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(Case Study Report)

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a) Introduction

Diabetes is one of the health conditions in which the blood sugar (glucose) stays very high. This issue also develops the pancreas; however, it does not produce enough insulin, and diabetes can impact any person and their age group. Most of the diabetic issues are chronic, and they can be managed through some changes and medication changes. Glucose, which is responsible for diabetes, mainly comes from carbohydrates that are available in drinks and foods. Having consistently high blood glucose can also be responsible for damage to the eyes and heart disease. The technical name of this disease is diabetes mellitus, which is quite problematic for the health condition of an individual. Diabetes is a very common issue for people, and approximately 37.3 million people in the US are suffering from diabetes issues, which is around 11% of the overall population. Experts have predicted that this number will rise to 643 million by 2030 and 783 million by 2045 (Cleveland Clinic, 2025).

There are **multiple risk factors** for diabetes which directly impact the health conditions of the individual and their lifestyle. People who are suffering from this issue are also having issues with being overweight or obese, which makes their lives more difficult and challenging. The individual can also become very inactive, and they will fail to engage in the activities. This can also cause damage to the cardiovascular system, and people who are suffering from this problem have to keep their blood pressure within less than 130/80 mm Hg, and the normal blood pressure for these people should have to be around 120/80 mm Hg. Due to these health risk factors, people who are suffering from diabetes have to take the right precautions because, without proper precautions, it can negatively impact their lifestyle (Heart, 2026).

b) Explain how blood sugar levels are maintained at a safe level for the body's needs.

The blood sugar levels are maintained through a continuous glucose monitor (CGM), which maintains checking process of blood sugar. The blood sugar can be checked when the individual wakes up and does not intake any food or drink; this must happen before a meal, or two hours after a meal. If the individual is suffering from type 1 diabetes and type 2 diabetes, they should take insulin before any kind of physical activity. The blood sugar level should stay between 80 and 130 mg/dL. There are multiple reasons which are

responsible for our blood sugar, and these factors include missing a meal, taking too much insulin, and being more physically active and taking too much (Gordon, 2019). There are multiple ways to manage blood sugar. First of all, the individual has to keep track of their blood sugar, eat at regular intervals, and not skip any meals. These kinds of people should also choose foods that are lower in calories, saturated fat, salt and sugar. It is also essential to track food, physical activity and drink. This is also necessary to reduce water intake instead of soda and juice, limit alcohol and reduce the intake of sugar and also control the food proportions on the meal plate (Mathew *et al.* 2023).

The diabetic conditions can also be managed through the support of health professionals, who can help individuals solve their health-related issues. The hormonal changes are also responsible for diabetic issues, hormonal fluctuation during ovulation, menopause, menstruation, and after blood sugar regulation in women. Females can also be affected if they are suffering from PCOS issues (Abrahamson, 2016). The poor sleep pattern is also essential for maintaining health because it disrupts glucose metabolism and leads to drops and spikes in the blood sugar level. Consuming a balanced diet can be the best way to prevent high blood sugar and maintain a healthy glucose level in the blood (Al Helal *et al.* 2015). Excessive consumption of street foods and sugar intake can make the situation worse. These are the reasons why patients must follow the glycemic index to prevent sudden spikes or drops in the blood level. Managing stress can also prevent the negative consequences of high blood sugar and help to maintain the mental stress level. To manage stress, people must incorporate some of the mindful activities like muscle relaxation, yoga, pursuing hobbies and maintaining a good work-life balance (Villines, 2026).

c) How oxygen and glucose are used to produce energy through cell metabolism.

The process in which glucose and oxygen are utilised to produce energy through cellular respiration is a very crucial process to maintain the organic compounds of the body and energy level. The crucial purpose of this process is to convert chemical energy to stored energy as nutrients such as proteins, fats and carbohydrates. This process generates energy which is utilised for many support work or reactions. The main current of energy into cells is known as ATP. These molecules are mainly utilised for energetically unfavourable types of reactions, which cannot be done without energy input, such as

transport across cell membranes and muscle contractions. There are some of the essential steps in this cellular respiration system, such as glycolysis, the tricarboxylic acid and citric acid cycle and the most important electron transport chain (Tarantino, 2026).

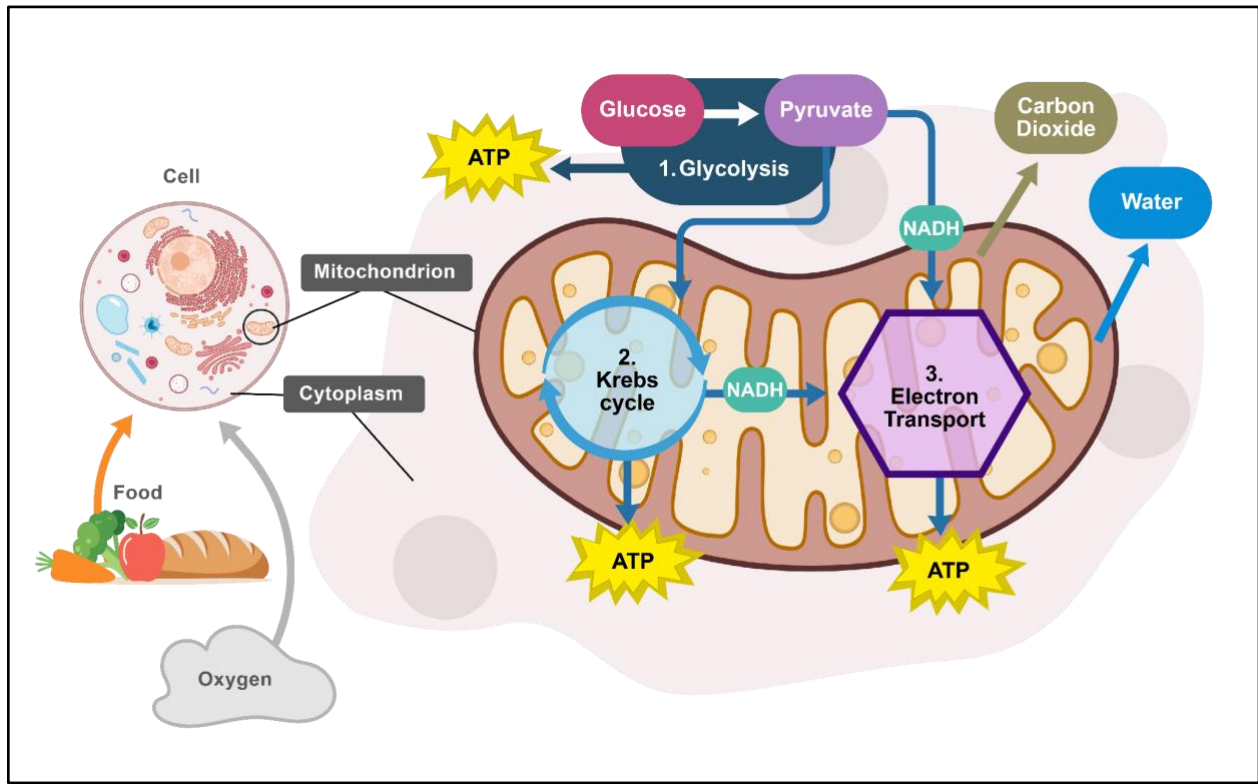


Figure 1: Stages of cellular respiration

[Source- Monash, 2026]

Glycolysis -

This glycolysis is considered a series of enzymatic reactions where the glucose or the six-carbon sugar molecules are broken down into 2 or three-carbon pyruvate molecules. Physiology and anatomy are intimately connected with each other because they can be described as the function and form. This anatomy and physiology help in creating an integrated organ system approach. This process happens in the cytosol of a cell, where it does not require oxygen or organelles. Thus, it only yields around 2 ATPs in the whole process. Once the process of pyruvate is done, the pyruvate then moves towards the mitochondrial matrix, where it transitions through its steps, which is known as pyruvate oxidation. In this overall process, it generates a series of enzymes which is known as the pyruvate dehydrogenase, which converts the complex into three-carbon pyruvate into acetyl-CoA (Tarantino, 2026).

Citric acid cycle -

This citric acid process starts from the time when acetyl-CoA combines with the other four-carbon oxaloacetate to create or form the six-carbon citrate. With the help of this series of enzymatic reactions, it transformed the citrate back into oxaloacetate. While producing the energy-rich molecules such as FADH₂, NADH and ATP during the transformations, these holes are utilised for the electron transport chain to generate more of the majority of ATP in this cellular respiratory process. As this process only produces 2 pyruvate molecules, that is why it takes a double turn to complete the whole cycle (Monash, 2026).

Electron Transport Chain -

This process is the final stage of cellular respiration and also generates lots of energy in this stage. This mainly occurs from the mitochondrial membrane, and it is also responsible for producing most of the ATPs through a process which is known as oxidative phosphorylation. Into this process, electrons are transported towards the various complexes of the electron transport chain system. These complexes are further coupled with metals like copper, and then they facilitate the movement of electrons (Monash, 2026).

d) How recording and tracking blood sugar levels help to manage Type 2 diabetes

Recording and tracking the blood sugar level or glucose level is essential to prevent type 2 diabetes because it helps to get immediate feedback on activity, diet, and medication impacts. This recording system helps track the impacts of medications on patients' health and fitness. By focusing on this tracking system, it can also help to adjust the medications as per the guidance, the treatment team and the condition of the individual with that health condition. Finding high blood sugar levels can prevent one from the intense and difficult situations of the industry and help to change the way of treatment as per needs. This also helps track the progress and reach of the treatment goals and learn about which kind of diet, exercise and medications are necessary to maintain the blood sugar level properly (Weinstock *et al.* 2020).

There is a process named the continuous glucose monitor process, which is essentially made for type 1 diabetic patients to prevent them from developing type 2 diabetes. The CGM process measures the blood sugar level in a very few minutes by placing a device

on the skin alongside a sensor that measures the glucose level. The CGM has also included some of the wireless devices for the body, which are known as transmitters. This transmitter sends information through sensors to the program and lets it know about the blood sugar level. This can be shown on the insulin pump or the smartphone easily. Preventing people from the type 2 stage is essential because if it grows, then their mental and physical health will be affected. Recording and tracking blood sugar is a very essential and crucial process which can be measured through a smart device (Tang *et al.* 2020).

e) Evidence-based recommendations on how lifestyle changes improve the condition

Changing lifestyle factors can directly help improve the diabetic condition and reverse towards the prediabetic conditions and enhance the glycemic control over the type 2 diabetes through 50%. There are some key actions which can help to achieve a 7% weight loss by engaging in 150 minutes of weekly exercise. **Enhancing eating habits** can help to prioritise fibre and include whole foods, which are required, such as increasing the intake of legumes, beans, non-starchy vegetables and whole grains, which are crucial. It is also essential for the patients to minimise the intake of street food and multiple other refined oil items or carbs, which negatively impact the health of individuals in the long term. After that, doing physical activities is also essential because doing 150+ minutes of moderate exercise can help with weight loss by 5 to 7%. **Maintaining a moderate level of physical activity** can also prevent individuals from type 2 diabetes-related issues and reverse the process to make things easier and more effective. Individuals must aim to do 30 minutes of moderate aerobic exercise or activities for strength building, which will directly help them to enhance their health-related condition and create ways to become more effective (Mayoclinic, 2026).

WHO has suggested that medications are also an essential part of preventing type 2 diabetes. First of all, patients have to store insulin properly and check its expiration properly. The insulin should stay away from extreme cold or heat. **Consult with a healthcare professional** about their own problems and difficulties regarding these issues and low or high blood sugar levels. It is also essential to be cautious about the new medicines and their uses. For this issue, it is essential to have prescribed medicines and

ways to prevent its negative impacts (WHO, 2026). **Alcohol and smoking** are very negative factors that can make the situation worse and negatively impact blood sugar levels. It is necessary to consult with healthcare professionals to obtain permission to see if it is safe to drink alcohol in this condition and choose drinks properly. It will be better to take light beer and dry wines because these have very few carbohydrates and calories. Women must lock their pattern of menopause and adjust their diet treatment with that process to maintain effectiveness between both of them properly. Stress management in this condition also becomes risky for patients to maintain the movement towards a type 2 diabetic condition. It is essential for patients to focus on taking control of their stress levels and set limits by using relaxation techniques (The Lancet, 2026).

f) Conclusion

The main purpose of this case study was to highlight diabetes related health issues, which defined how the blood sugar levels are maintained at an effective and safe level in the body. After that, it has also described the cellular respiration system or ways that were very crucial to assess. This has also examined the tracking and recording of the blood sugar levels of individuals, which helps them to prevent type 2 diabetes. After that, this article has also included some of the evidence-based recommendations and how lifestyle changes can help to enhance the condition. This has also described the relationship between anatomy and physiology.

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