

Module code: BMHP5023

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Introduction

Diabetes is considered a long-term and chronic health disorder caused by an abrupt rise in blood glucose and sugar levels in the blood (Silva *et al.*, 2018). There are various forms of diabetes such as Type 1, Type 2, Prediabetes and Gestational (Bessesen, 2023). The common risk factors associated with diabetes among individuals are overweight, unhealthy diet and eating pattern, poor sleep routine, age, ethnicity, hereditary, sedentary lifestyle and limited outdoor activities (BHF, 2021). The common symptoms of diabetes include increased thirst, frequent urination, blurred vision, fatigue and skin infections (WHO, 2024). Lack of timely interventions or medication to manage the risk of diabetes could result in complex health disorders such as kidney failure, retina problems, heart disorders, foot problems, gum disease, stroke and damage to the nerve cells (NHS, 2023). The report will focus on strengthening the knowledge and awareness of diabetes among nurses working in the GP surgery. The report would also emphasise discussing the role of oxygen and glucose in producing energy, recording and tracking of blood sugar levels and evidence-based recommendations to address the risk of diabetes through lifestyle changes.

Explain how blood sugar levels are maintained at a safe and effective level for the body's needs

Energy developed within the body is pivotal in maintaining a safe and effective level of blood sugar level. Büsing *et al.* (2019) had also provided conclusive evidence about the interrelationship between energy and glucose management in the body. The turnover of energy acquired from nutrients positively impacts maintaining homeostasis of glucose levels to prevent the risk of diabetes among individuals. Moreover, the controlled physiological process also plays an important role in maintaining a safe and effective level of sugar levels based on the needs of the body. During the post-eating phase, the blood sugar levels in the body are generally high. According to Kouřimská, Jiráková and Adámková (2015), foods are linked with glycemic level in the human body. Different types of foods consumed and cooking methods invariably impact the regulation of the glucose level in the blood. Once food is consumed, it breaks down slowly in the body and releases

glucose which enters the blood causing a sudden spike in the blood sugar levels. Upon the detection of the spike level, the pancreas gets activated in releasing insulin hormones (Ma *et al.*, 2025). The insulin helps to regulate the body cells by transforming excessive glucose into energy and glycogen. This physiological process helps to maintain a safe and effective level of glucose in the body ranging between 70 mg/dL and 110 mg/dL.

Consequently, between the meals phase, the blood glucose levels in the human body are generally low. The glucagon level in the body is maintained by the pancreas when the sugar levels in the blood are below the minimum threshold of 70 mg/dL. In this phase, the role of the pancreas becomes important as it closely monitors and regulates the blood glucose through the breakdown of glycogen into glucose in the blood (Röder *et al.*, 2016). Thus, conversion of glucagon into glucose helps to maintain a safe and effective level of blood glucose in the body. Guerra and Gastaldelli (2020) had further discussed the role of the liver in maintaining a safe and effective level of glucose in the body. Unlike the pancreas, the liver acts as one of the key regulators in maintaining a balance between glucose metabolism and insulin resistance. The liver stores an excessive volume of glucose and supports the normal functioning of the pancreas by slowly releasing glycogen to stabilise blood glucose levels as per the needs of the human body (Soon and Torbenson, 2023).

Show how oxygen and glucose are used to produce energy through cell metabolism

Cell metabolism is regarded as an important mechanism through which energy is developed within the human body using both glucose and oxygen (Liu *et al.*, 2025). The energy development process undergoes three different stages such as glycolysis. This stage generally occurs within the cytoplasm wherein glucose molecules are broken down into pyruvate molecules. Within the 10-step process of cellular respiration, glucose does not require oxygen to convert 1 glucose into two pyruvates to develop 2 ATP and 2 NADH molecules. The uniqueness of the glycolysis process is that it offers quick and instant energy (Salih, Sabir and Abdoul, 2022).

The next stage within the cell metabolism process is referred to as the Krebs Cycle. Unlike glycolysis, the Krebs cycle takes place within the mitochondrial matrix. The pyruvate molecules developed within the glycolysis process successfully pass into the Krebs cycle which is further converted into Acetyl-CoA (Franco and Serrano-Marín, 2022). Moreover, as compared to the glycolysis stage, the Krebs cycle requires an adequate volume of oxygen to support the overall development process of energy. Oxygen comes into contact with the Acetyl-CoA to develop citric acid. There are 8 enzymatic steps needed to oxidise the citric acid and release 2 molecules of carbon dioxide (CO₂) (Książek, 2023). Further, on every two turns of the enzymatic steps, one pyruvate molecules approximately produce 2 FADH₂, 6 NADH, 4 CO₂ and 2 ATP. This stage within the cell metabolism mechanism is the key to supplying a huge volume of electrons to support the next stage of oxidative phosphorylation.

Oxidative phosphorylation is the third and final stage of the cell metabolism process which takes place within the inner membranes of the mitochondrial membrane (Wilson, 2017). The process of energy development begins with the electrons developed within the Krebs cycle such as from NADH and FADH₂ are transferred to the electron transport chain which is responsible for generating 90% of the cellular ATP which equates to 30-32 per glucose. Unlike the previous two stages, oxygen is mandatorily required in this stage to develop a proton gradient by pumping H⁺ ions from the membrane. The presence of oxygen when combined with protons and electrons helps to form water (Mandal, Saito and Ishikita, 2022). Thus, all three stages of the cell metabolism process are relevant in generating energy needed by human beings to sustain themselves in the external environment.

Briefly examine how recording and tracking blood sugar levels helps individuals with Type 2 diabetes to safely manage their condition

Recording and tracking constitute an important part of the clinical management process of Type 2 Diabetes. Porth *et al.* (2024) had opined that monitoring of blood glucose level using digital tools has provided more control to patients to make healthy lifestyle choices. Monitoring, recording and tracking of blood sugar levels has also been linked with curbing

down the risk of long-term health complications arising from uncontrolled diabetes levels and living a healthy life.

One of the key contributing factors that can lead to safe management of diabetes condition is that regular monitoring of blood sugar level makes individuals aware of the current body dynamics. In the course of self-recording and tracking of blood sugar level at different times of the day especially before and after meals supports the meal planning journey. Jung *et al.* (2024) had stated that self-monitoring of diabetes helps to manage fluctuations of the sugar level in the body as low or high sugar content in the bloodstream can significantly impact on the wellbeing and quality of life by making individuals at high risk of hypoglycemia and hyperglycemia respectively (Patell *et al.*, 2017). Thus, frequent monitoring and recording support individuals to gain control to design their own meal to maintain correct threshold of glucose level between 70-110 mg/dL before, between and after meals.

Apart from gaining control over diabetes, regular recording and tracking of blood sugar levels can also be linked with informed decision-making. According to Ono *et al.* (2024), generating personal health records of diabetes through the use of a glucose monitoring device has positively reflected upon the attainment of self-management behaviours. Individuals maintaining regular records of blood sugar levels are better informed and aware to comprehend the pattern and trend of changes in the sugar content in the blood. Based on the changes recognised from regular monitoring and recording, informed and clinical decisions could be undertaken by diabetes patients by making positive lifestyle changes which include consumption of healthy foods, regular outdoor exercises, sleep routine and timely administration of glucose medication (Ahmad and Joshi, 2023).

Further, recording and tracking of blood sugar levels can promote safe management of Type 2 Diabetes by strengthening medication management. Eze *et al.* (2022) had opined that medication management also referred to as drug therapy is critical in tackling diabetes-related health complications and manages glycemic control to stabilise insulin hormones in the blood. Thus, tracking and recording empower individuals with Type 2 Diabetes to share the records with care professionals to ensure correct medication and insulin dosages are administered (Gerwer *et al.*, 2022). Based on the changes recorded

in the blood sugar level, amendments could be made to medicines and drugs to reduce the risk of medication side effects and overdose.

Include evidence-based recommendations on how lifestyle changes could help improve their condition

There are several evidence-based recommendations that could be made to address the risk of diabetes among people. According to Pandey (2025), lifestyle changes or modification play an important role in glycemic management as making proactive changes in daily living habits is linked with supporting pharmacologic therapy which invariably reflects upon good quality of life and wellbeing. One such recommended lifestyle change that needs to be adopted by people to tackle the condition of diabetes is the consumption of a healthy diet. In the UK, Diabetes UK has designed evidence-based nutritional guidelines aimed towards the timely management and prevention of diabetes (Diabetes UK, 2017). The evidence-based guideline focuses on personalising food habits over nutrients by undertaking a more collaborative and personalised approach to involve individuals in designing a healthy diet plan by considering cultural and personal preferences. Diabetic patients should include high portions of green vegetables, fruits, fish, pulses and wholegrains in their daily eating routine and avoid consumption of sweetened beverages, red meat and processed foods (Mulyo *et al.*, 2022).

Another recommended lifestyle change that can positively support individuals to improve and manage their diabetic condition is physical activity. Czarnota *et al.* (2025) had opined that physical activities are considered an evidence-based approach to prevent and manage diabetes. Physical activities are directly linked with improving insulin sensitivity and lowering glycemic levels by reducing insulin resistance. The NHS in the UK has developed evidence-based guidelines that recommend regular physical exercise for people living with diabetes (Diabetes UK, 2017). It is recommended for diabetic patients to engage in a minimum of 150 minutes of moderately intensified physical activities every week ranging across cycling, brisk walking and swimming or 75 minutes of vigorously intensified activities every week such as stair climbing, running and circuit training. The National Institute for Health and Care Excellence (NICE) has also undermined the

importance of physical activities in the management of diabetes. The PH38 guideline directs health professionals to raise awareness about physical activities and exercises to manage the risk of diabetes among people (NICE, 2012).

Further, weight management can also be considered as an evidence-based recommendation to manage the condition of diabetes among people. Garvey *et al.* (2022) had provided substantial evidence that can undermine the importance of weight management in tackling the risk of diabetes. It has been noted that 5% to 10% of weight loss can subsequently reduce the risk of cardiovascular health among diabetic patients. In the UK, the NHS has introduced the Digital Weight Management Programme. It is an evidence-based approach which supports obese and diabetic individuals to manage long-term health complications by engaging in the 12-week programme covering multiple aspects such as physical activities, healthy eating and lifestyle management (NHS NEL, 2024).

Conclusion

Thus, the report has provided valuable insight into the health condition of diabetes. The controlled physiological process has been significant within the human body to maintain a safe and effective level of blood sugar pre- and post-phases of eating. The three stages of cell metabolism process such as glycolysis, the Krebs Cycle and oxidative phosphorylation have been relevant in producing energy and water required to support the normal functioning of the human body. Regular recording and tracking of blood sugar levels has improved clinical decision-making, medication management and meal planning. Further, evidence-based lifestyle changes such as nutritional guidelines, physical activities and the Digital Weight Management Programme have been recommended to support individuals to tackle health complications from diabetes.

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