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**AN INTERNSHIP REPORT ON NUTRITIONAL MANAGEMENT OF
DIABETIC PATIENTS AT BIRDEM GENERAL HOSPITAL**

BY

Anika Tabassum Lamia

ID: 193-34-1017

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

Supervised By

Professor Dr. Md. Bellal Hossain

Dean (In-charge) & Professor

Department of Nutrition and Food Engineering

**FACULTY OF HEALTH AND LIFE SCIENCES
DAFFODIL INTERNATIONAL UNIVERSITY**

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APPROVAL

This Internship titled “**An internship report on nutritional management of diabetic patients at BIRDEM General Hospital**”, submitted by **Anika Tabassum Lamia** to the Department of Nutrition and Food Engineering, Daffodil International University, has been acknowledged as sufficient for partial completion of the B.Sc. in Nutrition and Food Engineering degree requirements and approved for style and substance. The presentation took place in Fall, 2023.

EXAMINING COMMITTEE

Chairman of the Board _____

External Member _____

Internal Member-1 _____

Internal Member-2 _____

Dr. Nizam Uddin

Head

Nutrition and Food Engineering

Faculty Of Health and Life Sciences

Daffodil International University

DECLARATION

I did this internship under **Professor Dr. Md. Bellal Hossain, Professor**, Department of Nutrition and Food Engineering, Daffodil International University. I further certify that neither this project nor any portion of it has been submitted anywhere for a degree or certificate.

Supervised by:



Professor Dr. Md. Bellal Hossain

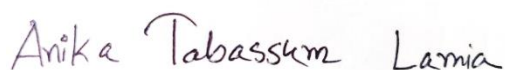
Dean (In-Charge) & Professor

Department of Nutrition and Food Engineering

Faculty Of Health and Life Sciences

Daffodil International University

Submitted by:



Anika Tabassum Lamia

ID: 193-34-1017

Department of Nutrition and Food Engineering

Daffodil International University

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EXECUTIVE SUMMERY

BIRDEM, an esteemed institution situated in the Shahbagh area of Dhaka, is a comprehensive medical, academic, and research center specializing in the study and treatment of diabetes, endocrine, and metabolic disorders in Bangladesh. The government orchestrated the provision of funding for the creation of the Diabetic Association of Bangladesh (DAB), which subsequently occupied three expansive multi-story structures. Out of the total bed capacity of 542, the hospital, situated inside a 15-story structure, designates 80 beds specifically for disadvantaged individuals suffering from diabetes. More than 3,000 individuals are seen and undergo medical examinations on a daily basis. Bangladesh's healthcare system is characterized by its substantial provision of clinical and diagnostic resources. BIRDEM's clinical services provide complete diabetic treatment to all registered patients with diabetes, without any associated costs. Diabetes patients are provided with complimentary medical treatment via the implementation of the "Cross Financing" initiative, whereby funds are generated by levying charges on other patients for their medical and diagnostic services. I was assigned the responsibility of overseeing the interior space. During my time at the indoor facility, I had the opportunity to engage with patients from all backgrounds and with diverse medical conditions. My primary area of interest is in persons with diabetes who also suffer from chronic kidney disease (CKD), stroke, and electrolyte imbalances. I consistently saw patients of this kind on a regular basis. I engaged in conversations with the patients while doing rounds inside the wards, gathering insights into their present medical statuses, dietary needs, and any associated difficulties, which I appropriately documented. Furthermore, it is important to give due consideration to their dietary regimen.

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CHAPTER 1

INTRODUCTION

1.1 Background

Diabetes mellitus, also known as diabetes, is a metabolic condition characterized by chronic hyperglycemia, resulting in elevated blood sugar levels. Severe consequences associated with diabetes include diabetic ketoacidosis, hyperosmolar hyperglycemia, and mortality. Serious long-term effects include cardiovascular disease, stroke, chronic renal disease, foot ulcers, nerve damage, eye damage, and cognitive impairment. It arises due to either insufficient insulin production. Insulin is an endocrine hormone that facilitates the cellular uptake and utilization of glucose derived from dietary sources for metabolic energy production. In 2014, the prevalence of diabetes among individuals aged 18 and above was 8.5%. The rates of early death attributable to diabetes have had a 5% increase between the years 2000 and 2016. The prevalence of premature mortality associated with diabetes exhibited a decline in high-income nations throughout the period spanning from 2000 to 2010. However, subsequent to this period, there was an observed rise in diabetes-related premature mortality from 2010 to 2016. The mortality rate associated with diabetes exhibited an upward trend in low- and middle-income nations over the specified time periods. On a worldwide scale, there was a notable decline of 18% in the mortality rate associated with the four primary noncommunicable illnesses (namely cardiovascular disease, cancer, chronic respiratory diseases, and diabetes) among those aged 30 to 70 years, over the period spanning from 2000 to 2016.

Diabetes is a significant and enduring medical condition characterized by insufficient production of insulin by the pancreas or ineffective utilization of the generated insulin, which is responsible for regulating blood glucose levels. Elevated blood glucose levels, a prevalent consequence of diabetic ketoacidosis, have the potential to induce long-term harm to several bodily systems, including the heart, blood vessels, eyes, kidneys, and neurons.

Diabetes affects a worldwide population over 400 million persons. Diabetes mellitus, often referred to as diabetes, is a medical condition characterized by a disruption in metabolic processes. Insulin facilitates the transportation of glucose from the bloodstream into cellular compartments, where it is either stored or used as a source of energy. The condition known as diabetes arises when the human body exhibits insufficient production of insulin or an impaired ability to use the insulin it does create. In the year 2012, around 1.5 million individuals succumbed to the fatal consequences of diabetes. In the year 2012, elevated blood glucose levels beyond the ideal range were shown to be accountable for an additional 2.2 million fatalities, mostly attributed to heightened susceptibility to cardiovascular ailments and other illnesses. Consequently, the total number of deaths associated with blood glucose levels amounted to 3.7 million. A significant proportion of these fatalities (43%) occur prior to reaching the age of 70. In the year 2014, the global population of individuals afflicted by diabetes amounted to 422 million. It is a prominent contributor to

visual impairment, renal dysfunction, lower extremity amputation, and other enduring consequences that have a substantial impact on an individual's everyday functioning.

1.1.1 Type-I diabetes

Insulin-dependent diabetes, sometimes abbreviated as IDDM, is characterized by the body's insufficient synthesis of insulin. In order to regulate glycemic levels, individuals diagnosed with type 1 diabetes need to administer insulin on a regular basis. Individuals without access to insulin are unable to sustain their lives. The condition in question is classified as an autoimmune illness. The immune system engages in an aggressive response, leading to the destruction of pancreatic cells responsible for insulin production.

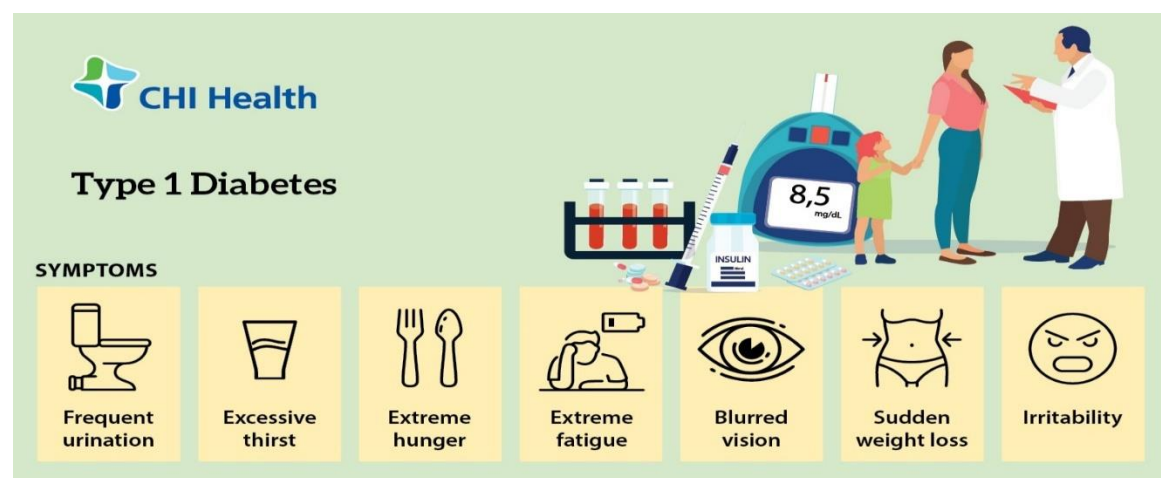


Figure 1: Type 1 diabetes symptoms(www.chihealth.com)

1.1.2 Type-II diabetes

This medical condition, often referred to as non-insulin-dependent diabetes, arises due to inadequate insulin utilization. Type 2 diabetes comprises predominant proportion of confirmed diabetes cases. The symptoms of this condition may exhibit similarities to those of type-I diabetes, but often presenting with lesser severity or absence. Consequently, the condition has the potential to be subject to underdiagnosis over an extended period of time, until such time as consequences arise. Over the course of many years, the prevalence of type-II diabetes was mostly seen among the adult population; nevertheless, there has been a notable emergence of this condition among young children.

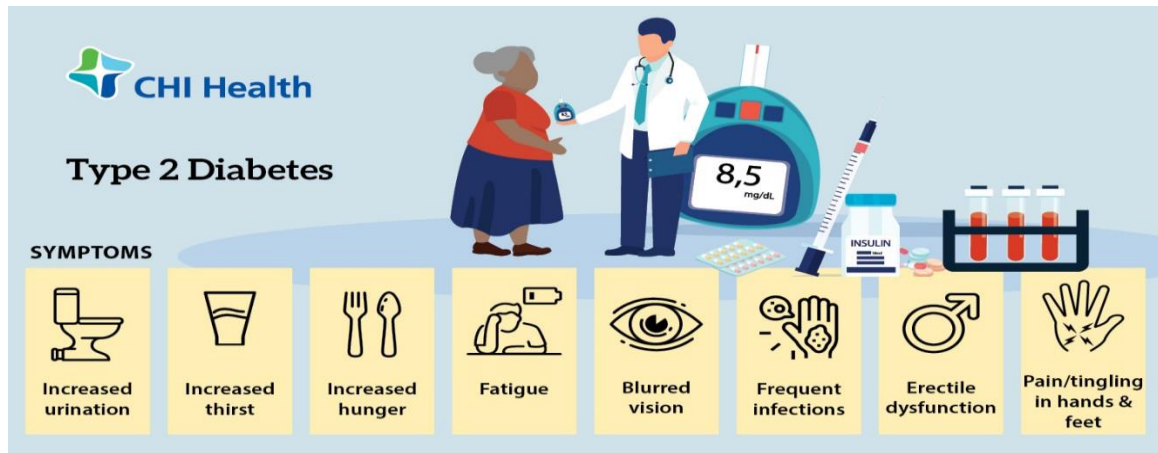


Figure 1.2: Type 2 diabetes symptoms(www.chihealth.com)

1.1.3 Gestational Diabetes

Elevated levels of blood glucose, often referred to as hyperglycemia, manifest as a characteristic indication of gestational diabetes, a condition typically resolved postpartum. While the condition may manifest at any point during gestation, it often presents itself during the second or third trimester.

1.2 Objectives

- To gain a better understanding of the diabetes mellitus.
- To expand on the limited knowledge of diabetes mellitus management.
- To learn more about DM and its complications.
- To gain knowledge about the dietary management for the diabetic patients based on their complications.
- To gain experience about monitoring procedures of patients.

CHAPTER 2

OVERVIEW

2.1 BIRDEM General Hospital

BIRDEM, short for the Bangladesh Institute of Research and Rehabilitation in Diabetes, Endocrine, and Metabolic Disorders, is a comprehensive institution dedicated to healthcare, academia, and research. It is located in the Shahbagh neighborhood of Dhaka. It was created in 1980. It is situated inside a 15-story edifice, now has a total of 542 beds, of which 80 are designated for indigent individuals suffering from diabetes, and are provided free of charge. On a daily basis, an approximate number of three thousand individuals seek medical attention and undergo routine examinations. The health institution in question is a prominent establishment in Bangladesh, providing a comprehensive range of clinical and diagnostic services. The hospital is equipped with highly trained employees and advanced medical equipment, enabling it to provide a comprehensive range of clinical medical services across all disciplines. While patients with diabetes and other endocrine disorders are often given precedence, the in-patient departments have adopted the qualities commonly associated with a comprehensive hospital setting. BIRDEM has an autonomous research section staffed by individuals who are employed on a full-time basis.



Figure 3: BIRDEM General Hospital

Professor Mohammad Ibrahim (1911-1989), the esteemed creator of BIRDEM, shown a profound inclination for social endeavors, particularly in the realm of patient social rehabilitation. The individual first contemplated the provision of diabetic treatment within this nation throughout their middle years of the fifth decade of life. The individual had a clear understanding that diabetes is an incurable condition; nonetheless, they acknowledged that individuals impacted by this ailment have the capacity to lead meaningful and conscientious lives. He considered the scenario to be within the realm of socio-medical care. Despite the lack of comprehensive knowledge on the extent of the diabetes pandemic nationwide, the individual in question shown foresight by assembling a collective of social workers, philanthropists, and specialists. It was established on February 28, 1956, with their support. The Director General of BIRDEM serves as its top executive and is accountable to a Board of Management. It underwent a recent name change to BIRDEM General

Hospital, with the aim of altering the prevailing public view that its services are only limited to diabetes patients.

2.1.1 Mission

- To provide comprehensive medical care to all diabetic patients,
- To provide affordable medical treatment
- To implement medical care administration

2.1.2 Vision

- All individuals will receive medical care at a reasonable cost.

2.2 Facilities and Services

BIRDEM's clinical services provide comprehensive diabetes treatment to all registered diabetic patients without any associated costs. The financial resources generated through the 'Cross funding' mechanism, namely via the provision of medical care and diagnostic services to other patients, are allocated towards delivering cost-free medical assistance to those afflicted with diabetes. Patients are entitled to receive medical oversight, consultations, diabetes education including fundamental understanding of general well-being, nutritional guidance, social assistance, and, if deemed essential, rehabilitative services.



Figure 4: Images from internship period at BIRDEM General Hospital

2.3 Activities

I have been assigned to work in the indoor section. I encountered patients of various types throughout the indoor part. The focus of my research is to individuals diagnosed with diabetes who are experiencing electrolyte imbalances, chronic kidney disease (CKD), and stroke. Consequently, I mostly met patients of this particular sort. During my ward rounds, I saw patients and engaged in interactions with them in order to get insights into their present conditions, dietary requirements, and any associated complexities. Subsequently, I diligently documented this gathered information. Furthermore, it is advisable to monitor their dietary regimen.

CHAPTER 3

DIABETES MELLITUS

3.1 Diabetes

When diabetes is inadequately managed, it gives rise to complications that pose a threat to both one's well-being and survival. Severe instances have a substantial role in the overall mortality rates, resulting in considerable financial burdens and diminished quality of life. Elevated blood sugar levels that are far higher than normal may have severe consequences, potentially leading to the development of Diabetic Ketoacidosis (DKA) in individuals with both type I and type II diabetes, and Hyperosmolar Coma specifically in those with type II diabetes. All forms of diabetes have the potential to induce abnormally low levels of blood glucose, which may result in convulsions or loss of consciousness. The onset of this condition may occur within a week after the consumption of a certain diet, increased frequency of activity, or due to an excessive dosage of prescribed anti-diabetic medications.

Diabetes has been implicated in the pathogenesis of several complications, including cardiovascular disease, stroke, damage to the heart, arteries, eyes, organs, and nerve cells. This injury has the potential to cause a reduction in blood circulation.

Diabetic retinopathy is a significant cause of visual impairment that arises from prolonged damage to the microvasculature of the retina. Diabetes is well recognized as a prevalent cause of renal dysfunction.

Diabetes is classified into three types :

1. Diabetes (Type I)
2. Diabetes (Type II)
3. Gestational Diabetes

3.2 Causes

Elevated blood sugar levels are the underlying factor responsible for the development of diabetes in its many manifestations. However, the etiology of hyperglycemia varies based on the specific form of diabetes mellitus that an individual is diagnosed with.

3.2.1 Diabetes (Type I)

The destruction of insulin-producing cells in the pancreas occurs as a consequence of the immune system specifically targeting and attacking these cells. When insulin is not present, glucose that would typically be absorbed by cells accumulates in the circulatory system.

3.2.2 Prediabetes and Type II Diabetes

Both conditions have a same underlying cause, which is the impaired functionality of cells in our bodies that hinder the proper action of insulin in facilitating glucose transportation to these cells. Insulin resistance has been seen in the cellular composition of the human body. As a consequence of this resistance, the pancreas exhibits an inability to produce insulin.

3.2.3 Gestational Diabetes

The etiology of this phenomenon may be attributed to the secretion of hormones by the placenta throughout the gestational period. These hormones provide increased cellular resistance to the physiological actions of insulin. As a consequence of this uprising, the pancreas exhibits an inability to produce an adequate amount of insulin.

3.3 Signs and Symptoms

The followings are nine early warning signs and symptoms of Diabetes :

1. Elevated levels of blood sugar.
2. Vision problems.
3. Weight loss in the long run.
4. Drowsiness and even coma in some people.
5. Overall increase in appetite.
6. Increase in water consumption.
7. Feeling exhausted.
8. Experiencing nausea and vomiting.
9. Infections.

3.3.1 Diabetes (Type I)

The onset of symptoms associated with type 1 diabetes may manifest either abruptly or gradually throughout a span of many weeks or months. During the early stages of human development, including childhood, adolescence, and young adulthood, individuals may first exhibit symptoms associated with this particular illness. Furthermore, patients may encounter gastrointestinal discomfort, emesis, mycotic infections, as well as urinary tract infections.

- Unintentional weight loss occurs when the body is unable to get the energy it needs from food and rather than begins to burn muscle and fat stores for fuel.
- Symptoms of nausea and vomiting due to ketones that are produced whenever fat is broken down in the body. Ketones have the potential to make people feel queasy in the stomach.

3.3.2 Diabetes (Type II)

The fact that one might not have any indicators at all. Although the onset of symptoms does not typically occur until adulthood, the prevalence of prediabetes and type 2 diabetes is increasing across all age groups.

- 1) Yeast infections are something that can affect both men and women who have diabetes. Infections are able to flourish in warm, moist folds of the skin like as :
 - Between toes and fingers
 - Between the breasts
 - Within or close to the sexual organs

- 2) Difficult for the body to heal wounds.
- 3) Pain or numbness in legs or feet indicating nerve damage.

3.3.3 Gestational Diabetes

It is characterized by a lack of noticeable symptoms in most cases. Between the 24th and 28th week of a woman's pregnancy, an obstetrician will check for gestational diabetes. One might notice that she is thirstier than usual or that she has to urinate more frequently.

3.4 Risk Factors

In addition to mitigating the risk of diabetes and hyperglycemia, consistent participation in physical activity plays a substantial role in maintaining a balanced overall energy equilibrium, managing body weight, and averting obesity. The aforementioned hazards are intricately linked to the growing incidence of diabetes.

Hence, the worldwide objective of mitigating the risk of diabetes is closely linked to the global objective of attaining a 10% relative decrease in sedentary behavior.

Inadequate management of diabetes may lead to many chronic consequences that significantly diminish an individual's quality of life, such as ocular impairment, renal dysfunction, and lower limb amputation.

3.4.1 Diabetes (Type 1)

It is believed that an immune response may be the root cause of type 1 diabetes, which occurs when the body mistakenly attacks itself. The onset of this form typically occurs in childhood. The production of insulin by pancreas stops. There is a lack of consensus regarding the factors that put people at risk for type 1 diabetes, in contrast to prediabetes and type 2 diabetes.

Some of the known risk factors are as follows :

- Diabetes in the family
- Reduction in the organ's capacity to produce insulin.
- Onset of infection or illness
- Age: can develop at any age, but it most commonly manifests itself in children, adolescents, and teenagers.

3.4.2 Diabetes (Type 2)

Several distinct risk factors converge to influence an individual's propensity for acquiring type 2 diabetes. While some risk variables such as family history, maturity level, caste, or ethnic origin are beyond our control, regular physical activity may aid mitigate certain risk factors. As a consequence, the human body is unable of effectively using the insulin it produces. Insulin resistance refers to the physiological state characterized by reduced responsiveness of cells to the actions of insulin. While type 2 diabetes mostly affects adults, it has the potential to develop at any stage of life.

- Body is unable to process glucose
- Obesity or being overweight

- Insulin resistance
- Ethnicity
- Gestational Diabetes
- Not engaging in any form of physical activity more than three times per week.
- Family history
- Polycystic ovarian disorder
- Age: over the age of 45, and overweight

3.4.3 Pre-Diabetes

If any of the following apply to one's, then they might have risk of developing pre-diabetes. Have a weight problem.

- Must be 45 or older.
- Have a close relative diagnosed with type 2 diabetes, such as a parent, brother, or sister.
- Participating in physical activity fewer than three times per week.
- Have previously been diagnosed with gestational diabetes or delivered a baby that weighed more than 9 pounds at birth.
- Might belong to one of the following groups: African-American, Hispanic or Latino, American Indian, or Alaska Native.

Research has shown that modifications in lifestyle, particularly in the areas of dietary habits and physical activity, have proven to be efficacious in the prevention and reversal of prediabetes. The recommended strategies include weight reduction for those with excess weight, consumption of a nutritious food, and engagement in regular physical activity.

3.4.4 Gestational Diabetes

One is at danger for gestational diabetes unless she is –

- Being obese or overweight
- Age
- Glucose intolerance
- Diabetes in the family
- Previously diagnosed with gestational diabetes during one of your pregnancies.
- Polycystic ovary syndrome(PCOS).

Gestational diabetes often resolves postpartum; however, its presence confers an elevated susceptibility to the subsequent onset of type 2 diabetes in the future. Infants possess an elevated susceptibility to the onset of type 2 diabetes in adulthood due to their heightened propensity to experience obesity throughout their childhood or adolescence.

3.5 Early Detection and Diagnosis

The foundation for successful diabetes management is on the timely identification of the condition. The absence of timely diagnosis and intervention may lead to significant health

implications in individuals with diabetes. This underscores the need of ensuring the availability of a fundamental diabetes diagnosis within primary healthcare settings.

Symptoms such as increased thirst, unintentional weight loss, and excessive urination are often seen in individuals diagnosed with type 1 diabetes, hence warranting a medical consultation. A considerable proportion of individuals afflicted with type 2 diabetes remain unaware of their condition, thereby refraining from pursuing medical intervention until the manifestation of severe problems such as visual impairment, cardiovascular ailments, or necrosis in the extremities. The detection of type 2 diabetes is often delayed due to the gradual progression of the illness, resulting in a considerable time lapse before individuals become aware of their condition.

The continuous management of diabetes cannot completely prevent all challenges; nonetheless, timely treatments have the potential to decelerate the advancement of problems. The timely identification and management of diabetic problems may effectively prevent their occurrence. The management of diabetes mellitus is a frequently addressed aspect of healthcare. While the importance of therapy cannot be overstated, the early detection of the condition significantly enhances the probability of implementing beneficial interventions.

It is recommended that individuals with diabetes get periodic and comprehensive ocular examinations. The prompt implementation of laser photocoagulation and effective blood glucose management may serve as preventive measures or delay the start of irreversible visual impairment. However, it is important to note that these therapies may not always be readily available or easily accessible in low- and middle-income nations. Vital medications commonly used in the treatment of hypertension have the potential to decelerate the advancement towards kidney failure. Additionally, the assessment of urine protein levels enables the timely identification of first renal impairment.

The two primary therapeutic approaches for renal failure are dialysis and kidney transplantation. The prevention of foot ulcers, if neglected, may result in the development of gangrene and subsequent amputation. However, this undesirable outcome may be avoided via the use of appropriate footwear and the implementation of routine examinations to detect indications of neuropathy, compromised blood circulation, and alterations in the skin. Physiotherapy and occupational therapy are two exemplars of rehabilitation treatments that have the potential to mitigate the impact of difficulties on patients' everyday functioning. Diabetes may be diagnosed by use of a blood test. In the diagnosis of diabetes, medical practitioners often use two procedures.

The diagnosis of diabetes is determined by measuring fasting blood glucose levels or glucose levels two hours after the oral ingestion of 75 grammes of glucose.

The diagnostic utility of Hemoglobin A1c (HbA1c) testing extends beyond its ability to identify diabetes without the need for patient fasting. To assess the average blood glucose levels over a three-month period, one may measure the extent of glycated hemoglobin. The blood test results are normally obtainable within a span of a few days. In other terms, a

glycated hemoglobin (HbA1c) level of 5.7% or below is regarded as within the normal range. The prevalence of prediabetes in the population ranges from 5.7% to 6.4%. Individuals with an A1C level equal to or over 6.5% are diagnosed with diabetes. However, it should be noted that this particular test incurs a higher cost compared to a basic blood glucose analysis.

The fasting blood sugar (FBS) test is a blood test often used by healthcare practitioners for the purpose of diagnosing diabetes. The blood test determines the resting blood glucose level. It is recommended that the patient observe a fasting period of no less than 8 hours prior to undergoing the test. The test has a turnaround time of under 10 minutes, with instantaneous presentation of findings. The typical range for fasting blood glucose levels falls within the range of 70 to 100 milligrams per deciliter (mg/dL), equivalent to 3.9 to 5.6 millimoles per liter (mmol/L).

3.5.1 Blood Sugar Control

Hyperglycemia, sometimes referred to as elevated blood glucose levels, has been associated with both diabetes and its antecedent condition, prediabetes. Prediabetes refers to a medical condition when an individual exhibits elevated blood sugar levels that do not meet the diagnostic criteria for diabetes mellitus. In the treatment of diabetes, a critical metric to monitor is the individual's blood glucose concentration.

The metabolism of blood sugar occurs as a result of the digesting process of a diverse range of food sources. It plays a crucial role as the main energy source for many organs inside the body, such as the neurological system, cardiovascular system, and muscle. Blood glucose is derived through the ingestion of food or endogenously synthesized by the liver. Subsequently, the substance is transported to the circulatory system, which facilitates its distribution to various organs and cells. Within the cellular environment, it undergoes conversion processes to generate energy.

The synthesis of insulin, a hormone facilitating cellular utilization of circulating blood glucose, is the physiological process by which our organisms regulate optimal blood glucose concentrations. Insulin plays a pivotal role in the control of blood glucose levels. However, blood glucose regulation may be compromised by several circumstances, resulting in the development of hyperglycemia.

Hyperglycemia may arise endogenously due to hepatic overproduction of glucose, insufficient endogenous insulin secretion, or impaired insulin utilization by the organism. The disease in question is referred to as insulin deficit. External variables include several elements that may significantly impact an individual's well-being. These factors include but are not limited to an inadequate dietary regimen, the use of certain pharmaceuticals, the adoption of an unhealthy lifestyle, and the experience of stress.

Maintaining optimal blood sugar levels is of utmost importance for those with diabetes, as prolonged elevation of blood glucose may lead to severe consequences that pose a significant risk to the affected individual's extremities.

Elevated blood sugar levels, even below the diagnostic threshold for diabetes, have been identified as a substantial factor contributing to both mortality and morbidity.

The diagnostic criteria for diabetes is a fasting plasma glucose level below 7.0 mol/L. The selection of this diagnostic criterion was based on the identification of microvascular problems, including diabetic retinopathy.

3.5.2 Low Blood Sugar (Causes)

Hypoglycemia, sometimes referred to as low blood sugar, may arise due to many circumstances, including excessive insulin administration, meal omission, increased physical activity, alcohol consumption, or the use of non-insulin diabetic treatments. A blood glucose concentration below 70 mg/dL is considered to be indicative of hypoglycemia.

The over use of insulin or other pharmacological agents aimed at reducing glucose levels is the prevailing factor leading to hypoglycemia in individuals with diabetes. This is due to the fact that these specific drugs are used to lower blood glucose levels in individuals with diabetes in instances when there has been a delay in meal consumption or a complete absence of meals. The term "insulin reaction" refers to a medical disorder characterized by hypoglycemia resulting from an over administration of insulin. Low blood sugar levels may sometimes occur due to insufficient calorie intake or rapid increase in physical exertion.

Consequently, decreased levels of blood glucose might give rise to symptoms associated with the central nervous system, which include the following:

- Quivering.
- Anxiousness or a feeling of anxiety.
- Being covered in sweat.
- Appetite.
- Emotional lability and/or mental cloudiness.
- Fainting.

3.5.3 Elevated Blood Sugar

The medical term for high blood sugar levels is hyperglycemia. Lack of insulin or improper insulin utilization causes this condition.

Reasons include the following :

- The main causes of diabetes complications are : eating too much (especially carbohydrates), not drinking enough water, sitting around too much, and not taking enough insulin or oral diabetes medicines.
- Ailment, anxiety, menstruation,

Low blood glucose levels are medically referred to as hypoglycemia (lows). At the point where they fall below a certain threshold, blood glucose levels necessitate correction in order to return to a healthy range.

A few of the reasons are :

- Inadequate nutrition, such as a meal or snack with fewer carbohydrates than
- Liquor
- Excessive oral hypoglycemic medicines
- Adverse reactions to other medications
- Increased exercise or physical activity in comparison to typical

3.5.4 Ketones

A source of energy, ketones can be found in food. It's a byproduct of the body's use of fatty acids as fuel. If there is insufficient insulin in the blood system, our liver begins breaking down fat to ensure that glucose is transported to the cells.

3.5.5 Diabetic Ketoacidosis

Accumulated ketone bodies can lead to diabetic ketoacidosis(DKA) unless ketone production increases too rapidly. DKA is a life-threatening condition that can result in a coma or even death. Symptoms DKA commonly include:

- A rapid breathing.
- Excessive dehydration causes flakiness and a parched mouth.
- Redness of the cheeks.
- Urine frequency or extreme thirst that persists for at least a day.
- A mouthful of fruity smell.
- Pain or stiffness in the muscles.
- Sickness and nausea.
- Problems in digesting food.

Ketones in urine may indicate DKA. High ketone levels require immediate medical attention. DKA needs hospitalization.

3.5.7 The Ways Carbohydrates Raise or Lower Blood Sugar

After eating foods containing carbohydrates, glucose level rises to a greater extent than after eating foods containing proteins or fatty acids. Even if one has diabetes, allowed to consume carbohydrates.

3.5.8 High Blood Sugar (Treatment)

- Keeping up with a regular exercise routine can aid in maintaining healthy blood sugar levels.
- It's important to follow the doctor's orders when taking medication. When blood sugar levels are persistently high, a physician may recommend adjusting the dosage or schedule of medication.
- It's important to stick to a diabetes diet.
- Checking blood sugar level as prescribed by doctor.
- Consulting with physician about changing insulin dosage or switching to a different insulin formulation, such as rapid-acting.

3.5.9 What Else Can Help with Blood Sugar Control

Maintaining a healthy weight, eating plenty of fruits and vegetables, and exercising regularly can help. Tips :

- Eat regularly.
- Tracking diet and exercise.
- Having water instead of juice or soda.
- Choosing low-calorie food which is also low in saturated fat, trans fat, sugar, and salt.
- Limiting alcohol consumption.
- Monitor blood sugar level.
- Using the plate method to portion food

3.5.10 Tuberculosis & Diabetes

Considering the rising prevalence of diabetes and TB in many countries. The findings of this study have significant significance for the management and therapeutic approaches of both conditions. The presence of diabetes exacerbates the urgency of addressing tuberculosis (TB) as a public health issue. There are two distinct forms of TB: latent tuberculosis infection and active tuberculosis. Individuals with diabetes who have untreated latent TB infection are at a greater risk of getting tuberculosis.

3.5.11 Fatty Liver Diabetes (FLD)

Fatty liver disease is a significant worry among those with diabetes, since it is recognized as one of the possible consequences associated with this metabolic disorder. The accumulation of fat inside the liver occurs as a result of this particular condition. Fibromyalgia spectrum disorder (FLD) has a prevalence rate of around 24 percent among those residing in the United States. However, estimates for the prevalence of overweight persons with type 2 diabetes exceed 70%.

Risk Factors (FLD):

- Overweight or obese
- Excessively high blood pressure
- Diabetes
- Type 2 Diabetes

Symptoms (FLD):

- Morning sickness
- Decreased hunger
- The skin and whites of the eyes turn yellow (jaundice)
- Body fluid retention; swelling in the stomach and lower extremities
- Low energy levels
- A lack of muscle strength

Potential Treatment: Optimal management of Fatty Liver Disease (FLD) involves implementing dietary modifications, increasing physical activity levels, and reducing excessive fat intake. It is widely accepted that a modest reduction of around 10 percent in an individual's body weight may lead to improvements in liver health and a reduction in inflammatory response among those who are overweight.

CHAPTER 4

DIETARY GUIDELINES

4.1 Diet

Individuals with diabetes must prioritize maintaining physical fitness by adherence to appropriate dietary practices and consistent engagement in physical activity. In addition to regulating blood glucose levels, also known as sugar levels, adhering to a nutritious dietary plan and engaging in physical activity may contribute to maintaining a desired range. To effectively manage blood sugar levels, it is important to establish a balance between dietary intake, physical activity, and potential diabetic medication. The regulation of blood sugar levels, as advised by medical professionals, is influenced by several factors including dietary choices, portion sizes, and meal timings. Enhancing our level of physical activity and modifying our dietary choices may first seem as formidable tasks. It may be more convenient for individuals to start the process by making little adjustments and seeking assistance from their family members, friends, and healthcare professionals with whom they collaborate. Certain dietary components, often known as carbs or more specifically as "refined sugars," serve as the origin of the sugar present in our bloodstream. Candies, sweets, soft drinks, baked products, flatbreads, and white rice are illustrative instances of food items that include a considerable quantity of carbs.

The increase in blood sugar levels is directly proportional to the amount of carbs ingested. For individuals diagnosed with either type 1 or type 2 diabetes, the prudent selection of dietary choices assumes paramount significance in the endeavor to maintain optimal blood glucose levels within a consistent range. Maintaining optimal blood glucose levels may significantly reduce the probability of developing severe medical complications associated with diabetes, including visual impairment and cardiovascular issues. In contemporary times, individuals may enhance their well-being by adhering to a nutritious dietary regimen and engaging in regular physical activity on a consistent basis.

- Healthy levels of blood sugar, heart rate, and saturated fat.
- To avoid or put off diabetes complications, one should -
 - Lose weight and keep it off.
 - Exercise regularly and eat healthily.

If one has diabetes, he/she should eat a balanced diet consisting of a wide range of nutritious food products from each of the five categories, in the proportion by diet plan.

4.2 Food groups

4.2.1 Vegetables

Vegetables that are not considered "starchy" include things like broccoli, carrots, greens, peppers, and tomatoes.

4.2.2 Fruits

It includes oranges, melon, berries, apples, bananas, and grapes

4.2.3 Whole grains

It should make up at least half of one's daily requirements of grains.

- Included in the group are: wheat, rice, oats, cornmeal, barley.
- Ruti, puffed rice, flattened rice and bread are some examples.

4.2.4 Protein

- Trimmings.
- Boneless chicken or turkey.
- Fish.
- Eggs.
- Peanuts and other nuts Dried chickpeas, split peas, and other types of beans and peas.
- Plant-based alternatives to meat, like – Tofu.

4.2.5 Nonfat or Low-Fat Dairy Products

- Milk
- Yogurt.
- Cheese.

4.2.6 Consume heart-healthy fats/oils

- Canola oil, olive oil, and other oils that remain fluid at room temperature.
- Eat more fish and seafood, sardines, and mackerel to keep one's heart fit and active
- Alternatives to butter, cream, lard, margarine, try to cook with oils.

4.2.5 High-carbohydrate foods and beverages

- Sweets, baked goods, ice cream, cereals with added sugar, and canned fruits with sugar.
- Usual drinks all contain added sugars and should be avoided.
- Anything made with white flour, including rice, tortillas, bread, and pasta
- White potatoes, corn, as well as legumes, which are all starchy veggies.

4.3 Diet Chart

Table 1: Diet chart for Breakfast

Breakfast	
Food Item	Quantity
Bread	2-3 Pieces
Jam	22-25 gram
Full Cream Milk	1.0-1.5 glass
Eggs	1 piece
Cornflakes	1-1.25 Cups

Clear Soup (Chicken)	1.5-2 Cups
Fruit – Only Red Apple	1-2 Pieces

Table 2: Diet chart for Lunch

Lunch	
Food Items	Quantity
Rice	2-3 Cups
Dal	2-2.25 Cups
Mixed vegetables	1 Cup
Leafy Vegetables	1 Cup
Curry (fish/chicken)	1or2 large piece
Salad	1.5 Cups
Curd	1 Cup (If possible)

Table 3: Diet chart for dinner

Dinner	
Food Items	Quantity
Ruti	2-3 Pieces
Dal	1.5-2 Cups
Mixed Vegetables	1-1.5 Cups
Salad	1 Cup
Clear Soup (Chicken)	1-2 Cups
Sweet/Dessert	1 Cup (If Possible)
Full Cream Milk	1-1.5 glass

4.4 Additional information

It is important to consider the food habits and know which foods to eat or avoid, such as:

- To promote a healthier dietary pattern, it is advisable to refrain from consuming simple carbs, sugar, and free sugars.
- Implementing restrictions on the intake of beverages such as Horlicks, coke, or soft drinks.
- Incorporating complex carbs, dietary fiber, and unsaturated fatty acids into one's nutritional intake.
- Incorporating almonds, fish oil, and olive oil into the diet.

- It is advisable to observe the temporal spacing of meals, according to a suggested interval of two hours between each meal.
- One strategy for managing portion sizes is to closely monitor the amount of food consumed at meals. Additionally, individuals may make use of food swaps, such as recognizing that 30 grammes of chapati is comparable to half a cup of rice.
- In the case of pediatric patients with diabetes, it is important to provide a well-balanced diet that takes into account the proper quantities of carbs, proteins, and fats. In the event that a kid exhibits shortages in essential nutrients such as calcium or iron, it is recommended to use appropriate supplements, such as iron pills, to address these deficiencies.
- In the case of patients experiencing gestational diabetes throughout the course of pregnancy, namely during the first, second, and third trimesters, it is recommended to supplement their daily caloric intake by an extra 350 calories. During the second trimester, it is recommended to decrease carbohydrate consumption while simultaneously boosting protein intake. Furthermore, in the third trimester, it is advised to augment protein intake by an additional 100 grammes. In the case of an obese woman, it is recommended that the increased calorie consumption during pregnancy should not exceed the amounts seen in the second trimester.

CHAPTER 5

CONCLUSION

5. Conclusion

Individuals with diabetes have difficulties in effectively converting the carbs they ingest into energy. Type 2 diabetes is a persistent chronic condition that may not achieve full remission. At now, there are no effective therapies available for this insidious and lethal condition. The severity of consequences associated with it may be reduced with early detection and timely intervention. The management of blood glucose levels is a complex task due to the potential occurrence of hypoglycemia, which poses much greater risks compared to elevated blood glucose levels. Researchers are now exploring several therapeutic approaches for the management of diabetes. Regular physical activity has been shown to reduce the occurrence of diabetes and mitigate its long-term effects. Regular physical activity has been shown to contribute to the maintenance of stable blood sugar levels, hence reducing the need for medication. In summary, engagement in physical activity contributes to the regulation of blood sugar, weight, and blood pressure via the reduction of harmful cholesterol and elevation of beneficial cholesterol levels within the bloodstream. Engagement in regular physical exercise has been shown to be associated with a reduced risk of heart disease and nerve damage among those diagnosed with diabetes. Modifications to an individual's lifestyle, encompassing the adoption of a nutritionally balanced diet, regular engagement in physical exercise, and the implementation of responsible weight control measures, have the potential to optimize the body's utilization of insulin. Consequently, these alterations may contribute to improved prognoses for individuals recently diagnosed with diabetes.

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APPENDICES

Appendix 01: Case studies

Daffodil International University
Department of Nutrition and Food Engineering

Session: Year:
Case Study No. 29..... Dated:

1. Information about Patient:

a) Name : Abdur Rahman
b) Address : New Eskaton Road, Dhaka
c) Name of the Hospital : Bindem general hospital
d) Admission date : 25-08-23
e) Reason of admission : Abdominal pain and vomiting
f) Ward No. : 61
g) Bed No : 609

2. Anthropometric parameters:
Age: 32 year Sex: M / F
Weight: 61 Kg Height: 66 Cm

b / Biochemical Test Results (Blood)

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

Lab / Biochemical Test (Blood)	Results
☐ Blood Glucose (F) <u>5.2</u> mmol/dl	☐ Magnesium mmol/l
☐ Blood Glucose (ABF) <u>10.5</u> mmol/dl	☐ Phosphate mmol/l
☐ HbA1c %	☐ Calcium mmol/l
☐ Albumin <u>48.5</u> mg/dl	☐ Potassium <u>5.0</u> mmol/l
☐ Total protein g/dl	☐ Sodium <u>140</u> mmol/l
☐ TG mg/dl	☐ Serum Chloride <u>102</u> mmol/l
☐ HDL mg/dl	☐ Hb <u>15.3</u> g/dl
☐ LDL mg/dl	☐ Hematocrit <u>44.5</u> %
☐ Cholesterol, total mg/dl	☐ ESR <u>10</u> mm
☐ BUN mg/dl	☐ SGOT <u>35</u> IU/l
☐ Creatinine <u>1.2</u> mg/dl	☐ SGPT <u>88</u> U/l
☐ Urea <u>21</u> mg/dl	☐ Alk. Phos. <u>67</u> SomU/L
☐ Bilirubin <u>0.5</u> mg/dl	☐ Amylase <u>67</u> IU/l
☐ STCO ₂ <u>28</u>	☐ Uric Acid mg/dl
	☐ Bicarbonate mmol/l

Diagnosis:

- subacute intestinal obstruction
- DM

Admission unit

Surgery

Supplements:	Yes	No
If yes, type,	Vitamin and minerals	
	Vitamins	
	Minerals	
Appetite:	Excellent	Good ☐ Fair ☐ Poor ☒

3. Socioeconomic & Culture factor:

Monthly family income : 16000
 Religion : muslim
 Education : B.A
 Occupation : service (Bridgway)
 Living status : Dhaka
 Rural/ Urban : urban

Daffodil International University
Department of Nutrition and food engineering

Session:

Year:

Case Study No. 02

Dated:

1. Information about Patient:

- a) Name : Sushanto Das
b) Address : Khaje Beran, 2nd land, Lalbaga
c) Name of the Hospital :
d) Admission date : 27-05-23
e) Reason of admission : Upper abdominal pain. Skin colour inflamed of left leg
f) Ward No. : 61 (Gallbladder Stone)
g) Bed No. : 612 Gall bladder

2. Anthropometric parameters:

Age: 52 years Sex: M / F
Weight: 79 Kg Height: 5'5" Cm

b / Biochemical Test Results
(Blood)

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

	Lab / Biochemical Test (Blood)	Results
☐ Blood Glucose (F) 6.0		mmol/dl
☐ Blood Glucose (ABF) 8.7		mmol/dl
☐ HbA1c 7.7		%
☐ Albumin 42.5		mg/dl
☐ Total protein 8.7		g/dl
☐ TG 35		mg/dl
☐ HDL 102.6		mg/dl
☐ LDL 153		mg/dl
☐ Cholesterol, total 0.8		mg/dl
☐ BUN 12.7		mg/dl
☐ Creatinine 0.4		mg/dl
☐ Urea 2.4		mmol/dl
☐ Bilirubin 2.4		mmol/dl
☐ STCO ₂		
☐ Magnesium		mmol/l
☐ Phosphate		mmol/l
☐ Calcium		mmol/l
☐ Potassium 3.8		mmol/l
☐ Sodium 141		mmol/l
☐ Serum Chloride 106		mmol/l
☐ Hb 12.7		g/dl
☐ Hematocrit 37.6		%
☐ ESP 5		mm
☐ SGOT 16		IU/l
☐ SGPT		IU/l
☐ Alk. Phos. 65		SomU/L
☐ Amylase		IU/l
☐ Uric Acid		mg/dl
☐ Bicarbonate		mmol/l

Diagnosis:

- Gallbladder stone
- DM
- HTN

Unit:

Surgery unit

Supplements:	☒ Yes	☐ No
If yes, type,	☒ Vitamin and minerals ☐ Vitamins ☐ Minerals	
Appetite:	Excellent	Good ☐ Fair ☐ Poor ☐

3. Socioeconomic & Culture factor:

Monthly family income : 60K
 Religion : Hindu
 Education : M. Com
 Occupation : Service
 Living status : 1st b/g h.
 Rural/ Urban : Urban

Daffodil International University
Department of Nutrition and food engineering

Session:

Year:

Case Study No. (01).....

Dated: 22-08-2023

1. Information about Patient:

- a) Name : Sabbir Hossain
b) Address : Kurail Kajibani Khilkhet
c) Name of the Hospital : BirDEM general Hospital
d) Admission date : 26/8/23
e) Reason of admission : Infection, Pain in his right toe. (chronic osteomyelitis)
f) Ward No. : 61
g) Bed No. : 619

2. Anthropometric parameters:

Age: 50 years Sex: M/F
Weight: 65 Kg Height: 162 Cm

b / Biochemical Test Results
(Blood)

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

Lab / Biochemical Test (Blood)	Results
☐ Blood Glucose (F) 225 mmol/dl	
☐ Blood Glucose (ABF) 10.3 mmol/dl	
☐ HbA1c 10.3 %	
☐ Albumin mg/dl	
☐ Total protein g/dl	
☐ TG mg/dl	
☐ HDL mg/dl	
☐ LDL mg/dl	
☐ Cholesterol, total mg/dl	
☐ BUN mg/dl	
☐ Creatinine 1.5 mg/dl	
☐ Urea mg/dl	
☐ Bilirubin mg/dl	
☐ STCO ₂ 24	
☐ Magnesium mmol/l	
☐ Phosphate mmol/l	
☐ Calcium mmol/l	
☐ Potassium 4.8 mmol/l	
☐ Sodium 138 mmol/l	
☐ Serum Chloride 109 mmol/l	
☐ ID ₅₀ 12.3	
☐ Hematocrit 34.2 %	
☐ ESR mm/h	
☐ SGOT IU/L	
☐ SGPT IU/L	
☐ Alk. Phos. Som/L	
☐ Amylase IU/L	
☐ Uric Acid mg/dl	
☐ Bicarbonate mmol/l	

Diagnosis:

- Infection in (Right foot)
- DM

Unit:

Surgery - II

Supplements:	☒ Yes	☐ No
If yes, type,	☒ Vitamin and minerals ☐ Vitamins ☐ Minerals	
Appetite	☐ Excellent ☐ Good ☐ Fair ☒ Poor ☐	

3. Socioeconomic & Culture factor:

Monthly family income : 50000
 Religion : Muslim
 Education : Primary
 Occupation : Business
 Living status : Dhaka
 Rural/ Urban : Urban

AN INTERNSHIP REPORT ON NUTRITIONAL MANAGEMENT OF DIABETIC PATIENTS AT BIRDEM GENERAL HOSPITAL

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