AN INTERNSHIP REPORT ON DIETARY MANAGEMENT OF DIABETIC NEPHROPATHY PATIENTS

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

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APPROVAL

This internship, "**An internship report on dietary management of diabetic nephropathy patients**", has been turned by **Sumiya Afrin** 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.

EXAMINING COMMITTEE

Chairman of the Board _____ _____

External Member _____ _____

Internal Member-1 _____ _____

Internal Member-2 _____ _____

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DECLARATION

The internship was completed under the supervision of **Juwel Rana, Assistant Professor**, Department of Nutrition and Food Engineering 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.

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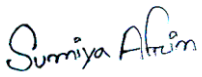

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ACKNOWLEDGMENT

First I express our heartiest thanks and gratefulness to almighty God for His divine blessing makes us possible to complete the final year internship successfully. I really grateful and wish our profound our indebtedness to **Juwel Rana, Assistant Professor**, dept of NFE at Daffodil International University, supervised me throughout my project work. I owe a lot of gratitude to him for always having my back.

I would like to express our heartiest gratitude to **Dr. Nizam Uddin, Associate Professor, and Head,** Department of NFE, for his kind help to finish our project and also to other faculty member and the staff of NFE department of Daffodil International University.

I would like to thank our entire course mate in Daffodil International University, who took part in this discuss while completing the course work. Finally, we must acknowledge with due respect the constant support and patients of our parents.

EXECUTIVE SUMMARY

Diabetic nephropathy is a significant and growing concern, with the number of patients worldwide on the rise. Managing this condition requires a multidisciplinary approach, with dietary management playing a central role. This internship emphasized the importance of tailoring dietary plans to each patient's unique needs, preferences, and restrictions. Personalized nutrition strategies are more likely to result in better adherence and improved outcomes. This internship report underscores the critical role of dietary management in the care of individuals with diabetic nephropathy. By adopting a patient-centered approach, regularly monitoring progress, and providing patient education and support, we can make significant strides in managing this complex condition. The insights gained during this internship emphasize the importance of ongoing research and innovation in the field of dietary management for diabetic nephropathy patients. As we move forward, it is crucial to continue exploring new strategies and interventions to enhance the quality of life for those living with this condition.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Diabetes is a chronic metabolic condition characterized by elevated levels of blood glucose, also known as blood sugar. This pathological state progressively leads to substantial damage to several physiological systems, including the cardiovascular system, vasculature, ocular structures, renal system, and peripheral nerves. Type 2 diabetes is the predominant manifestation of the condition, often occurring in adult individuals. In this form, the body exhibits resistance to insulin or experiences insufficient production of insulin. In recent decades, there has been a notable rise in the occurrence of type 2 diabetes in nations with diverse economic levels. Type 1 diabetes, also known as juvenile diabetes or insulin-dependent diabetes, is a chronic medical disorder characterized by inadequate synthesis of endogenous insulin in the pancreas. Ensuring the continuing survival of those afflicted by diabetes necessitates the uttermost significance of cost-effective treatment, namely insulin, in terms of availability. By the year 2025, there exists a widely acknowledged goal to halt the progression of diabetes and obesity.

Diabetes has a global impact, affecting around 422 million persons worldwide, with a substantial majority of the affected population living in low- and middle-income countries. Furthermore, it is believed that diabetes is directly responsible for around 1.5 million fatalities per year. In recent decades, there has been a persistent rising trend seen in the incidence and prevalence of diabetes.

1.2 Background

Diabetic nephropathy is a chronic complication that emerges as a result of prolonged diabetes mellitus, and it is characterized by a gradual deterioration of kidney function. It presents a substantial public health concern, impacting an increasing population of persons on a global scale. The effective management of diabetic nephropathy requires a holistic approach including medicinal, nutritional, and lifestyle therapies. Among these factors, the management of one's food emerges as a pivotal cornerstone, with the potential to have a substantial impact on the advancement of the ailment and the holistic welfare of those affected by it.

Despite the significant progress made in the field of healthcare, the process of optimizing nutritional treatment for individuals with diabetic nephropathy continues to be a multifaceted and continuously developing endeavor. The intricate relationship among diabetes, renal function, and dietary intake needs a comprehensive understanding and tailored strategies. The objective of this internship was to tackle these problems and enhance comprehension of nutritional management in the setting of diabetic nephropathy, inside a healthcare center known for its competence in nephrology.

1.3 Objectives of the Internship

1. To gain a comprehensive understanding of the pathophysiology of diabetic nephropathy, including the mechanisms by which diabetes affects kidney function, the progression of the disease, and the associated complications.

2. To familiarize oneself with existing dietary guidelines and recommendations for diabetic nephropathy patients, including macronutrient balance, sodium intake, and dietary restrictions.
3. To develop and practice a patient-centered approach in dietary management, focusing on tailoring dietary plans to the specific needs, preferences, and restrictions of individual patients.
4. To learn how to regularly monitor patient progress and apply adjustments to dietary plans as needed. This involves understanding the significance of blood sugar control, blood pressure management, and kidney function assessment in the context of dietary interventions.

CHAPTER 2

BIRDEM GENERAL HOSPITAL OVERVIEW

2.1 Historical background

The Bangladesh Institute of Research and Rehabilitation in Diabetes, Endocrine, and Metabolic Disorders (BIRDEM) is a fully-fledged healthcare facility situated in the Shahabag area of Dhaka, Bangladesh. The organization functions under the patronage of the Bangladesh Diabetic Association and offers a diverse array of medical services across several fields of study. BIRDEM, a renowned facility, is committed to doing research, providing treatment, and facilitating rehabilitation for those afflicted with diabetes, endocrine diseases, and metabolic problems. It has a substantial capacity of 600 beds. In the year 1980, the government of Bangladesh devoted financial resources towards the construction of a hospital. BIRDEM, an institution founded in 1980, was created by the late Muhammad Ibrahim, a renowned national intellectual. In February 1956, he facilitated the establishment of the Diabetic Association for Pakistan, an organization that has since undergone a name change and is now recognized as the Diabetic Association for Bangladesh.

The Bangladesh Diabetic Association has nine unique organizations. Dr. Mohammed Ibrahim is well recognized as a trailblazer in the domain of diabetes treatment inside the country. The person demonstrated an understanding of the importance of active patient involvement in the treatment of diabetes, acknowledging the value of people with diabetes actively participating alongside their healthcare professionals. The Diabetic Association of Bangladesh (BADAS) was founded on February 28, 1956, in Dhaka, under the leadership of National Professor Dr. Muhammad Ibrahim (1911-1989), as stated by the Bangladeshi Diabetic Association (n.d.). The implementation of this plan was carried out by a consortium of social workers, philanthropists, medical professionals, and government representatives.

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

2.2 Mission

- The Diabetic Associations of Bangladesh aim to provide comprehensive healthcare services, including rehabilitation, to those diagnosed with diabetes, irrespective of their gender, socioeconomic status, or societal position.

- In order to ensure the provision of accessible and cost-effective healthcare services for the whole population of Bangladesh, it is imperative to broaden the scope of these services and build self-sustaining centers of excellence. By doing so, these centers will be able to consistently provide high-quality healthcare solutions, therefore contributing to the overall improvement of healthcare in the country.
- Develop a highly skilled workforce comprising of research scientists, doctors, technicians, nurses, and other relevant employees who possess exceptional ethical standards.
- Enhance leadership within the healthcare sector by implementing a dedicated and transparent managerial framework.
- The establishment of industrial sectors dedicated to the manufacturing of premium medicines and healthcare items is necessary.

2.3 Vision

It is imperative that individuals with diabetes in Bangladesh do not suffer from untreated conditions, unemployment, or food insecurity, ultimately leading to their death. Every individual should be given the opportunity to avail themselves of high-quality healthcare services at affordable rates.

2.4 Recruiting procedure

To get an internship, I underwent a comprehensive selection procedure. The individual overseeing my work was Juwel Rana, Assistant Professor, who held the position of supervisor. He recommended that I pay a visit to BIRDEM hospital in order to get more information on the prerequisites and procedures for submitting an application.

I engaged in a conversation with the Senior Research Officer at the hospital, who provided guidance indicating that it would be necessary for me to submit an application to the director. then, I informed my supervisor, Juwel Rana, who composed a formal letter of application on my behalf for the internship opportunity, which was then sent to the Director. Upon successfully executing all the necessary procedures, I proceeded to the hospital on the subsequent day to give the aforementioned correspondence to the esteemed director, in accordance with the provided instructions. Following a brief period of anticipation, I received a phone call from Quamrun Nahar, a distinguished individual holding a PhD and serving as a senior research officer at BIRDEM. The supervisor notified me that I had been granted permission to start my internship program at BIRDEM.

2.5 Internship duration

The duration of my internship spanned a period of fifteen days. The internship was started on August 28th, 2023 and concluded on September 13th, 2023. I was engaged in duty from 2:00 PM to 8:00 PM, amounting to a duration of six hours every day. I made the decision to abstain from work on Friday.

Figure 1: BIRDEM General Hospital Insides

CHAPTER 3

DIABETIC NEPHROPATHY

3.1 Diabetes Mellitus

Diabetes mellitus (DM) is a prevalent and significant metabolic disorder that poses a significant obstacle in contemporary healthcare. The worldwide incidence of diabetes mellitus (DM) has seen a significant surge, escalating from 108 million cases in 1980 to 451 million cases in 2017, with a continuous and fast upward trend (Beerli et al., 1998). According to projections provided by the International Diabetes Federation, it is anticipated that the global population of individuals affected by diabetes would reach around 693 million by the year 2045 (Boch et al., 2009). Currently, diabetes ranks as the seventh most significant contributor to global mortality, necessitating urgent attention to address the prevailing diabetes pandemic. Diabetes is distinguished by the presence of persistent high blood sugar levels and an inability to properly metabolize glucose, which is caused by compromised insulin function and/or production. The prevalence of micro and macro-diabetic chronic vascular problems is high among individuals with diabetes in both industrialized and developing nations. The patient group has high morbidity due to microvascular diseases, including diabetic nephropathy, retinopathy, and neuropathy. The macrovascular consequences include accelerated coronary heart disease, ischemic stroke, and peripheral vascular disease, and are the primary cause of death among individuals with diabetes.

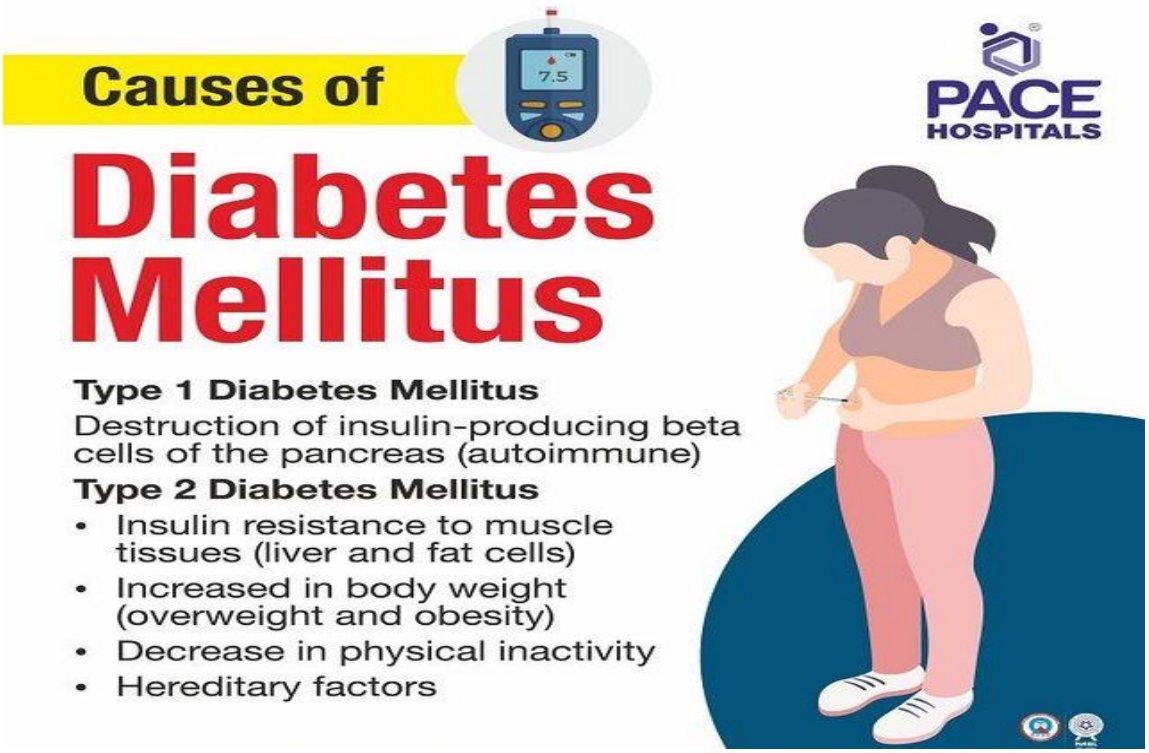

Figure 2: Causes of Diabetes mellitus (www.pacehospital.com)

3.2 Classification of Diabetes Mellitus

According to the classification system established by the American Diabetes Association, there are two primary categories of diabetes. The first category is known as type 1 diabetes

mellitus (T1DM), which is characterized by an autoimmune response leading to the destruction of the insulin-producing β-cells located in the islets of Langerhans. This particular form of diabetes accounts for approximately 5-10% of all cases. The second category is referred to as type 2 diabetes mellitus (T2DM), which is a more prevalent form of diabetes, accounting for up to 90% of cases. T2DM is primarily attributed to a reduction in insulin effectiveness. There has been a noticeable rise in the prevalence of type 2 diabetes mellitus (T2DM) in conjunction with the escalating global rates of obesity. This increase in T2DM is particularly prominent when contrasted to type 1 diabetes mellitus (T1DM), which is now more often seen in a younger patient demographic characterized by higher levels of obesity. In recent studies, researchers have suggested the categorization of patients into subgroups using six specific characteristics. These variables include glutamate decarboxylase antibodies, age at diagnosis, body mass index, glycated hemoglobin, and homoeostatic model assessment 2 estimations of β-cell activity and insulin resistance. The resultant cohorts maintain a heterogeneous disease course and varying levels of risk for chronic problems associated with diabetes.

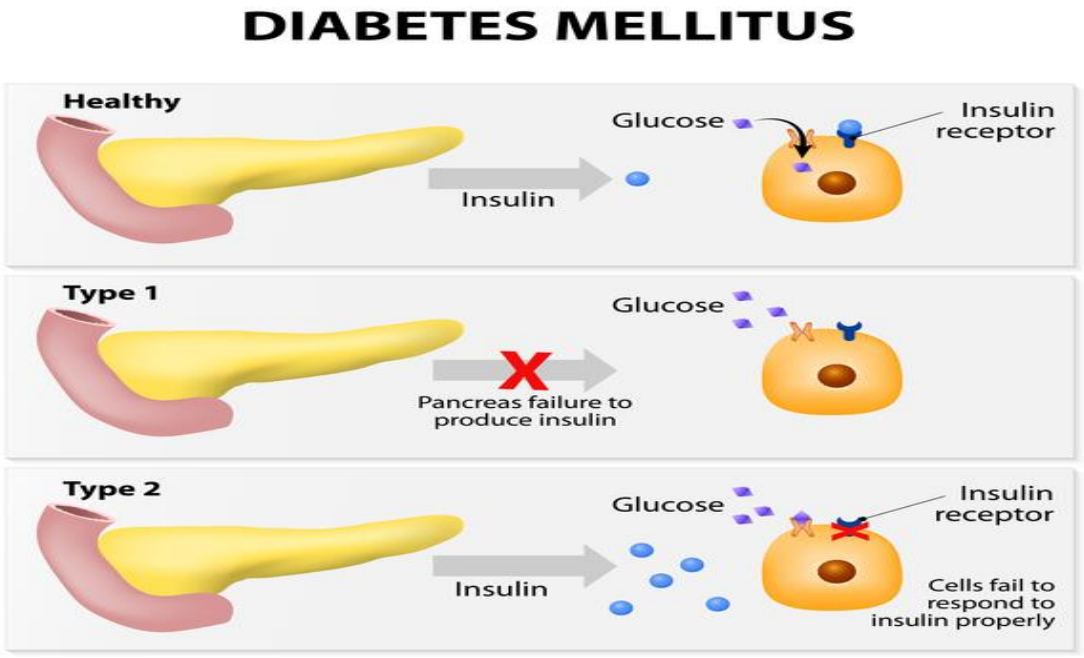

Figure 3: Diabetes mellitus(medlineplus.gov)

3.3 Diabetic Nephropathy

Diabetic nephropathy (DN) is a serious and very concerning condition associated with diabetes. This microvascular complication affects a significant proportion of individuals diagnosed with type 1 diabetes mellitus (T1DM) and type 2 diabetes mellitus (T2DM), with a notable prevalence of 45%. Currently, diabetes is the primary contributor to end-stage renal disease (ESRD) in the Western world and is the main factor contributing to the need for renal replacement treatment in patients globally. Nevertheless, owing to the robust correlation between diabetic nephropathy (DN) and cardiovascular disease, a significant proportion of individuals afflicted with DN may experience mortality prior to the

advancement to end-stage renal disease (ESRD), mostly due to cardiovascular-related incidents.

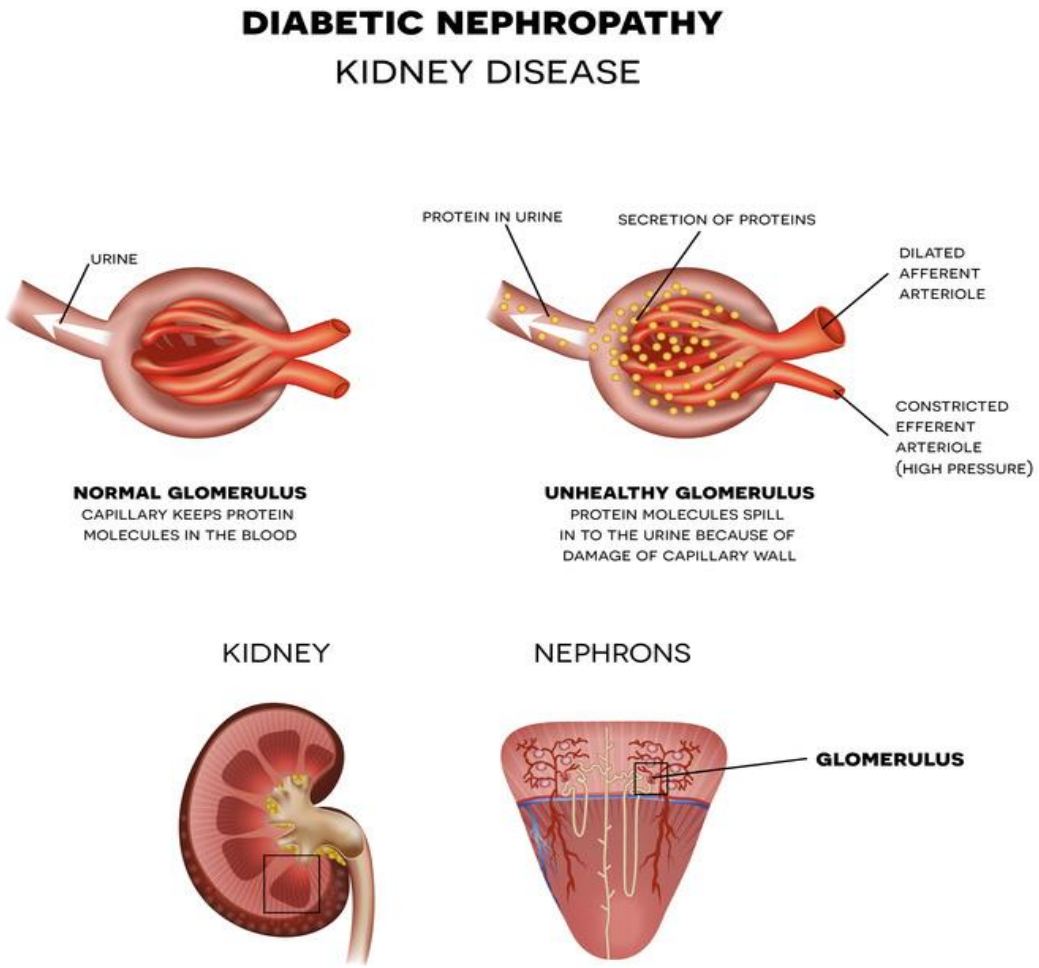

Figure 4: Diabetic Nephropathy(parkinsonsingapore.com)

3.4 Epidemiology

Diabetic nephropathy (DN) is a chronic and progressive renal condition that manifests gradually, often reaching its highest prevalence 10 to 20 years after the onset of diabetes. Ethnicity has a significant role in shaping the severity and prevalence of diabetic nephropathy (DN). Specifically, African Americans, Asians, and Native Americans have a higher susceptibility to DN and tend to experience a more rapid disease progression when compared to those of White Caucasian descent. In a minority of individuals afflicted with modest renal impairment caused by diabetes, diabetic nephropathy (DN) may persist without exhibiting any clinical symptoms throughout their whole lifespan. The prevalence of diabetic nephropathy (DN) has seen a significant rise in recent years. However, current data indicates that the occurrence of end-stage renal disease (ESRD) is now showing signs of reaching a plateau. The estimated cumulative risk of developing end-stage renal disease (ESRD) in individuals with both type 1 diabetes mellitus (T1DM) and type 2 diabetes mellitus (T2DM), after a continuous presence of proteinuria for a period of 5 years, is around 40%.

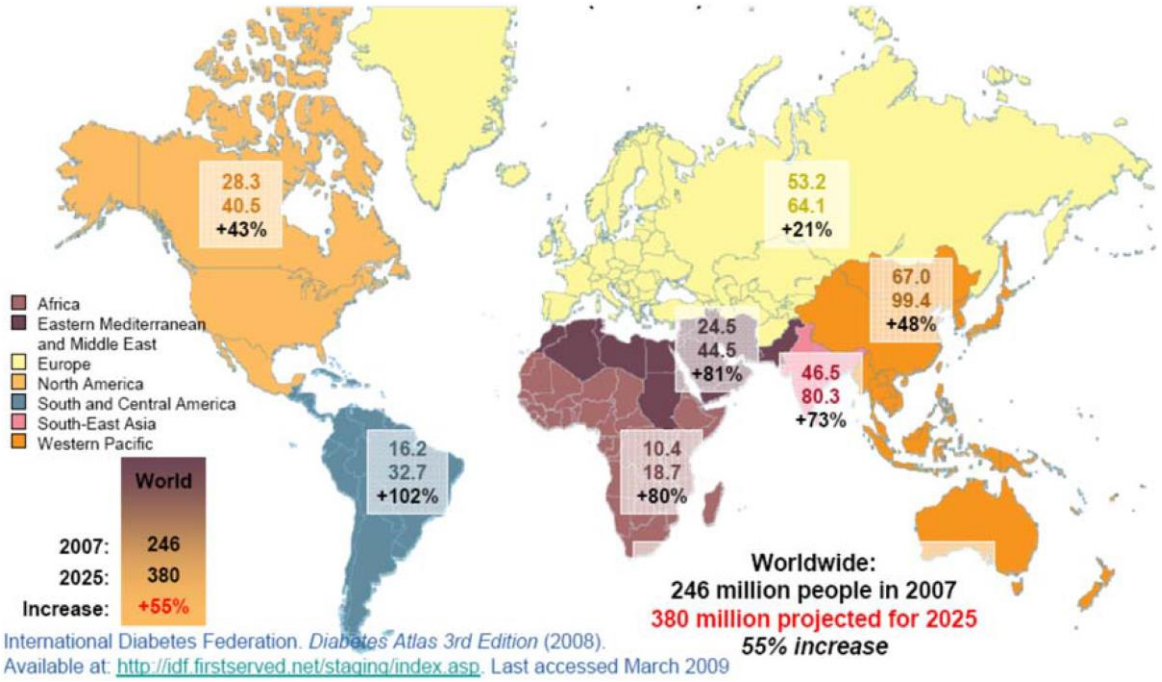

Figure 5: Epidemiology of Diabetic Nephropathy(www.mdpi.com)

3.5 Pathogenesis

The chronic exposure to increased blood glucose levels results in the impairment and disturbance of the renal cellular structure and microvasculature in individuals diagnosed with diabetes. Several intricate pathways are responsible for mediating these effects, which may be classified into four primary categories: metabolic, hemodynamic, intracellular, and growth factors/cytokines. Consequently, distinctive alterations in the ultrastructure manifest inside the renal nephron, namely within the glomerulus. The glomerular filtration barrier (GFB) is a multifaceted structure including four essential constituents: the mesangium, glomerular basement membrane (GBM), fenestrated glomerular endothelial cells, and podocytes. In the context of diabetic nephropathy (DN), significant pathological alterations are seen in the glomerular filtration barrier (GFB). These changes include thickening of the glomerular basement membrane (GBM), mesangial sclerosis, impaired endothelial function leading to degradation of the glycocalyx, effacement and detachment of podocyte foot processes, as well as a reduction in the number of podocytes. The renal tubular compartment is adversely impacted by comparable insults, leading to a gradual accumulation of extracellular matrix and subsequent development of tubular interstitial fibrosis.

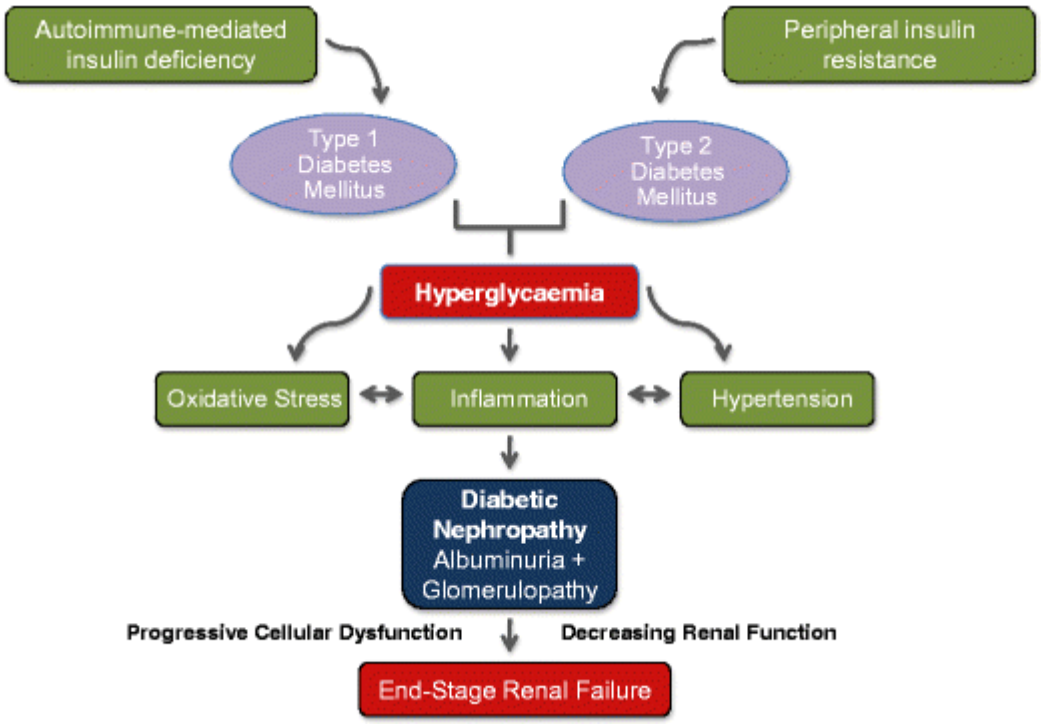

Figure 6: Pathogenesis of Diabetic Nephropathy(link.springer.com)

3.6 Clinical Assessment

From a clinical perspective, Diabetic Nephropathy (DN) is often identified by the gradual elevation in urinary albumin excretion (UAE), accompanied by an elevation in blood pressure and an associated rise in cardiovascular risk. This is followed by a steady decrease in glomerular filtration rate (GFR) and ultimately progression to end-stage renal disease (ESRD). Defects occurring at the glomerular filtration barrier (GFB) result in elevated levels of urine protein, namely albuminuria. This manifestation serves as an early indicator of diabetic nephropathy (DN) and systemic vascular dysfunction. The correlation between the degree of albuminuria and proteinuria and its significance as a clinical predictor of kidney disease development, particularly at the macroproteinuria stage, is well-established. The estimation of glomerular filtration rate (GFR) is a crucial clinical inquiry that is used to evaluate the loss in renal function. It is advisable to conduct regular yearly monitoring for diabetic patients in order to assess the advancement and pace of deterioration of renal function. In the conventional framework, DN is often classified into five distinct phases, which are determined by the levels of UAE (urinary albumin excretion) and GFR (glomerular filtration rate). These stages include glomerular hyperfiltration, a phase characterized by increased filtration rate; a silent period, during which no apparent symptoms are present; incipient nephropathy, marked by the first manifestation of microalbuminuria, which is the first clinically detectable indication of kidney damage; overt nephropathy, denoting the presence of evident kidney dysfunction; and, ultimately, end-stage renal disease (ESRD), representing the most advanced and severe stage of DN.

3.7 Management of Diabetic Nephropathy

The present approach to managing diabetic nephropathy (DN) involves a multifaceted strategy that largely focuses on addressing glycemic, blood pressure, and lipid control, alongside implementing lifestyle modifications. This is significantly impacted by the

results of significant pivotal clinical studies. The Diabetes Control and Complications Trial (DCCT) brought attention to the significant advantages of implementing rigorous glycemic control in individuals with Type 1 Diabetes Mellitus (T1DM) as a means of reducing the decrease of glomerular filtration rate (GFR) and the onset and advancement of proteinuria. Moreover, the United Kingdom Prospective Diabetes Study (UKPDS) observed a significant decrease in the occurrence of microalbuminuria among individuals diagnosed with type 2 diabetes mellitus (T2DM) who achieved improved management of both diabetes and blood pressure. Therefore, regular monitoring of glycated hemoglobin and blood pressure measures is conducted in these individuals. Suggested lifestyle alterations include the cessation of smoking, the optimization of body mass index, and dietary adjustments aimed at reducing salt and alcohol consumption.

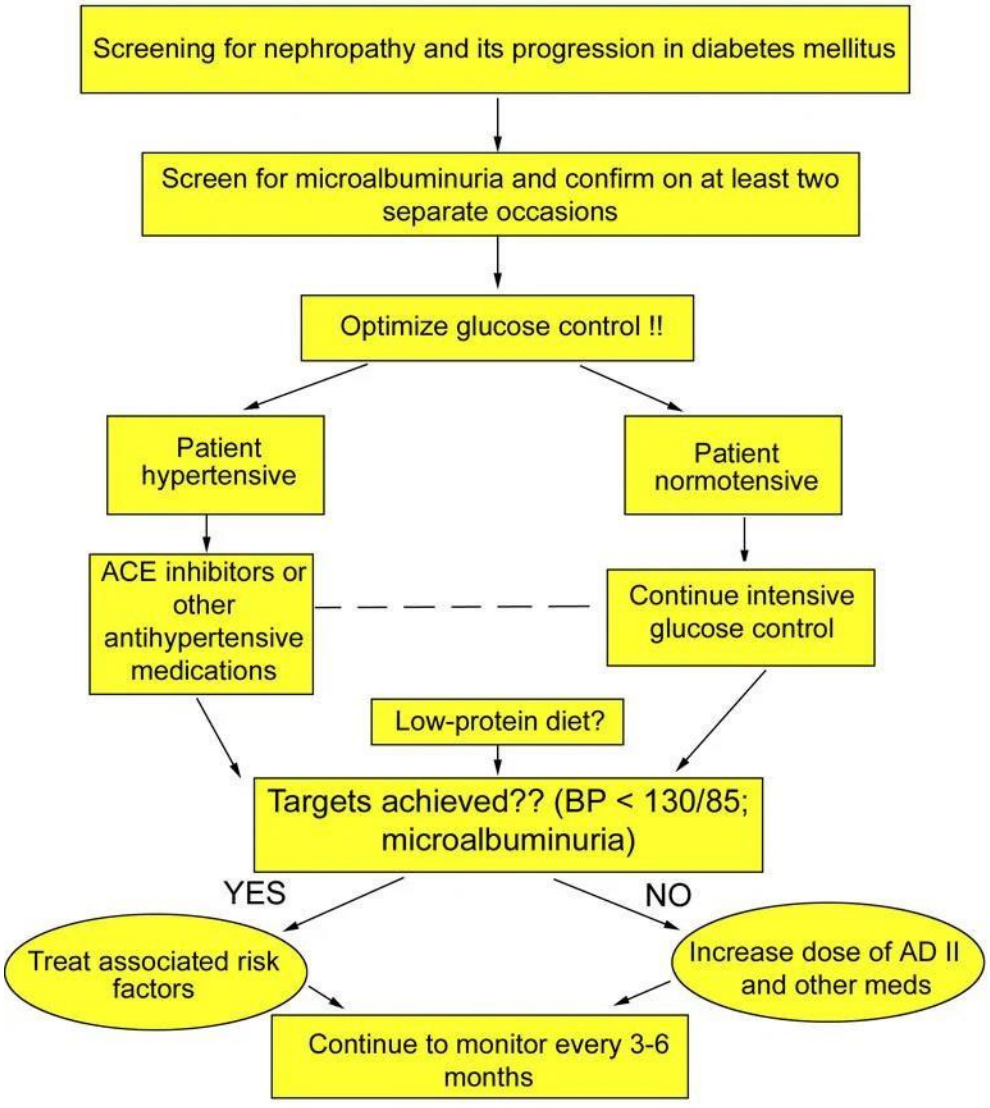

Figure 7: Management of Diabetic Nephropathy

The primary therapy objective is inhibiting the renin angiotensin system by using angiotensin-converting enzyme inhibitors or angiotensin II receptor blockers. These medications include reno protective, anti-proteinuric, and antihypertensive properties, and have shown efficacy in decelerating the advancement of end-stage renal disease (ESRD).

Nevertheless, the existing therapeutic options have shown limited clinical efficacy, resulting in a considerable number of patients progressing to end-stage renal disease (ESRD).

Table 1: Clinical description of current stages of diabetic nephropathy

Stage of diabetic nephropathy	**GFR**	**UAE**	**Blood pressure**	**Additional comments**
Stage 1: glomerular hyperfiltration	Normal >90 mL/ min/1.73 m2 or increased	<30 mg/day	Normotensive	Renal hyperfunction and hypertrophy
Stage 2: silent stage	Normal >90 mL/ min/1.73 m2	<30 mg/day	±Hypertensive	Thickening of basement membrane and mesangial proliferation
Stage 3: incipient nephropathy	<60 mL/min/ 1.73 m2	Microalbuminuria: 30–300 mg/day	±Hypertensive	First clinical signs of kidney disease
Stage 4: overt nephropathy	<30 mL/min/ 1.73 m2	Macroalbuminuria: >300 mg/day	±Hypertensive	Significant loss of kidney function
Stage 5: end-stage renal disease	<15 mL/min/ 1.73 m2	Macroalbuminuria: >300 mg/day	Hypertensive	Major loss of kidney function. Usually requires RRT (dialysis or transplantation)

CHAPTER 4

DIETARY MANAGEMENT

4.1 Diet for Diabetic Nephropathy

The kidney is a vital organ inside the human body that plays a crucial role in the filtration of blood and the elimination of pollutants. Kidney failure gives rise to significant complications. During the early phases, the use of medicines and dietary adjustments may serve as a potential remedy. Nevertheless, when the severity of the problem escalates, it becomes imperative to seek professional medical consultation and perhaps necessitates the implementation of dialysis or kidney replacement therapy.

Water is a crucial component of every dietary regimen. During the early phases, there are no limitations on water consumption. Nevertheless, as the severity of the disease increases, individuals are recommended to restrict their water intake due to the potential risk of experiencing respiratory difficulties.

In order to mitigate thirst, it is important to refrain from consuming foods that are high in sodium content. The regulation of blood pressure may be achieved with the use of a reduced salt intake. Numerous salt manufacturers have introduced products that are either devoid of sodium or have reduced levels of sodium.

Potassium levels play a crucial role in the maintenance of homeostasis inside the human body. Hence, it is important to consume potassium-rich foods such as broccoli, lettuce, and avocado. Anemia is a common complication seen in a significant number of individuals afflicted with renal failure. In order to maintain vigilance in this regard, individuals must intentionally ensure they consume an appropriate quantity of iron. Kale, beef, and other similar food items are considered to be abundant sources of dietary iron.

It is essential to ingest the appropriate kind and amount of protein. Protein generates metabolic byproducts that undergo renal digestion. Consequently, it is important for those experiencing renal failure to adhere to the medical professional's guidance about the appropriate protein intake, which may vary depending on the specific kind of kidney failure. It is recommended to refrain from consuming dairy products in accordance with this statement.

The concept of diet encompasses the inclusion of some foods as well as the exclusion of others. It is recommended to abstain from the use of carbonated drinks, alcohol, smoking, and processed meals. Adhere to this dietary regimen to expedite the recuperation process from renal failure. The combination of a proper diet and medicine consistently yields optimal outcomes.

4.2 Food items to limit

Sodium, a mineral included in sodium chloride commonly known as salt, is extensively used in culinary practices. Salt is a frequently used condiment that necessitates a period of adjustment while attempting to decrease its consumption in one's diet. Nevertheless, the reduction of salt/sodium intake is a crucial strategy in managing renal disease. Potassium is a crucial mineral that plays a significant role in the functioning of muscular tissues. In cases of renal dysfunction, there is a resultant accumulation of potassium inside the

bloodstream. This phenomenon may induce alterations in cardiac rhythm, potentially culminating in the occurrence of a myocardial infarction. Potassium is mostly present in fruits and vegetables, such as avocados, dried fruits (including raisins, apricots, and prunes), potatoes, oranges, bananas, and salt alternatives. Additionally, potassium may be found in milk and meats. It is essential to refrain from some entities while also imposing restrictions on the quantity of others.

Phosphorus is a mineral that may accumulate in the bloodstream as a consequence of renal dysfunction. In the event of such an occurrence, it is possible for calcium to be extracted from the skeletal structure, subsequently accumulating within the integumentary system or circulatory pathways. The presence of bone disease might afterwards provide a challenge, increasing the likelihood of experiencing a bone fracture. Various food items that are rich in phosphorus include seeds such as pumpkin and squash, cheese like Romano, fish such as salmon, shellfish like scallops, nuts like Brazil nuts, lean cuts of pork like sirloin, lean beef and veal, low-fat dairy products like nonfat yoghurt, soy-based foods like tofu, legumes such as lentils, and carbonated drinks.

Protein, which is included in many food sources such as meats, fish, poultry, dairy products, nuts, and some grains, plays a crucial role in facilitating the development of muscle and tissue inside the human body. However, in cases of impaired kidney function, the accumulation of byproducts resulting from the degradation of proteins may occur within the bloodstream. This phenomenon might potentially result in increased renal workload.

4.3 Easily consumable food items

- Cereals & cereal products- white rice, wheat products.
- Legumes & Pulses- daal, , chickpeas, bengal gram daal (leached)
- Fruits & Vegetables- papaya, pineapple, peach, berries, white jamun, apple, guava, all gourds except bitter gourd, leached green leafy vegetables.

4.4 Diet chart recommendations

Sunday	
Breakfast (8:00-8:30AM)	1 cup toned milk/ 1 cup tea (100ml)
Mid-Meal (11:00-11:30AM)	1 apple (100gm)
Lunch (2:00-2:30PM)	1 cup rice +1/2 cup snake gourd dal(red gram dal leached in hot water for 2 hours)+1/2 cup cabbage(leached) vegetables+ 1/2 cup curd
Evening (4:00-4:30PM)	1 cup puffed rice + 1 cup toned milk/tea (100ml)
Dinner (8:00-8:30PM)	1 cup rice+1/2 cup cabbage(leached) vegetables
Monday	
Breakfast (8:00-8:30AM)	1 cup capsicum rice+1 cup toned milk/ 1 cup tea (100ml)

Mid-Meal (11:00-11:30AM)	1 pear (100gm)
Lunch (2:00-2:30PM)	1.5 cup rice+1/2 cup dal(red gram dal leached)+1/2 cup vegetables+ 1/2 cup curd
Evening (4:00-4:30PM)	1 cup toned milk/tea (100ml)+ 4 biscuits
Dinner (8:00-8:30PM)	1 cup rice+ 1/2 cup vegetables
Tuesday	
Breakfast (8:00-8:30AM)	3 rice dosa+1/2 cup sambhar(100ml)(red gram dal-leached, onion, ladies finger, bottle gourd)+1tsp tomato chutney+1 cup toned milk/ 1 cup tea (100ml)
Mid-Meal (11:00-11:30AM)	4 Jambu fruits/ strawberries(small)
Lunch (2:00-2:30PM)	1 cup rice +1/2 cup mix vegetables (leached (red gram dal,ladies finger, bottle gourd), onion)+ 1/2 cup curd
Evening (4:00-4:30PM)	3 Cracker biscuits+ 1 cup toned milk/tea (100ml)
Dinner (8:00-8:30PM)	1 cup rice+ 1/2 cup vegetables
Wednesday	
Breakfast (8:00-8:30AM)	4 rice Idly+ 1/2 cup sambhar (100ml)(red gram dal-leached, onion, ladies finger, bottle gourd)+ 1 cup toned milk/ 1 cup tea (100ml)
Mid-Meal (11:00-11:30AM)	Pineapple (100gm)
Lunch (2:00-2:30PM)	1 cup rice +1/2 cup ridge gourd vegetables+ 1/2 cup curd
Evening (4:00-4:30PM)	1 cup toned milk/tea (100ml)+ 4 biscuits
Dinner (8:00-8:30PM)	1 cup rice+1/2 cup ridge gourd vegetables
Thursday	
Breakfast (8:00-8:30AM)	1 cup vermicelli upma+1 cup toned milk/1 cup tea(100ml)
Mid-Meal (11:00-11:30AM)	Musk melon (100gm)
Lunch (2:00-2:30PM)	1.5 cup rice+ 1/2 cup capsicum(leached) vegetables+ 1/2 cup ridge gourd dal(red gram dal leached)+ 1/2 cup curd
Evening (4:00-4:30PM)	1 cup poha (rice flakes)+ 1 cup toned milk/tea (100ml)
Dinner (8:00-8:30PM)	1 cup rice+ 1/2 cup capsicum(leached) vegetables
Friday	
Breakfast (8:00-8:30AM)	3 ruti+ capsicum curry-1/2 cup+1 cup toned milk/ 1 cup tea (100ml)

Mid-Meal (11:00-11:30AM)	papaya (100gm)
Lunch (2:00-2:30PM)	1 cup rice +brinjal(leached) vegetables+1/2 cup tomato dal(green gram dal leached)+ 1/2 cup curd
Evening (4:00-4:30PM)	1 cup toned milk/tea (100ml)+ 4 biscuits
Dinner (8:00-8:30PM)	1 cup rice+ brinjal(leached) vegetables
Saturday	
Breakfast (8:00-8:30AM)	1 cup tomato rice +1 cup toned milk/ 1 cup tea (100ml)
Mid-Meal (11:00-11:30AM)	1 small wedge(100gm) watermelon
Lunch (2:00-2:30PM)	1.5 cup rice+1/2 cup mix veg sambhar (leached(red gram dal),ridge gourd, snake gourd,bottle gourd)+ 1/2 cup curd
Evening (4:00-4:30PM)	1 cup toned milk/tea (100ml)+ 4 biscuits
Dinner (8:00-8:30PM)	1 cup rice+ 1/2 cup ivy gourd vegetables

CHAPTER 5

CONCLUSION

5. Conclusion

The dietary management of individuals with diabetic nephropathy is an essential aspect of their comprehensive healthcare routine. The internship experience has offered significant insights into the comprehensive strategy necessary for safeguarding the welfare of these persons. In the finalization of this internship report, it becomes apparent that customized nutrition plays a crucial role in managing the advancement of diabetic nephropathy and enhancing the well-being of those impacted by this condition. During the course of the internship, I have acquired knowledge on the significance of adopting a patient-centered approach in the formulation of food regimens for individuals with diabetic nephropathy. In order to develop a strategy that is both successful and sustainable, it is essential to consider the distinct requirements, preferences, and limitations of each individual patient. Furthermore, it is important to emphasize the need of strong cooperation among dietitians, healthcare professionals, and patients in order to guarantee compliance with dietary guidelines. I have also developed an appreciation for the need of routinely checking and altering food patterns. The ongoing evaluation and adjustment of dietary approaches are essential in effectively managing blood glucose levels, blood pressure, and the advancement of diabetic nephropathy due to its dynamic character. It is important for dietitians and healthcare practitioners to exercise diligence in monitoring patients' progress and adjusting suggestions appropriately. In addition, it is important to provide patients with education on their medical condition and dietary choices. Enabling patients with the information and competencies necessary to make well-informed choices about their nutrition has the potential to enhance adherence to dietary guidelines and provide improved health outcomes.

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APPENDICES

Appendix 1: Case studies

DAFFODIL INTERNATIONAL UNIVERSITY

Department of Nutrition and Food Engineering

Session:…….. Year:2023

Case Study No:01 Date:30/08/2023

1.Information about patient:

A. Name : Harisur Rahman
B. Address : Dhaka
C. Name of the hospital : BIRDEM General Hospital
D. Admission date :22/08/23
E. Reason of admission : DM, Chest pain, difficulty in breathing, CKD
F. Word No :131
G. Bed No. :1322

2.Anthropometric parameters:

Age:64years Sex: ☒M/☐F

Weight: 62kg Height: 5’7”

Conditions that currently exist:	☐Swallowing difficulties
☐Nausea	☒Constipation
☐Vomiting	☒Diet restriction(***Protein***)
☒Diarrhea	☒Gas formation
☐Chewing difficulties	Test & smell perception (any change?) ☐Y/☐N

Lab / Biochemical Test (Blood)	**Result**	**Lab / Biochemical Test (Blood)**	**Result**
□ Blood Glucose (F):	mmol/L	□ SBP	mmHg
□ Blood Glucose (ABF):	mmol/dl	□ DBP	mmHg
□ HbA1c	%	□ Magnesium	mmol/l
□ Albumin	g/dl	□ Phosphate	mmol/l
□ Total Protein:	g/dl	□ Calcium	3.9 mmol/l
□ TG	mg/dl	□ Potassium	124 mmol/l
□ HDL	mg/dl	□ Sodium	90 mmol/l

□ LDL	mg/dl	□ Serum Chloride	11.1 mmol/l
□ Total Cholesterol	mg/dl	□ Hb	33.1 g/dl
□ BUN	mg/dl	□ Hematocrit	%
□ Creatinine:	4.9 mg/dl	□ ESR	mm
□ Urea:	59 mg/dl	□ SGOT	47 IU/I
□ Bilirubin	0.4 mmol/dl	□ SGPT	15 U/I
□ S. TCO2:	23 mmol/L	□ Alk.Phos.	131SomU/I
□ Amylase	IU/I	□ Others	
□ Bicarbonate	mmol/l	□ Others	
□ Uric Acid	mg/dl	□ Others	

Supplements: ☒Yes No

If yes, type, ☐Vitamin and minerals

☒Vitamins

☐Minerals

Appetite: ☐Excellent ☐Good ☒Fair ☐Poor

3.Socioeconomic & Cultural factors:

- Monthly family income: 25,000 BDT /=
- Religion: Islam
- Education: SSC
- Occupation: Business
- Living status: Dhaka
- Rural/Urban: Urban

DAFFODIL INTERNATIONAL UNIVERSITY

Department of Nutrition and Food Engineering

Session:…….. Year:……..

Case Study No:02 Date:09.09.2023

1.Information about patient:

H. Name : Mrs Laila Begum

I. Address : Dhaka

J. Name of the hospital : BIRDEM General Hospital

K. Admission date :06/09/23

L. Reason of admission :DM, HTN, CKD

M. Word No :143

N. Bed No. :1459

2.Anthropometric parameters:

Age: 71years Sex: ☐M/☒F

Weight: 67kg Height: 5'1"

Conditions that currently exist:	☐Swallowing difficulties
☐Nausea	☐Constipation
☐Vomiting	☒Diet restriction(Protein)
☒Diarrhea	☐Gas formation
☐Chewing difficulties	Test & smell perception (any change?) ☐Y/☐N

Lab / Biochemical Test (Blood)	**Result**	**Lab / Biochemical Test (Blood)**	**Result**
□ Blood Glucose (F)	mmol/L	□ SBP	mmHg
□ Blood Glucose (ABF)	8.0mmol/dl	□ DBP	mmHg
□ HbA1c	%	□ Magnesium	0.7 mmol/l
□ Albumin	36.5 g/dl	□ Phosphate	mmol/l
□ Total Protein	g/dl	□ Calcium	9.1 mmol/l
□ TG	mg/dl	□ Potassium	4.5 mmol/l
□ HDL	18 mg/dl	□ Sodium	141 mmol/l
□ LDL	115 mg/dl	□ Serum Chloride	109 mmol/l
□ Total Cholesterol	186 mg/dl	□ Hb	g/dl
□ BUN	mg/dl	□ Hematocrit	28.5 %

□ Creatinine	1.5 mg/dl	□ ESR	13 mm
□ Urea	56 mg/dl	□ SGOT	20 IU/I
□ Bilirubin	0.2 mmol/dl	□ SGPT	14 U/I
□ S. TCO2	22 mmol/L	□ Alk.Phos.	2.5 SomU/I
□ Amylase	IU/I	□ Others	
□ Bicarbonate	mmol/l	□ Others	
□ Uric Acid	0.5 mg/dl	□ Others	

Supplements: Yes No

If yes, type, ☐Vitamin and minerals

☐Vitamins

☐Minerals

Appetite: ☐Excellent ☐ Good ☒ Fair ☐Poor

3.Socioeconomic & Cultural factors:

- Monthly family income: BDT /=
- Religion: Islam
- Education: SSC
- Occupation:
- Living status: Dhaka
- Rural/Urban: Urban

An internship report on dietary management of diabetic nephropathy patients.

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