



**Daffodil**  
*International*  
**University**

**An Internship Report**

**NUTRITIONAL MANAGEMENT OF DIABETIC PATIENTS  
SUFFERING FROM CHRONIC KIDNEY DISEASE**

**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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**DAFFODIL INTERNATIONAL UNIVERSITY**

**OCTOBER 2023**

## **APPROVAL**

This internship, “**Nutritional management of diabetic patients suffering from chronic kidney disease**”, has been turned in by **Farzin Sayma** 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.

## **EXAMINING COMMITTEE**

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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 for the purpose of earning a degree or certificate.

Supervised by:

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## **ACKNOWLEDGMENT**

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

I had a great opportunity to study and develop my practical skills during my internship with BIRDEM general Hospital. I met a number of knowledgeable and skilled individuals who were really helpful to me during this process.

I'm quite appreciative that the director of BIRDEM general Hospital approved my application for an internship. For their help throughout this program, I also like to thank Quamrun Nahar, PhD Senior Research Officer, BIRDEM ma'am, and Tasmia Tasnim ma'am.

My deepest thanks go out to Mrs. Tasmia Tasnim, my supervisor, for all of her help and support throughout this internship program, especially during the challenging times.

## **EXECUTIVE SUMMARY**

In order to work as an intern at the BIRDEM General Hospital, I had to complete a lot of steps. The major goals of this internship were to obtain practical patient management skills and to watch and learn from patient-nutritionist interactions. I dealt with 80 patients at BIRDEM who had diabetes and its complications, such as chronic kidney disease and cardiovascular disease. I observed that some of the patients didn't fully follow their diet plans while I was an intern. As a result, even after taking medication, their circumstance doesn't get better as much as it ought to. It will be simpler for the patients to control their diabetes and other issues if they correctly follow their diet plans. I had a fantastic learning opportunity thanks to this internship program, and I will benefit greatly from it in the future. I had to face a variety of new difficulties, such as learning how to relate to people from diverse ages and socioeconomic groups. I learned about many ailments, their treatments, dietary requirements, and diet plans during my internship at BIRDEM. I also discovered how altering one's diet can help diabetics who suffer from chronic kidney disease and its pain I can without a doubt declare that as a result of my internship, my understanding of the workplace has significantly expanded.

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# Chapter 1

## Introduction

### 1.1 Introduction

Diabetes is a persistent metabolic disorder characterized by heightened levels of blood glucose, also referred to as blood sugar. This condition gradually results in significant harm to several bodily systems, including the heart, blood vessels, eyes, kidneys, and nerves. The prevailing form of diabetes is type 2, typically observed in adults, wherein the body develops resistance to insulin or fails to produce adequate amounts of insulin. Over the course of the last three decades, there has been a significant increase in the prevalence of type 2 diabetes across countries with varying income levels. Type 1 diabetes, formerly referred to as juvenile diabetes or insulin-dependent diabetes, is a persistent medical condition characterized by insufficient endogenous insulin production in the pancreas. The availability of cost-effective therapy, particularly insulin, is of utmost importance for individuals who are affected by diabetes in order to ensure their continued existence. A universally accepted objective has been established to cease the escalation of diabetes and obesity by the year 2025.

Diabetes affects around 422 million individuals globally, with a significant proportion residing in low- and middle-income nations. Moreover, an estimated 1.5 million deaths annually can be directly linked to diabetes. The incidence and prevalence of diabetes have exhibited a consistent upward trend in recent decades.

### 1.2 Reason for choosing BIRDEM

An internship is a structured program implemented by businesses with the purpose of providing students and recent graduates with training opportunities and practical job experience. Selecting a company for participation in an internship program was a challenging task. Upon the conclusion of the eleventh semester, students enrolled in the Bachelor of Science (BSC) program are required to fulfil an internship requirement with a reputable organization. The involvement of that organization in the domains of food or health is highly probable, given my academic background as a student in the department of nutrition and food engineering. Prior to concluding my internship at BIRDEM General Hospital, I conducted extensive study on several enterprises, hospitals, and organizations. I selected this hospital for my internship due to the opportunity it provides for acquiring comprehensive information on diverse food charts, gaining awareness of patients' circumstances, and enhancing my communication skills to facilitate knowledge expansion.



### 1.3 Historical background

The Bangladesh Institute of Research and Rehabilitation in Diabetes, Endocrine, and Metabolic Disorders (BIRDEM) is a comprehensive hospital facility located in Shahabag, Dhaka, Bangladesh. It operates under the auspices of the Bangladesh Diabetic Association and provides a range of medical services across several disciplines. With a capacity of 600 beds, BIRDEM serves as a prominent institution dedicated to the research, treatment, and rehabilitation of those affected by diabetes, endocrine disorders, and metabolic conditions. In 1980, Bangladesh allocated financial resources for the building of the hospital. BIRDEM, an institution established in 1980, was formed by the esteemed national thinker Muhammad Ibrahim, who has since passed away. In February 1956, he oversaw the creation of the Diabetic Association for Pakistan, an organisation that has now been renamed as the Diabetic Association for Bangladesh.

The Bangladesh Diabetic Association has nine distinct entities. Dr. Mohammed Ibrahim is credited as the pioneer in the field of diabetes care in the nation. He comprehended the need of active patient engagement in the management of diabetes, recognising the significance of individuals with diabetes taking an active role alongside their healthcare providers. According to the Bangladeshi Diabetic Association (n.d.), The establishment of the Diabetic Association of Bangladesh (BADAS) took place on February 28, 1956, in Dhaka, under the leadership of the esteemed National Professor Dr. Muhammad Ibrahim (1911-1989). This initiative was undertaken by a collective of social workers, philanthropists, medical practitioners, and government officials.

The following people made up the majority of the original BADAS:

- Major Dabiruddin is the president.
- Dr. M. Ibrahim is the vice president.
- Nurjahan Morshed is the vice president.
- A.M. Salimullah Karim is the secretary.
- Tahera Karim is the joint secretary.
- M.A. Mannan, MD, is the joint secretary.
- Mrs. F. Dosani serves as the treasurer

### 1.4 BIRDEM hospital board of directors

Chairman	Mr. Abdul Mueyed Chowdhury
Member	Pro Rashid-E Mahbub (Joint Secretary General, BADAS)
Member	Rafiqul Islam Khan (Member, NC, BADAS)
Member	Prof. M.K.I. Quayyum Choudhury (DG, BIRDEM)



Member	Md. Muhibur Rahman Addl. Secretary (Hospital), Health Service Division, Ministry of Health & Family Welfare, Govt of Bangladesh & Member, BOM, BIRDEM
Member	Md. Kamrul Hasan Khan Addl. Secretary (Development), Ministry of Women & Children Affairs, Govt of Bangladesh & Member, BOM, BIRDEM
Member	Prof Kishwar Azad Project Director, PCP, BADAS
Member	Mr. Biswajit Mazumder Director (Finance & Accounts), BADAS
Member	Prof. M.A Rashid CEO, ICHRI
Member	Prof. Nazma Haque Principal,

### 1.5 Mission

- "Through various institutions of the Diabetic Associations of Bangladesh, provide total healthcare, including rehabilitation, for all diabetics, regardless of gender, economic situation, or social standing."
- "Expand these services to establish self-sustaining centers of excellence to provide affordable BADAS healthcare for all Bangladeshi."
- "Create specialized quality manpower (research scientists, physicians, technicians, nurses, and other related personnel) of high ethical standard."
- Develop leadership in the healthcare industry through a committed and open management structure.
- "Build industries to produce high-quality pharmaceuticals and healthcare products."

### 1.6 Vision

- No diabetic should perish in Bangladesh untreated, unemployed, or hungry. "All persons shall have access to quality, reasonably priced health care services."

### 1.7 Departments

Medicine Emergency Unit	Department of Endocrinology
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Department of Internal Medicine	Department of Internal Medicine and Neurology (I & II)
Department of Gastrointestinal, Hepatobiliary & Pancreatic Disorders (GHPD)	Department of Critical Care Medicine (CCM)
Department of Nephrology and Dialysis (Unit-I)	Department of Cardiology
Department of Nephrology and Dialysis (Unit-II)	Department of Diet and Nutrition
Department of Nephrology and Dialysis (Unit-III)	Department of Physical Medicine & Rehabilitation
Department of Dental Surgery	Department of Social Welfare
Department of Dermatology	Clinical physicians of the department
Pharmacology and Cell Biology	Transfusion Medicine and Clinical Hematology
Biochemistry and Molecular Biology and Laboratory Medicine	Endocrinology
Histopathology	Transfusion Medicine and Clinical Hematology

### **1.8 Recruiting procedure for Interns**

In order to become an intern, I had to go through a process. My supervisor was Mrs. Tasmia Tasnim Ma'am. She suggested I visit the BIRDEM hospital to find out more about the requirements and the application process.

I spoke with the Senior Research Officer at the hospital, who advised me that I would have to apply to the director. I then told my supervisor, Tasmia Tasnim ma'am, who wrote a letter of application for my internship to the Director Sir. After completing all the steps, the following day, I went to the hospital and delivered the letter to the director sir as instructed. After a few days of waiting, Quamrun Nahar ma'am, a PhD and senior research officer at BIRDEM, called me. Ma'am informed me that I can begin my internship program at BIRDEM.

### **1.9 Duration**

My internship lasted for one month. I got started on August 24 and finished on September 22. I worked from 2:00 PM until 8.00 PM, six hours a day. I opted to take Friday off.

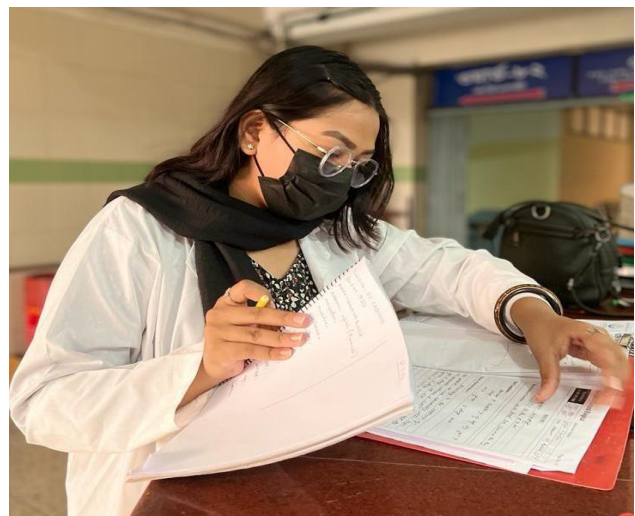
## Chapter 2

### Overview

#### 2.1 Learning process

For graduates of nutrition programs, internships are a crucial component of the educational process. The greatest place to learn about or get information on nutrition-related issues is at BIRDEM General Hospital. My first duty when I arrived for an internship program was to speak with the patient and see how the nutritionist and doctor interacted and spoke with the patient.

I would visit there every day at 2:00 PM. I would then proceed to the sixth level, where I would receive a word number for the day. Every day's Ward Number was varied to allow me to better keep track of the nutrition plans for various patients and their issues. I would talk to the patients about their issues and look over their paperwork after arriving at the designated location that had been assigned to me. I made one additional observation after that. What foods are being served to what kinds of patients. I visited almost every ward and cabin to observe patients and examine their menus, which were tailored to meet each patient's specific nutritional requirements. I completed my internship at BIRDEM in this manner for a month.



#### 2.2 Objectives

- To learn about diabetes
- To know about diabetes and its errors
- To learn how diabetes affects other disease such as chronic kidney disease
- to learn about the interactions between nutritionists and their patients.
- must be familiar with the challenges that could come up during a patient appointment.

- to comprehend how to make a food plan for a certain patient.

### **Topic that I learned during my internship period**

The nutrition section primarily addresses the eating habits of patients and the appropriate diet for each patient's health. Here, I learnt about a diet plan for diabetic patients as well as how diabetes is connected to chronic renal disease. And how can I provide such patients with the right nutrition plan.

### **2.3 Diabetes**

The development of diabetes occurs when there is an excessive presence of blood sugar, also known as glucose, within the body. The occurrence of this condition arises when the pancreas fails to synthesize an adequate amount of insulin or when the body exhibits an inadequate response to the physiological effects of insulin. There are several types of diabetes. The most common forms include:

- Type 1 diabetes
- Type 2 diabetes
- Pre-diabetes
- Gestational Diabetes

#### **Type 1 diabetes**

This particular autoimmune disorder manifests when, due to an unknown etiology, the immune system engages in an attack on and subsequent destruction of the insulin-producing cells located within the pancreas. Type 1 diabetes impacts a considerable proportion, approximately 10%, of individuals diagnosed with the condition. While the condition can manifest at any stage of life, it is commonly identified in individuals within the pediatric and adolescent age groups.

#### **Symptoms**

Symptoms associated with type 1 diabetes may manifest abruptly and encompass the following manifestations:

- Increased thirst relative to one's usual baseline.
- Elevated frequency of urine.
- The phenomenon of nocturnal enuresis, commonly known as bedwetting, is observed in children who have not had urinary incontinence during sleep.
- Weight loss achieved without conscious effort
- One potential symptom that individuals may encounter is the manifestation of irritation or other fluctuations in mood.

- Experiencing fatigue and vulnerability
- Experiencing visual impairment characterized by a blurred or hazy appearance.

**Risk factors** are variables or conditions that increase the likelihood of an adverse event or negative outcome. These factors can be associated with several aspects

There are various factors that can contribute to an individual's susceptibility to developing type 1 diabetes, including:

**Family background** plays a significant role in determining an individual's susceptibility to type 1 diabetes, since there is a little elevation in risk if one has a parent or sibling affected by the condition.

**Genetics** have a significant role in the susceptibility to Type 1 diabetes, as individuals with certain genetic profiles are more prone to developing the condition.

**Geographical factors** have been observed to correlate with the incidence of type 1 diabetes, with a notable trend of higher prevalence as one moves further away from the equator.

**Age:** Type 1 diabetes can present itself at many stages of life, however it tends to occur predominantly during two discrete age peaks. During the developmental stage spanning from four to seven years of age, children experience their initial period of accelerated growth. The second phenomenon impacts individuals within the age range of 10 to 14 years.

## **Complications**

Over the course of time, the presence of type 1 diabetes can lead to several complications that might adversely affect the functioning of the body's major organs. The organs encompassing the heart, blood vessels, nerves, eyes, and kidneys are among the examples provided. Maintaining regular blood sugar levels might mitigate the risk of several complications.

Complications arising from diabetes have the potential to hinder one's functional capacity and pose a significant risk to one's life.

### **Blood vessels and cardiac disease.**

Diabetes is associated with an increased susceptibility to certain cardiovascular and vascular complications. The aforementioned health conditions encompass elevated blood pressure, myocardial infarction, cerebrovascular accident, angina pectoris, and atherosclerotic arterial narrowing.

### **Neuropathy**

Excessive blood glucose levels can lead to structural impairment of the capillary walls responsible for nerve supply. This phenomenon is particularly evident in the lower extremities. These symptoms may arise as a consequence of this condition, including tingling, numbness, burning, or discomfort. This phenomenon commonly manifests as a progressive extension from the distal ends of the digits, either in the form of toes or fingers. Over a prolonged period,

inadequate blood sugar management might lead to complete sensory loss in the affected extremities.

Damage to the nerves responsible for regulating nausea, vomiting, diarrhoea, and constipation within the digestive tract may occur. Males may experience the condition known as erectile dysfunction.

### **Nephropathy**

The kidneys are equipped with a vast network of numerous small blood capillaries that serve the purpose of safeguarding the bloodstream against the infiltration of waste materials. Diabetes has the potential to adversely affect this system. Severe injury can lead to the development of renal failure or irreversible end-stage renal disease. The exclusive therapeutic options for end-stage renal illness encompass dialysis and kidney transplantation.

### **Eye damage**

Diabetes, specifically diabetic retinopathy, has the potential to inflict damage onto the blood vessels located in the retina, which is the ocular region responsible for light detection. This could lead to visual impairment. Diabetes is associated with an increased susceptibility to glaucoma and cataracts, which are both debilitating ocular conditions.

### **Foot damage**

Certain foot conditions are more prone to manifest in cases where there is neuropathy or inadequate vascular perfusion in the lower extremities. If blisters and wounds are not treated, they have the potential to progress into severe infections. Surgical removal of the lower extremities, specifically the leg, foot, or toe, may be deemed necessary in the management of some infectious conditions.

### **Skin and mouth conditions**

Individuals with diabetes may have increased susceptibility to cutaneous and oral infections. Among the various types of infections, those caused by bacteria and fungus are included. There is an increased likelihood of experiencing dry mouth and gum problems.

### **Pregnancy complication**

Both parents and infants may be at risk from elevated blood glucose levels. When diabetes is inadequately controlled, there is an increased likelihood of experiencing miscarriage, stillbirth, and congenital malformations during pregnancy. The presence of diabetes in parents increases the likelihood of having many complications during pregnancy, including preeclampsia, diabetic ketoacidosis, retinopathy, gestational hypertension, and diabetic ketoacidosis.

### **The management of Type 1 diabetes:**

Type 1 diabetes is managed by several treatment approaches.

- The administration of insulin by injection

- The monitoring of protein, lipids, and carbohydrates.
- Regularly monitoring blood glucose levels
- Consuming a diet that is rich in essential nutrients
- Engaging in consistent physical activity and adhering to a balanced weight management regimen

### **Insulin with other medications**

Individuals diagnosed with type 1 diabetes require lifelong insulin therapy. There are a wide range of insulin types, which include:

#### **Short-acting insulin**

This particular form of insulin, commonly referred to as regular insulin, initiates its physiological effects approximately 30 minutes following administration. The duration of its effects typically spans a timeframe of 4 to 6 hours, with its maximum potency being achieved approximately 90 to 120 minutes after administration. Some examples of insulin medications are Afrezza, Novolin R, and Humulin R.

#### **Rapid-acting insulin**

The onset of action for this type of insulin occurs within a duration of 15 minutes. The duration of its effects is around four hours, with the maximum impact occurring approximately 60 minutes after administration. This type of medication is commonly administered approximately 15 to 20 minutes before to meals. Several examples of rapid-acting insulin analogues include aspart (marketed as Novolog and FiAsp), glulisine (marketed as Apidra), and lispro (marketed as Humalog, Admelog, and Lyumjev).

#### **Intermediate-acting insulin**

This particular type of insulin, commonly referred to as NPH insulin, initiates its physiological effects during a timeframe ranging from one to three hours. The duration of its effects ranges from 12 to 24 hours, with peak efficacy often occurring between 6 and 8 hours. Two examples of insulin NPH are Novolin N and Humulin N.

#### **Long-acting and ultra-long-acting insulin**

This particular type of insulin has the potential to provide a protective effect for a duration ranging from 14 to 40 hours. Several examples of long-acting insulin analogues include Detemir (Levemir), glargine (Lantus, Toujeo Solostar, Basaglar), and degludec (Tresiba).

#### **Options for delivering insulin**

There are several methods available for administering insulin to individuals with diabetes. These options include subcutaneous injections, insulin pens, insulin pumps, and inhalable insulin.

The oral administration of insulin for the purpose of reducing blood sugar levels is not feasible due to the enzymatic degradation of the medicine by stomach enzymes, resulting in its loss of

efficacy. In order to manage your condition, it is necessary to employ the use of an insulin pump or provide injections.

## **Injections**

The subcutaneous administration of insulin can be accomplished by the utilization of either an insulin pen or a tiny needle and syringe. Insulin pens are available in both disposable and refillable forms, exhibiting a resemblance to conventional ink pens.

If an individual chooses to administer injections, it is probable that they will require a diverse range of insulin types to be utilized during nocturnal hours as well as throughout the daytime.

## **Insulin pump**

One has the ability to develop a compact apparatus that can be externally worn to deliver pre-determined quantities of insulin at specific intervals throughout the day, as well as during meal times. A subcutaneously implanted catheter is connected to an insulin reservoir through a tube.

An alternative choice for a pump is a tubeless pump, necessitating the placement of an insulin pod on the individual's body and a minuscule catheter beneath the dermis.

## **Type 2 diabetes**

Type 2 diabetes arises from a disruption in the body's regulatory mechanisms and metabolic processes related to the control and utilization of glucose as an energy source. This particular substance is commonly referred to as glucose. This chronic condition leads to excessive levels of glucose circulating in the bloodstream. Prolonged elevation of blood glucose levels might potentially lead to the development of cardiovascular, neurological, and immune system complications.

In a general sense, type 2 diabetes presents two primary concerns. Insufficient production of insulin by the pancreas hampers its ability to regulate the rate at which glucose is transported into cells. Moreover, cellular absorption of glucose is reduced and has a diminished insulin response.

## **Symptoms**

The symptoms of type 2 diabetes can manifest in a progressive manner. Indeed, it is possible for an individual to have type 2 diabetes for an extended period of time without being aware of its presence. In instances where symptoms are present, they may manifest as:

- Increased thirst.
- There is a significant amount of pee present.
- One notable effect is an elevation in appetite.
- Involuntary weight loss.
- One common symptom that individuals may experience is fatigue.
- visual perception characterized by a lack of clarity or sharpness.
- The process of wound healing occurring at a gradual pace.



- There is a high prevalence of infections.
- Individuals may have sensations of tingling or numbness in their hands or feet.
- The phenomenon being described pertains to the darkening of specific regions of the skin, commonly observed in the vicinity of the neck and armpits.

### **Causes**

There are two primary factors that contribute to the development of type 2 diabetes.

- Insulin resistance manifests in liver, fat, and muscle cells. The cells exhibit insufficient uptake of glucose as a consequence.
- Insufficient insulin production by the pancreas leads to inadequate regulation of blood glucose levels.

### **Risk factors**

The concept of weight refers to the measure of the force exerted on an object due to

- Obesity or the condition of being overweight poses a significant risk.
- Storing fat predominantly in the abdominal region, rather than in the hips and thighs, is associated with an increased risk. Individuals with a waist circumference exceeding 40 inches (101.6 centimeters) for males and 35 inches (88.9 centimeters) for women are at an elevated risk of acquiring type 2 diabetes.
- The risk escalates in proportion to an individual's degree of sedentary behavior. Physical activity contributes to the management of body weight, facilitates the utilization of glucose as an energy source, and enhances the sensitivity of cells to insulin.
- Individuals who have a family history of type 2 diabetes, particularly if a parent or sibling is affected, exhibit an increased susceptibility to developing the condition.
- Individuals belonging to certain racial and ethnic groups, including Black, Hispanic, Native Americans, Asians, and Pacific Islanders, have a higher susceptibility to the development of type 2 diabetes compared to individuals of white ethnicity. However, the underlying factors contributing to this disparity remain unclear.
- An elevated risk is associated with low concentrations of high-density lipoprotein (HDL) cholesterol, commonly referred to as the "good" cholesterol, as well as high concentrations of triglycerides.
- The chance of developing type 2 diabetes increases with advancing age, particularly after reaching the age of 35.

### **Prediabetes**

Prediabetes is a medical disorder characterized by blood sugar levels that exceed the normal range, however do not reach the threshold for a diagnosis of diabetes. If prediabetes is not treated, it often progresses into type 2 diabetes.

The potential hazards associated with pregnancy

Individuals who experienced gestational diabetes during pregnancy and women who gave birth to infants with a weight over 9 pounds (4 kilograms) exhibit an increased susceptibility to developing type 2 diabetes.

### **Polycystic ovarian syndrome (PCOS)**

Polycystic ovarian syndrome (PCOS) is a medical condition that manifests through irregular menstrual periods, excessive hair growth, and obesity. It has been found to elevate the chance of developing diabetes.

### **Complications**

Type 2 diabetes exerts a significant influence on various vital organs, including but not limited to the heart, blood vessels, nerves, eyes, and kidneys. Moreover, the presence of risk factors for diabetes may potentially increase the likelihood of developing other severe medical conditions. The use of blood sugar control measures and effective diabetes management strategies can significantly decrease the probability of experiencing these aforementioned outcomes, as well as mitigate the risk of developing additional associated ailments.

### **Blood vessels and the heart disease**

There exists a correlation between diabetes and an elevated susceptibility to heart disease, stroke, hypertension, and atherosclerosis, a pathological state characterized by the narrowing of blood vessels.

### **Limb nerve injury**

The medical term assigned to this particular ailment is neuropathy. Over a prolonged period, elevated levels of blood glucose have the potential to inflict damage onto nerves, potentially leading to their demise. Consequently, individuals may experience sensations of tingling, numbness, burning, discomfort, or eventual sensory loss. These symptoms often manifest initially in the distal regions of the toes or fingers and gradually progress proximally.

### **Further nerve injury**

Heart rhythm irregularities can potentially arise as a consequence of neural impairment within the heart. Injury to the nerves of the digestive system can lead to various manifestations, including but not limited to, symptoms such as nausea, vomiting, diarrhoea, or constipation. Nerve damage can also be a contributing factor to the occurrence of erectile dysfunction.

### **Renal disease**

Diabetes has the potential to induce chronic renal damage or irreversible end-stage kidney disease. This could potentially need the implementation of kidney transplants or dialysis.

Diabetes has the ability to cause damage to the blood vessels located in the retina, which can lead to the development of blindness. Additionally, diabetes increases the likelihood of experiencing major ocular disorders such as cataracts and glaucoma.

## **Dermatological issues**

Individuals with diabetes are at an elevated risk of acquiring bacterial and fungal infections, as well as many dermatological complications.

If cuts and blisters are not treated, they have the potential to progress into severe infections that may impede healthy healing. In cases of serious injuries, it may be imperative to perform amputations of the toe, foot, or leg.

Individuals diagnosed with diabetes have a higher propensity to encounter auditory impairments.

## **Apneic sleep**

Individuals diagnosed with type 2 diabetes often encounter the occurrence of obstructive sleep apnea. Obesity may be identified as the principal etiological factor contributing to various disorders.

## **Dementia**

There appears to be an elevated chance of developing dementia, including Alzheimer's disease and other forms of dementia, among individuals diagnosed with type 2 diabetes. There exists a correlation between inadequate blood sugar regulation and the occurrence of memory impairment and other forms of cognitive decline.

Treatment.

The incorporation of a nutritious diet is an integral component of the management of type 2 diabetes.

- Engaging in regular physical activity.
- Weight loss.
- One potential course of action could be the administration of insulin therapy or the prescription of diabetes medication.

## **Monitoring and recording blood glucose levels**

These behaviors enhance the probability of maintaining blood glucose levels within a desirable range. Furthermore, individuals have the potential to delay or circumvent challenges.

There is no specific dietary regimen recommended for those with diabetes. However, it is imperative to direct one's dietary choices towards:

A regimen for nutritious snacks and evening meals.

The serving sizes have been decreased.

Incorporating a greater quantity of whole grains, non-starchy vegetables, and fruits into one's diet is recommended due to their high fibre content.

It is recommended to reduce the consumption of sugar, starchy vegetables, and refined carbs.

Small servings of dairy products, meat, and seafood that are low in fat.

Oils that are suitable for culinary use include canola oil and olive oil.

The caloric content is reduced.

In accordance with medical recommendations, it is advisable to seek guidance from a certified dietitian as suggested by your healthcare provider. The dietitian possesses the necessary expertise to:

- Discerning nutritious dietary choices.
- One should strategize the preparation of nourishing and harmoniously proportioned meals.
- Establish novel behavioral patterns and eliminate barriers to facilitate the process of habit modification.

In order to achieve and sustain stable blood sugar levels, it is advisable to monitor and regulate one's consumption of carbohydrates.

Physical exercise refers to any bodily activity that enhances or maintains physical fitness and overall health. It involves the engagement of various muscle groups and

Regular physical activity is essential for achieving weight loss or maintaining a healthy body weight. Moreover, it assists in regulating blood glucose levels. Prior to initiating or modifying your exercise routine, it is advisable to seek guidance from a healthcare professional to ensure the appropriateness of the activities for your individual circumstances.

### **Aerobic exercise**

Select a form of aerobic exercise that you find pleasurable, such as cycling, jogging, swimming, or walking. It is recommended that adults aim to engage in a minimum of 150 minutes of moderate aerobic exercise per week, or alternatively, at least 30 minutes of such exercise on a daily basis.

### **A resistance training session**

Resistance training has been shown to enhance an individual's strength, balance, and overall capacity to do daily activities. Yoga, callisthenics, and weightlifting are all modalities encompassing resistance training. It is recommended that those diagnosed with type 2 diabetes in adulthood should aim to engage in two to three bouts of resistance exercise per week.

It is advisable to maintain a consistent level of physical activity.

Extended periods of sedentary behaviour, such as engaging in computer work, can be interrupted in order to aid in the regulation of blood glucose levels. It is recommended to incorporate brief intervals of physical activity, such as standing up, moving around, or participating in mild exercise, every half hour.

### **Weight loss**

Weight loss is associated with improved regulation of blood pressure, cholesterol levels, triglyceride levels, and blood sugar levels. When an individual who is overweight has a reduction in body weight of even 5%, several indicators have the potential to exhibit improvement. Nevertheless, the health advantages become more pronounced with more weight loss. In certain situations, it may be recommended to reduce body weight by a maximum of 15%.

Realistic weight-loss goals can be established with the guidance of healthcare professionals such as doctors or nutritionists, who can also provide support in implementing essential lifestyle modifications.

### **Sustaining optimal blood glucose levels**

In order to maintain adherence to your target range, your healthcare provider will provide you with guidance regarding the recommended frequency for monitoring your blood glucose levels. For example, it may be necessary to assess it prior to or following physical activity, as well as on a daily basis. Individuals who administer insulin may be required to monitor their blood glucose levels multiple times throughout the day.

The blood glucose metre, a tiny domestic device utilised for the quantification of sugar levels in a small blood sample, is commonly employed for the purpose of monitoring. In order to disseminate information among medical personnel, it is advisable to maintain a comprehensive log of one's measurements.

### **Treatments for diabetes**

In cases where dietary and physical activity interventions are inadequate in achieving optimal blood glucose levels, medical professionals may advise the use of insulin therapy or the prescription of antidiabetic medications aimed at reducing glucose levels.

### **Pre-diabetes**

Prediabetes is diagnosed when an individual's blood sugar level exceeds the normal range. The current level does not meet the criteria for classification as type 2 diabetes. Nevertheless, individuals who are classified as prediabetic, including adults and children, have an elevated susceptibility to the onset of type 2 diabetes if they do not make significant modifications to their current lifestyles.

If an individual is diagnosed with prediabetes, it is possible that the adverse consequences associated with diabetes, namely pertaining to the heart, blood vessels, and kidneys, may already be underway. Nevertheless, there is positive information to report. The development of type 2 diabetes is not an inevitable outcome for individuals diagnosed with prediabetes.

The restoration of normal blood sugar levels can be achieved through the implementation of a well-balanced diet, consistent engagement in physical activity, and the maintenance of an optimal body weight. The lifestyle adjustments that have been shown to be effective in preventing type 2 diabetes in adults may also be utilised to achieve normalisation of blood sugar levels in children.

## **Gestational diabetes**

Gestational diabetes refers to the manifestation of diabetes during pregnancy (gestation). Gestational diabetes disrupts the cellular utilisation of glucose, akin to other forms of diabetes. Elevated blood glucose levels resulting from gestational diabetes can have detrimental effects on the health of both the expectant mother and the developing foetus.

Despite the worrisome nature of any pregnancy concern, there is still positive news to be found. The management of gestational diabetes during pregnancy involves adopting a balanced dietary regimen, engaging in physical activity, and, if deemed required, administering medication. Effective management of blood sugar levels is crucial for maintaining the well-being of both the expectant mother and her unborn offspring, thereby mitigating the potential complications associated with childbirth.

In cases where an individual has experienced gestational diabetes during pregnancy, it is commonly seen that their blood glucose levels tend to revert to a normal state quickly following childbirth. Nevertheless, the likelihood of acquiring type 2 diabetes is heightened among those who have already experienced gestational diabetes. It is necessary to undergo an evaluation for potential adjustments.

### **The manifestation of clinical indicators**

Gestational diabetes commonly lacks overt manifestations or symptoms. Potential symptoms may encompass heightened thirst and a greater frequency of urination.

The factors that contribute to or bring about a particular phenomenon or event.

The aetiology of gestational diabetes in certain women remains uncertain, as the factors contributing to its development have not been definitively identified. Weight gain during pregnancy is often a contributing factor.

In general, blood sugar levels are regulated by a variety of hormones. Nevertheless, due to hormonal fluctuations occurring during pregnancy, the body experiences challenges in efficiently metabolising glucose. This phenomenon results in an abrupt increase in blood glucose levels.

### **Risk factors**

Risk factors associated with gestational diabetes mellitus (GDM) encompass a range of conditions that may increase the likelihood of developing diabetes during pregnancy.

Individuals who are obese or overweight who do not participate in physical exercise are at risk of developing pre-diabetes.

The individual has a history of gestational diabetes during a previous pregnancy, as well as a diagnosis of polycystic ovarian syndrome.

- Possessing a familial connection to an individual with diabetes

In previous instances, the individual has experienced the delivery of an infant with a weight above 9 pounds (4.1 kg).

As an American individual, one may identify with a particular racial or ethnic group, such as Black, Hispanic, American Indian, or Asian.

### **Complications**

Unregulated gestational diabetes may lead to heightened levels of blood glucose. Both the pregnant individual and their foetus may encounter complications stemming from elevated blood glucose levels, potentially leading to an augmented probability of necessitating a caesarean section for childbirth.

Potential illnesses that may pose a threat to the well-being of child

If an individual is diagnosed with gestational diabetes, there is an increased likelihood that their unborn child may exhibit a higher susceptibility to:

The phenomenon of excessive weight during birth.

If an individual's blood sugar levels exceed the permissible range, there is a possibility that the size of their infant may exceed the norm. Infants with a birth weight of 9 pounds or over exhibit an increased likelihood of encountering birth-related injuries, experiencing difficulties in navigating through the birth canal, or necessitating the implementation of a caesarean section.

### **Preterm Birth.**

There appears to be an increased likelihood of preterm labor and delivery in individuals with elevated blood glucose levels. Alternatively, it may be recommended to induce an early birth if the baby is of considerable size.

The individual is experiencing notable breathing difficulties.

Premature infants may experience respiratory distress syndrome, a condition characterized by difficulties in respiration.

### **Hypoglycemia**

Following the delivery process, newborn infants may sometimes encounter a condition known as hypoglycemia, characterized by abnormally low levels of blood sugar. Infants who encounter severe hypoglycemia may undergo

### **Seizures**

Prompt feedings and, in some cases, the administration of intravenous glucose solution can effectively restore the baby's blood sugar level to its normal range.

In the later stages of an individual's life, there is an increased likelihood of developing type 2 diabetes and obesity. There is an increased propensity for infants to develop type 2 diabetes and obesity in their later years.

## **Stillbirth**

Untreated gestational diabetes has the potential to result in foetal demise, occurring either prenatally or shortly after delivery. Potential Challenges That May Arise

## **Gestational diabetes**

Both hypertension and pre-eclampsia are medical conditions that can occur during pregnancy. Preeclampsia, a significant pregnancy complication characterised by elevated blood pressure and associated symptoms that pose potential risks to maternal and foetal well-being, represents an additional risk factor for hypertension that is exacerbated by the presence of gestational diabetes.

Undergoing a caesarean section (surgical procedure) for childbirth. The presence of gestational diabetes increases the likelihood of a caesarean section.

The impending onset of diabetes. Individuals who have already had gestational diabetes are at an increased likelihood of having the condition once more in subsequent pregnancies. As individuals advance in age, the likelihood of developing type 2 diabetes increases.

## **Prevention**

Developing healthier behaviours before to pregnancy is advantageous. The prevention of gestational diabetes cannot be guaranteed. Engaging in these health-conscious behaviours may potentially reduce the likelihood of developing type 2 diabetes or experiencing a recurrence of gestational diabetes in individuals with a prior history of the condition.

## **Consume a diet that is rich in essential nutrients.**

Select foods that are high in dietary fibre and low in calories and fat. It is imperative to prioritise the consumption of entire grains, vegetables, and fruits. In order to effectively pursue your objectives while maintaining both taste and nutritional value, it is advisable to prioritise diversity. It is advisable to carefully consider and adhere to recommended serving sizes.

## **Continue to progress**

Engaging in physical activity has been found to be beneficial in mitigating the risk of developing gestational diabetes both prior to, during, and subsequent to pregnancy. It is recommended to engage in 30 minutes of moderate activity on most days of the week. Engage in a daily routine of brisk walking. Engage on a cycling excursion. Engaging in lap swimming. Brief episodes of physical exertion, such as deliberately parking one's vehicle at a greater distance from a retail establishment while accomplishing tasks or engaging in a brief interlude of walking, together contribute to overall physical activity levels.

It is advisable for individuals to commence pregnancy when they have achieved a state of optimal weight.



Engaging in weight loss efforts prior to conception may contribute to a more favourable pregnancy outcome in terms of overall health. It is advisable to prioritise the adoption of enduring dietary modifications that can provide sustained support during pregnancy, such as augmenting the consumption of fruits and vegetables.

It is advisable to avoid exceeding the recommended weight limit. It is common and considered to be a healthy phenomenon for women to experience weight gain during pregnancy. However, the rapid accumulation of excessive weight can elevate the likelihood of developing gestational diabetes. It is advisable to consult with your healthcare practitioner regarding an appropriate and tolerable level of weight gain for your specific circumstances.

## **2.4 Chronic Kidney Disease**

Medical professionals utilise the term "renal disease" to encompass any deviations from normal kidney function, including cases where only minimal impairment is present. The term "chronic" denotes a persistent ailment that exhibits limited or no substantial improvement over an extended duration. The term "chronic" does not necessarily indicate the severity of a condition.

### **Causes**

There are a multitude of factors that lead to chronic kidney disease (CKD), with renal ageing, diabetes, and high blood pressure being the most prevalent among them. Performing extensive investigations to determine the underlying cause of chronic kidney disease (CKD) is often unnecessary when blood tests indicate stable kidney function, as only a small proportion of the causes are fully curable. A renal scan is indicated in cases where an individual presents with notable impairment in renal function, progressive decline in renal function, or symptoms associated with renal pain. The kidney biopsy procedure, characterised by the extraction of a tiny tissue sample from the kidney using a needle, followed by microscopic examination, is a diagnostic test that certain individuals may undergo.

### **The stages of chronic kidney disease (CKD).**

- Chronic Kidney Disease (CKD) stage 1 is characterized by an estimated glomerular filtration rate (eGFR) exceeding 90 ml/min, denoting normal kidney function. However, additional diagnostic assessments reveal certain manifestations of renal impairment, including the presence of protein or blood in the urine, the existence of many cysts inside the kidneys, or the presence of a solitary kidney.
- In stage 2 of chronic kidney disease (CKD), the estimated glomerular filtration rate (eGFR) ranges between 60-90. Other diagnostic tests reveal a minor decline in eGFR and provide indications of renal dysfunction.
- Chronic Kidney Disease (CKD) stage 3a is characterized by a mild to moderate decline in renal function, as shown by an estimated glomerular filtration rate (eGFR) ranging from 45 to 59 ml/min.
- Chronic Kidney Disease (CKD) stage 3b is characterized by a moderate to severe reduction in renal function, often observed when the estimated glomerular filtration rate

(eGFR) falls within the range of 30-44 ml/min.

- Chronic Kidney Disease (CKD) in stage 4 is characterized by a significant decline in renal function, as evidenced by an estimated glomerular filtration rate (eGFR) ranging from 15 to 29 ml/min. In cases where there is a partial loss of renal function, supplementary medication may be required.
- CKD stage 5 renal failure is diagnosed when the glomerular filtration rate (GFR) falls below 15 ml/min. Individuals are very susceptible to experiencing signs of renal failure, hence potentially requiring the implementation of dialysis or a kidney transplant.

## **Proteinuria**

The presence of proteinuria in urine elevates the risk of developing renal diseases. Hence, it is imperative that individuals diagnosed with chronic kidney disease (CKD) undergo a urine test to ascertain the extent of proteinuria. In the event of elevated protein levels, it is crucial for these individuals to receive heightened medical attention and maybe undergo further comprehensive evaluations.

- Inadequate control of blood pressure, weight gain, and suboptimal management of diabetes are three contributing variables that exacerbate the occurrence of proteinuria.
- The management of chronic kidney disease (CKD) involves a comprehensive approach that encompasses several therapeutic interventions aimed at slowing the progression of the disease and managing its associated complications.
- It is recommended that individuals diagnosed with chronic kidney disease (CKD) endeavor to engage in several activities. The aforementioned items encompass:
- Individuals who are overweight should engage in regular exercise and strive to achieve weight loss.
- Cease the habit of smoking.
- To facilitate the management of blood pressure, it is advisable to reduce salt intake. I recommend utilizing the Footswitch application to identify dietary items that possess elevated levels of sodium. The footswitch is a device that is operated by the foot and is commonly used in various
- It is recommended to adhere to a balanced and nutritious diet.
- It is recommended to consume around 2 liters of fluid daily (equivalent to 10 cups or 6 mugs) unless the estimated glomerular filtration rate (eGFR) falls below 15ml/min. With the exception of a limited number of uncommon scenarios or individuals prone to recurrent urinary tract infections, there is no discernible advantage to increasing fluid intake.
- It is advisable to procure an automated blood pressure monitor to conduct regular blood pressure measurements at home, with a recommended frequency of at least two times per week.
- It is recommended to adhere to your existing vaccination regimen, which should encompass a yearly administration of the influenza vaccine, commonly known as the flu shot, as well as a single dosage of the pneumococcal vaccine, intended to prevent

pneumonia. It is advisable to consult with your healthcare provider on the latter. It is advisable to seek guidance from a nephrologist when utilizing immunosuppressive medications, as certain immunizations may not be recommended.

- It is advisable to refrain from the consumption of medicines such as anti-inflammatory drugs (e.g., Ibuprofen, diclofenac), herbal treatments, and recreational substances, since they have the potential to cause harm to the kidneys and elevate blood pressure levels.

Prudent caution should be exercised in the management of blood pressure. In cases when the blood pressure (BP) exceeds the threshold of 140/85, it is typically necessary to initiate medication. Furthermore, those with proteinuria or diabetes are advised to aim for a reduction in blood pressure to 140/90 or below. It is advisable to monitor one's cholesterol levels, and certain individuals may receive instructions to consume a daily aspirin tablet. The frequency of conducting a blood test to assess the estimated glomerular filtration rate (eGFR) should be determined based on the stage of chronic kidney disease (CKD) that an individual is in, with a recommended minimum of once annually. The condition will be attended to by a nephrologist, or alternatively, a referral to a nephrologist may be initiated if the urinalysis indicates a substantial presence of protein in the urine or if there is a decline in renal function.

## **2.5 Chronic Kidney Disease (CKD) and Diabetes**

Diabetes has been identified as a potential etiological factor for chronic kidney disease (CKD), however the reverse causal relationship, where CKD acts as a cause of diabetes, has not been established. The presence of diabetes poses challenges in the management of chronic kidney disease (CKD), necessitating careful monitoring of blood pressure, blood glucose levels, and cholesterol levels. Due to the potential acceleration of kidney failure associated with inadequately managed diabetes, it is imperative to enhance the monitoring procedures. This entails conducting a more comprehensive assessment, which involves an increased frequency of urine tests aimed at detecting the presence of protein.

## **Chapter 3**

### **Dietary Management**

#### **3.1 Dietary treatment**

The optimal dietary intervention for certain individuals with chronic kidney disease (CKD) may vary over time, contingent upon their serum biochemistry levels and existing nutritional condition. Moreover, a potential conflict may arise between the dietary recommendations for chronic kidney disease (CKD) and diabetes mellitus (DM), hence posing challenges in the management of patients with DM. It is crucial to provide patients with reassurance regarding the appropriateness of past dietary recommendations given their disease status at the time. Although it may be challenging to facilitate their comprehension of shifting dietary priorities, it is often beneficial to elucidate the health advantages associated with various components of dietary guidance. Patients who acquire chronic kidney disease (CKD) as a result of diabetes are likely to have been exposed to a range of dietary and health information from various sources. Hence, it is imperative that these individuals are regularly directed to a certified dietitian with the necessary expertise to evaluate their comprehensive dietary patterns and provide tailored recommendations accordingly.

#### **3.2 Malnutrition**

The occurrence of malnutrition is frequently observed in individuals with CKD stages 4 and 5, with documented prevalence rates reaching as high as 48% in those with CKD stage 4 and ranging from 20% to 70% in patients with CKD stage 5, as described by Fouque et al. in 2011. The condition frequently arises due to a decline in glomerular filtration rate (GFR) and advancing age, and is linked to elevated rates of illness and death (Leavey et al., 2001; Pifer et al., 2002; Dwyer et al., 2005). There are several additional factors that contribute to the susceptibility of developing malnutrition. These factors include symptoms commonly linked with uremia, such as nausea and vomiting, decreased taste, loss of appetite, and anemia. Stratton et al. (2005) conducted a meta-analysis on the effects of oral nutritional supplementation and enteral tube feeding in dialysis patients. Their findings indicate that nutritional support has the potential to enhance clinical outcomes in individuals suffering from malnutrition. Consequently, the timely identification of malnourished patients is of utmost importance, as it enables prompt implementation of appropriate nutritional interventions. Given the absence of a universally accepted benchmark for evaluating nutritional status, it is advisable to incorporate a diverse range of measurements in regular nutritional screening and assessment in order to accurately capture an individual's nutritional status. In cases where malnutrition is suspected, it is advisable to refer patients to a registered dietitian for the purpose of conducting a comprehensive nutritional assessment and providing appropriate support. Individuals diagnosed with diabetes mellitus (DM) are frequently advised to decrease their consumption of carbohydrates in order to enhance glycemic control. Alternatively, they may be advised to limit their intake of dietary fats to mitigate their potential risk of developing

cardiovascular disease (CVD) in the future. Nevertheless, in the case that individuals are rapidly approaching the need for dialysis, experiencing difficulties related to uremia and exhibiting a diminished appetite, the prevailing dietary focus should be on ensuring an appropriate energy intake, rather than only prioritizing the prevention of cardiovascular disease at a later time. The patients' outcome is more threatened by the repercussions of malnutrition than cardiovascular disease due to the compounding factors of weariness and nausea, which exacerbate difficulties with food preparation and lower dietary intake. Ensuring nutritional sufficiency from an early stage is of utmost importance, and it is imperative to avoid imposing unnecessary dietary limitations on patients.

### **3.3 Dietary recommendation**

#### Stages 1 & 2

- The objective is to reduce the likelihood of chronic kidney disease (CKD) advancement and mitigate the risk of cardiovascular complications.
- The objective is to enhance glycemic control by the optimisation of dietary and pharmacological interventions.
- Weight control involves implementing strategies to achieve an acceptable reduction in caloric consumption and an increase in physical activity.
- Achieving optimal blood pressure regulation can be facilitated by the implementation of certain measures, such as the adoption of a low-sodium diet and the maintenance of a healthy weight.
- To enhance the lipid profile, it is recommended to incorporate certain dietary practises. These include the consumption of oily fish, fruits, and vegetables, while limiting the intake of saturated fats and increasing fibre consumption.
- In cases when the potassium level exceeds 5.5 mmol/l, it is recommended to provide basic guidance on managing low potassium levels.

#### Stage 3

- The objective is to impede the advancement of chronic kidney disease (CKD).
- Regarding stages 1 and 2, it is recommended to address any metabolic issues that may emerge, such as hyperkalemia, malnutrition, and renal bone disease.

#### Stage 4

- Pre-dialysis recommendations include prioritizing optimum nutritional intake and taking measures to prevent malnutrition. Additionally, it is advised to avoid the use of added salt.
- Metabolic problems should be managed by implementing necessary measures such as adhering to a low potassium and phosphate diet, as well as restricting fluid intake.
- Recommendations for optimizing glycemic control and/or achieving weight reduction if necessary

## Stage 5

- The provision of personalized dietary recommendations based on an individual's biochemistry and renal replacement therapy, with a focus on achieving optimal nutrient intake.

### **Dietary and lifestyle modification for CKD ( NICE 2008 ; Renal Association 2011).**

1	The implementation of dietary intervention should encompass comprehensive instruction, thorough assessment, and diligent supervision to effectively safeguard against the occurrence of malnutrition.
2	Promoting the attainment of a healthy body weight is advisable, and individuals with a body mass index (BMI) exceeding 30 kg/m <sup>2</sup> should be provided with nutritional guidance to facilitate the process of weight reduction.
3	It is recommended to offer dietary guidance that limits sodium consumption to less than 2.4 grammes per day (equivalent to 100 millimoles per day or less than 6 grammes per day of salt).
4	It is recommended that individuals be offered guidance on engaging in regular and moderate exercise.

### **Lower potassium fruits and vegetables.**

<b>Fruits</b>	<b>Vegetables</b>
(Portion size – 1 fruit unless otherwise stated)	(Portion size – approx. 2 tablespoons) Vegetables should be boiled where possible
Apple	
Cherries (approx. 10)	Broccoli
Clementine, Satsuma or tangerine	Cabbage
½ Grapefruit	Carrots
Nectarine	Cauliflower
1 slice fresh Pineapple	Green beans
Plum	Leeks
Raspberries (approx. 10)	Peas
Strawberries (approx. 5–6)	Runner beans
150 g any tinned fruit, drained (except prunes)	Swede
	Sweetcorn
	Turnip
	Small side salad (e.g. lettuce, cucumber, ½ small tomato)

### **Nutritional guidelines for low clearance patients and those on RRT.**

- Regular screening for undernutrition in stages 4 and 5 of chronic kidney disease (CKD) is recommended, employing a range of evaluation methods such as evaluating actual body weight, percentage weight loss, and utilizing the subjective global assessment (SGA).
- The prevention of undernutrition in stages 4 and 5 of chronic kidney disease (CKD) should be accomplished through the recommendation of suitable protein and energy consumption.
- The recommended daily protein intake for those not undergoing renal replacement therapy (RRT) is 0.75 grammes per kilogram of ideal body weight (IBW). For individuals undergoing RRT, the minimum recommended protein intake is 1 to 1.2 grammes per kilogram of IBW per day.
- The recommended caloric intake for all patients is 30-35 kcal per kilogram of ideal body weight per day.
- The identification of undernutrition in stages 4 and 5 of chronic kidney disease (CKD) should be based on thorough clinical evaluation. Treatment should involve the judicious utilization of oral nutritional supplements, enteral nutrition, or parenteral nutrition, as deemed necessary.
- The assessment of body mass index (BMI) might be utilized to evaluate the presence of overnutrition in chronic kidney disease (CKD).

## **Chapter 4**

### **4.0 Conclusion**

This internship program was a fantastic learning experience for me and will be crucial to my future professional success. I had to learn how to connect realistically with individuals of all ages and socioeconomic backgrounds, among other new challenges. During my internship at BIRDEM, I gained knowledge about a wide range of diseases, their treatments, nutritional needs, and diet charts. I also learned about the nutritional management of diabetics with chronic renal disease. I can say with certainty that performing this internship has greatly increased my understanding of the workplace. At BIRDEM, I cared for 50 patients with diabetes and additional complications such as chronic kidney disease.

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## Appendices

### Appendix 1: Case studies

**DAFFODIL INTERNATIONAL UNIVERSITY, BIRULIA, SAVAR, DHAKA**  
**DEPARTMENT OF NUTRITION AND FOOD ENGINEERING**

Year: 2023

Case Study No: 01 Date:

#### Information about Patient

- a) Name: Mrs Lutfunnahar
- b) Address: Narshindi, Dhaka
- c) Name of the Hospital: Birdem General Hospital
- d) Admission Date: 3.09.33
- e) Reason of admission: DM, HTN, CKD
- f) Word No:111
- g) Bed No:1113
- h) Health Condition: stable
- i) Mental status: conscious and oriented

#### Anthropometric parameters

**Age:** 50years **Sex:** Female **Weight:** 60 kg **Height:** 146 cm **BMI:** 28.15 kg/m<sup>2</sup> **IBW:** 46 kg

Underweight  Normal  Over weight  Obesity

#### Nutritional Status

< 17  17-18.5  > 18.5 – 23  23 – 25  25.1 – 29.9  30 – 39.9  ≥ 40

#### Activity Level

Very active  Active  Moderate worker  Sedentary worker  Ambulatory bed rest

Lab / Biochemical Test (Blood)	Result	Lab / Biochemical Test ( Blood)	Result
<input type="checkbox"/> Blood Glucose (F)	mmol/L	<input type="checkbox"/> SBP	mmHg
<input type="checkbox"/> Blood Glucose (ABF)	mmol/dl	<input type="checkbox"/> DBP	mmHg
<input type="checkbox"/> HbA1c	%	<input type="checkbox"/> Magnesium	mmol/l
<input type="checkbox"/> Albumin	g/dl	<input type="checkbox"/> Phosphate	mmol/l
<input type="checkbox"/> Total Protein	g/dl	<input type="checkbox"/> Calcium	mmol/l
<input type="checkbox"/> TG	249 mg/dl	<input type="checkbox"/> Potassium	mmol/l
<input type="checkbox"/> HDL	34 mg/dl	<input type="checkbox"/> Sodium	mmol/l
<input type="checkbox"/> LDL	140 mg/dl	<input type="checkbox"/> Serum Chloride	86 mmol/l
<input type="checkbox"/> Total Cholesterol	224 mg/dl	<input type="checkbox"/> Hb	g/dl

<input type="checkbox"/> BUN	mg/dl	<input type="checkbox"/> Hematocrit	%
<input type="checkbox"/> Creatinine	mg/dl	<input type="checkbox"/> ESR	mm
<input type="checkbox"/> Urea	mg/dl	<input type="checkbox"/> SGOT	14 IU/I
<input type="checkbox"/> Bilirubin	mmol/dl	<input type="checkbox"/> SGPT	17 U/I
<input type="checkbox"/> S. TCO2	mmol/L	<input type="checkbox"/> Alk.Phos.	73 SomU/I
<input type="checkbox"/> Amylase	IU/I	<input type="checkbox"/> Others	
<input type="checkbox"/> Bicarbonate	mmol/l	<input type="checkbox"/> Others	
<input type="checkbox"/> Uric Acid	mg/dl	<input type="checkbox"/> Others	

**Supplements:**  Yes  No

**Appetite:**  Excellent  Good  Fair  Poor

**Socioeconomic & Cultural factor:**

- Monthly family income: 30000 BDT /=
- Religion: Islam
- Education: school completed
- Occupation: housewife
- Living status: middle class
- Rural/Urban: Urban

**DIET PLAN (for present condition)**

Nutritional status: Over weight

<input type="checkbox"/> Estimated Energy needs: 1200 kcal	<input type="checkbox"/> Carbohydrate: 164.02 gm
<input type="checkbox"/> Protein: 35 gm	<input type="checkbox"/> Fat: 23.58 gm

Restrictions:  Yes  No If yes,

<input type="checkbox"/> Calorie	<input type="checkbox"/> Fat	<input type="checkbox"/> K
<input type="checkbox"/> Protein	<input type="checkbox"/> Cholesterol	<input type="checkbox"/> Mg
<input type="checkbox"/> Free sugar	<input type="checkbox"/> Na	<input type="checkbox"/> Other

**Food List**

Food group	Serving	Amount gm	Kcal	Carbohydrate gm	Protein gm	Fat gm
Cereals	8	370	682	144.13	19.61	3.17
Pulses	0	0	0	-	-	-
Fish/Meat/ Egg	3	112	198	0.6	29.81	7.54

Vegetables	2	60	38	8.08	2	0.31
Milk & Milk product	2	248	108	11.21	7.99	8.06
Fruits					-	-
Oil	2	17.8	40	0	0	4.5
Total	17	807.8	1066	164.02	59.41	23.58

### Menu Planning

Meal	Food	Serving	Amount	
			Household	gm
Breakfast	Roti	2	2 pieces	60 gm
	Egg	1	1 piece	52 gm
Snacks (Mid-morning)	Shagu	1	1/3 cup	30 gm
	Milk 1 cup	1	1 cup	125 ml
Lunch	Rice 2 cups	3	2 cups	220 gm
	Fish/chicken 1 piece	1	1 piece	30 gm
	Vegetable 1 cup	1	1 cup	30gm
Snacks (Afternoon)	Shagu Milk 1 cup	1	1/3 cup 1 cup	30gm 125 ml
		1		
Dinner	Roti 2 pieces	2	2 pieces	60 gm 30gm 30 gm
	Fish/chicken 1 piece	1	1 piece	
	Vegetable 1 cup	1	1 cup	
Bed-time	Bun 1 piece	1	1 piece	30 gm

Total cooking oil: 3 tsp

#### Advice /Recommendation for Patients:

Foods to be avoided	Moderate to eat	Foods permitted
All types of beans, lentils, seeds are must be avoided	Extra sugar, salt, oily foods Must be eaten in a limited way.	Whole grains, fruits, vegetables, fish, lean meat.

**Other Dietary Guidelines:**

- 1. Must limit your protein intake
- 2. Must drink not more than 2 liters of water
- 3. Must eat fresh vegetables

**DAFFODIL INTERNATIONAL UNIVERSITY, BIRULIA, SAVAR, DHAKA  
DEPARTMENT OF NUTRITION AND FOOD ENGINEERING**

Year: 2023

Case Study No: 02 Date:

**Information about Patient**

- a) Name: Mrs. Dilruba
- b) Address: Maddo monipur, mirpur-2
- c) Name of the Hospital: Birdem General Hospital
- d) Admission Date: 31-08-22
- e) Reason of admission: DM, CKD (stage five), HTN, Recurrent CVD
- f) Word No: 143
- g) Bed No: 1448
- h) Health Condition: unstable
- i) Mental status: conscious and oriented

**Anthropometric parameters**

**Age:** 75 years **Sex:** Female **Weight:** 47 kg **Height:** 145 cm **BMI:** 22.35 kg/m<sup>2</sup> **IBW:** 45 kg

Underweight  Normal  Over weight  Obesity

**Nutritional Status**

< 17  17-18.5  > 18.5 – 23  23 – 25  25.1 – 29.9  30 – 39.9  ≥ 40

**Activity Level**

Very active  Active  Moderate worker  Sedentary worker  Ambulatory bed rest

Lab / Biochemical Test (Blood)	Result	Lab / Biochemical Test ( Blood)	Result
<input type="checkbox"/> Blood Glucose (F)	mmol/L	<input type="checkbox"/> SBP	mmHg

<input type="checkbox"/> Blood Glucose (ABF)	mmol/dl	<input type="checkbox"/> DBP	mmHg
<input type="checkbox"/> HbA1c	%	<input type="checkbox"/> Magnesium	mmol/l
<input type="checkbox"/> Albumin	g/dl	<input type="checkbox"/> Phosphate	mmol/l
<input type="checkbox"/> Total Protein	g/dl	<input type="checkbox"/> Calcium	mmol/l
<input type="checkbox"/> TG	mg/dl	<input type="checkbox"/> Potassium	mmol/l
<input type="checkbox"/> HDL	mg/dl	<input type="checkbox"/> Sodium	mmol/l
<input type="checkbox"/> LDL	mg/dl	<input type="checkbox"/> Serum Chloride	102 mmol/l
<input type="checkbox"/> Total Cholesterol	mg/dl	<input type="checkbox"/> Hb	g/dl
<input type="checkbox"/> BUN	mg/dl	<input type="checkbox"/> Hematocrit	%
<input type="checkbox"/> Creatinine	6.1 mg/dl	<input type="checkbox"/> ESR	mm
<input type="checkbox"/> Urea	mg/dl	<input type="checkbox"/> SGOT	IU/I
<input type="checkbox"/> Bilirubin	mmol/dl	<input type="checkbox"/> SGPT	U/I
<input type="checkbox"/> S.TCO2	24 mmol/L	<input type="checkbox"/> Alk.Phos.	SomU/I
<input type="checkbox"/> Amylase	IU/I	<input type="checkbox"/> Others	
<input type="checkbox"/> Bicarbonate	mmol/l	<input type="checkbox"/> Others	
<input type="checkbox"/> Uric Acid	mg/dl	<input type="checkbox"/> Others	

**Supplements:**  Yes  No

**Appetite:**  Excellent  Good  Fair  Poor

**Socioeconomic & Cultural factor:**

- Monthly family income: BDT /= 30000
- Religion: Islam
- Education: illiterate

- Occupation: Housewife
- Living status: middle class
- Rural/Urban: urban

**DIET PLAN (for present condition)**

Nutritional status: Normal

<input type="checkbox"/> Estimated Energy needs: kcal	<input type="checkbox"/> Carbohydrate: gm
<input type="checkbox"/> Protein: 30 gm	<input type="checkbox"/> Fat: gm

Restrictions:  Yes  No If Yes,

<input type="checkbox"/> Calorie	<input type="checkbox"/> Fat	<input type="checkbox"/> K
<input type="checkbox"/> Protein	<input type="checkbox"/> Cholesterol	<input type="checkbox"/> Mg
<input type="checkbox"/> Free sugar	<input type="checkbox"/> Na	<input type="checkbox"/> Other

**Food List**

Food group	Serving	Amount gm	Kcal	Carbohydrate gm	Protein gm	Fat gm
Cereals	11	480	837	177.04	19.97	10.63
Pulses	0	0	0	-	-	-
Fish/Meat/ Egg	3	112	198	0.6	29.81	7.54
Vegetables	2	60	38	8.08	2	0.31
Milk & Milk product						-
Fruits					-	-
Oil	2	17.8	40	0	0	4.5
Total						

**Menu Planning**

Meal	Food	Serving	Amount	
			Household	gm
Breakfast	Roti	2	2 pieces	60
	Egg	1	1 whole	
	Vegetable	1	1 cup	
Snacks (Mid-morning)	Lal chira	1	1 cup	30
Lunch	Rice	3	2 cups	240
	Fish/chicken	1	1 piece	30
	Vegetable	1	1 cup	30
Snacks (Afternoon)	Shabudana	1	1 cup	30
Dinner	Roti	2	2 pieces	60
	Fish/chicken	1	1 piece	30
	Vegetable	1	1 cup	30
Bed-time	Diabetes biscuit	2	2 pieces	30

Total cooking oil: 3 tsp

#### Advice /Recommendation for Patients

Foods to be avoided	Moderate to eat	Foods permitted
Salty and sugary food must be avoided	Can eat diabetes crackers sometimes	Try to eat starchy vegetables

#### Other Dietary Guidelines

1. Must avoid red meat
2. Must control fluid intake
3. Must control sodium intake