and seeds
- 100 g (half cup) boiled = 7-10 g protein

- 60 grams of lentils = 4 g
- Bread (2) = 6-8 grams
- 1/4 plate of rice (160 grams) = 4 grams

For example breakfast - 2 pieces of bread and an egg = 6 + 6 = 12 grams of protein.

5.6 Cooking method

5.6.1 Cook vegetables and pulses to reduce potassium

If the potassium level is above 4.0 - learn cooking methods to lower potassium levels in vegetables

5.6.2 Cook vegetables to reduce potassium levels

- First cut the vegetables into small pieces and soak the cut vegetables in a bowl of hot enough water for two hours.
- Drain the water after two hours.
- Boil the vegetables in a pot with enough water for 3 minutes.
- Drain the boiling water.
- Now cook the vegetables as required.

5.6.3 Cook pulses to reduce potassium levels

- Soak 1 cup of dal (190 g) in a bowl of water for 12 hours or more
- Now discard the water (full of potassium) and wash the pulses well.
- Cook lentils by diluting them in 3 cups (700 grams) of water.

5.7 More information

- Vegetables and fruits with low and medium potassium can be eaten up to 100 grams
- Vegetables and fruits containing more potassium can be eaten up to 50 grams
- Vegetables and fruits containing too much potassium are not suitable for kidney patients.

5.7.1 Foods that are high in uric acid

Fish and meat -marine fish, shrimp, fish roe, beef, chicken or meat broth, dried fish, internal organs of animals, especially liver, kidney, brain. Vegetables, seeds, nuts, and pulses Spinach, beans, sunflower seeds, jackfruit seeds, broccoli, cauliflower, asparagus, tofu, lentils, and Foods that lower uric acid levels include- rice, bread, other fruits and vegetables, dairy products, eggs, butter, oil.

5.7.2 Control uric acid levels

- Fasting for long periods or rapid weight loss will increase uric acid levels.

- Purine-rich animal foods (fish, meat) raise uric acid levels more than purine-rich plant foods (choke vegetables, pulses), according to research. Therefore, purine-rich plant foods can be consumed in moderation.
- Certain foods such as strawberries, oranges, tomatoes, and nuts are not high in purines but can raise uric acid levels.
- Patients who have very high uric acid levels are vegetarian for one day a week excluding meat and fish.
- Frequent consumption of sugary soft drinks can increase uric acid levels.

5.7.3 Ways to reduce the amount of salt in food

- All types of salt intake should be reduced. Any other salt such as beet salt is not suitable because all types of salt have the same effect on our body. Kidney patients should consume less than 2 grams of salt per day (less than half a teaspoon).
- Cook without salt or with less salt. Instead of salt, mild spices like red pepper, lemon juice, vinegar, garam masala & turmeric make the food tasty.
- Do not take extra salt on your plate while eating.
- Avoid eating foods high in salt. Most of the packaged foods are very high in salt such as packet chips, instant noodles, and all kinds of bottled sauces: tomato sauce, soy sauce, pickled instant soup, cheese, salted nuts, and restaurant or hotel food. mung beans, mushrooms, broccoli, corn, raisins, avocado, starch, tomatoes.

5.7.4 To keep our kidneys healthy

- Make healthy food choices
- Make physical activity part of routine
- Aim for a healthy weight
- Get enough sleep
- Stop smoking
- Limit alcohol intake
- Explore stress-reducing activities
- Manage diabetics, high blood pressure & heart disease.

CHAPTER 6

Case study with diet chart

6.1 Case Study 1 (stage 3)

This diet chart is used for kidney patients who are in stage 3 i.e. their eGFR is between 30-59. It plays a very effective role in preventing further prolongation of kidney problems. If this diet is followed regularly, a kidney patient can maintain this position (stage 3) for a longer period and also keep his diabetes under control.

Patient Name: Firoza

Age: 68, **Gender:** Female

Address: Ochintipur, Gouripur.

BMI: 21.5, **Kidney stage:** 3B, **Duration:** 7 months, **physical activity:** walking 15 min.

Medical condition: HTN, CKD

Biochemistry report:

eGFR: 34.3, **Albumin:** 3.7, **creatinine:** 1.3, **potassium:** 4.58, **chloride:** 108.4, **sodium:** 134.2, **Hemoglobin:** 8.6.

Medication: HTN, anti-gout, ARB.

Nutritional estimation:

Total energy: 1400 kcal

Carb: 170 gm **protein:** 40-42gm

Fat: 30 gm. **Water:** 1-1.5 liter [with doctor's recommendation]

Meal	Time	Menu Plan	Calories
Breakfast	7-8 am	2 (Bread / white flour bread/rice powder bread) 1 whole egg (including the yolk and egg white) and 1 just the egg white Vegetable stir-fry -150 grams (4.5 tablespoons) Choose low potassium and low phosphate vegetables)	15 gm of protein. 44 gm of carbohydrates. 330 kcal

		(Learn about cooking methods to lower potassium levels in vegetables)	
Mid-morning	11 am	Tea (without milk) Choose an option from below: Biscuits -2pcs From the list of low-potassium fruits 1 fruit (100g) Puffed rice 1 cup (14 grams)	1 gm of protein. 15 gm of carbohydrates. 180 kcal
Lunch	2-2.30 pm	Rice (Atop Rice, Basha Rice) - 160g (1/4 plate, 2 cups hand size) Vegetable Fry -100g (4.5 tbsp.) Fish or chicken -40g (boneless)	14 gm of protein. 44 gm of carbohydrate. 350 kcal
Mid-afternoon	5-6 pm	Tea (without milk) Choose an option from below: Biscuits -2pcs From the list of low-potassium fruits 1 fruit (100g) Puffed rice 1 cup (14 grams)	1 gm of protein. 15 gm of carbohydrates. 130 kcal
Dinner	8-9 pm	Rice (Atop Rice, Basha Rice) - 160g (1/4 plate, 2 cups umbrella size) Vegetable stir-fry - 150 grams (4.5 tablespoons) Lentils – 60g (1/4 cup, 60 ml, 4-5 tablespoons) (Learn about cooking methods to lower potassium levels from pulses)	11 gm of protein 55 gm of carbohydrates. 350 kcal

[N.B: It's important to establish a routine of going to bed at 11 p.m. every night and getting a healthy 7-8 hours of sleep.]

6.2 Case Study 2 (stage 4)

Chronic kidney disease Stage 4 is the most severe, and it affects a majority of people who get kidney diseases at this stage. By taking medicine under the advice of an experienced doctor and following the advice of a renal nutritionist, patients can manage this severe phase for a few days by taking prescribed medication and consuming the appropriate amount of nutrients such as, (protein, carbohydrates, fats, potassium levels, sodium levels, etc.)

Name: Shamsul Alam

Age: 70, **Gender:** male

Address: Rupshi, Fulpur.

BMI: 24.3, **kidney stage:** 4, **duration:** 48 months, **physical activity:** walking 20 min.

Medical condition: HTN, DM.

Biochemistry report:

eGFR: 29.7, **albumin:** 2(3.5), **creatinine:** 2.2, **potassium:** 4.7, **Chloride:** 112.7, **sodium:** 146.6, **hemoglobin:** 8.3, **HbA1C:** 7.8

Medication: antihypertensive, ARB, diuretics, insulin, antigout.

Nutritional estimation:

Total energy: 1400 kcal

Carbohydrate: 170 gm

Protein: 36-38 gm

Fat: not more than 30 gm,

Water intake: 1-1.2 liter (with tea, curry, soup)

Meal	Time	Menu Plan	Calories
Breakfast	7-8 am	2 (Bread/ white flour bread/Rice powder bread) 1 whole egg (including yolk and egg white) Fried vegetables (100g) (3 tablespoons) (Choose low potassium and low phosphate-rich vegetables) (Learn about cooking methods to lower potassium levels in vegetables)	12 gm protein. 44 gm carbohydrate. 330 kcal
Mid-morning	11 am	Tea (without milk) Choose an option from below: Biscuits (2 pieces) Low potassium rich 1 fruit (100g)	1 gm protein. 15 gm carbohydrate. 180 kcal

		Puffed rice 1 cup (14 grams)	
Lunch	2-2.30 pm	Rice (Atop Rice, Basha Rice) - 160g (1/4 plate, 2 cups hand size) vegetable stir-fry - 150g (4.5 tablespoons) Fish or Chicken- 40g (Without bones)	13 gm protein. 44 gm carbohydrate. 350 kcal
Mid-afternoon	5-6 pm	Tea (without milk) Choose an option from below: Biscuits -2pcs From the list of low-potassium fruits 1 fruit (100g) Puffed rice 1 cup (14 grams)	1 gm of protein. 15 gm of carbohydrates. 130 kcal
Dinner	8-9 pm	Rice (atop rice, Basha rice) -160 gm (1/4 plate, 2 cups hand size) fried vegetables - 100g (3 tbsp.) Lentil - 60 g (1/4 cup, 60 ml, 4-5 tablespoons)	11 gm protein. 55 gm of carbohydrates. 350 kcal

[N.B: It's important to establish a routine of going to bed at 11 p.m. every night and getting a healthy 7-8 hours of sleep.]

CHAPTER 7

Conclusion

The Kidney Foundation Hospital and Research Institute serves as a source of optimism for individuals suffering from kidney-related ailments in Bangladesh. Founded in the year 2002 with little resources, the institution has experienced significant expansion and now functions as a comprehensive healthcare establishment, providing an extensive array of services. The hospital has experienced significant growth since its inception, transitioning from a modest establishment housed in a rented facility with a limited workforce and dialysis equipment to a substantial institution with 300 beds and a highly skilled and committed staff. The foundation's dedication to ensuring accessible healthcare at a reasonable cost is praiseworthy. In addition to providing patient care, the institution engages in significant research endeavors, facilitates training initiatives, and fosters collaborative partnerships with global organizations to augment its capacities. The acknowledgment it has garnered from the International Kidney Association is indicative of its unwavering commitment to achieving high standards of quality and performance. Looking ahead, the Kidney Foundation has set forth ambitious objectives for both expansion and enhancement. The primary objective is to expand the reach to a larger population requiring assistance, enhance the training of professionals, and advance research endeavors. Despite encountering several obstacles, such as financial viability and spatial constraints, the institution's notable attributes, such as cost-effective healthcare provisions and specialized proficiency, position it favorably for sustained achievements. The Renal Foundation Hospital and Research Institute in Bangladesh serves as a noteworthy illustration of the accomplishments attainable via unwavering devotion, diligent efforts, and a steadfast resolve to deliver healthcare services and instill optimism among those afflicted with renal ailments. The transition from a little endeavor to a prominent establishment serves as evidence of its influence on the local populace and its capacity for further significant contributions in the coming years.

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