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A QUALITATIVE EXPLORATION OF UNDERGRADUATE NURSING STUDENTS' KNOWLEDGE REGARDING NUTRITIONAL MANAGEMENT OF TYPE-2 DIABETES MELLITUS

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ABSTRACT

Type-2 Diabetes Mellitus (T2DM) is a prevalent chronic metabolic disease in the world and proper nutritional management of the disease becomes important to prevent the complications and better patient outcome. Nurses are considered to be important educators of diabetics about healthy eating, lifestyle modification and self-management care. Thus, the importance of having good knowledge for the nutritional management among under graduate nursing students is essential for good patient care. But little qualitative studies have examined students' understanding of the nutrition management of T2DM in the Pakistani context. This study aimed to assess the knowledge of undergraduate students in the field of nursing about the nutrition management of T2DM among them. A qualitative exploratory research design was used for the study. It was done at the Department of Nursing, Peace College of Nursing and Allied Health Sciences at Dow University of Health Sciences. The sampling method was purposive sampling and a total of 25 nursing students, who were undergraduate students, were selected. Data were gathered using semi-structured interviews with the data analyzed using thematic analysis.

Findings indicated that general knowledge about the T2DM was present and that the importance of nutrition care in managing their blood glucose levels and preventing complications was known. Healthy diet, carbohydrate control, balanced meal planning, and lifestyle modification were cited as important diabetes-management components of the participants. The study also revealed that participants considered nurses as key health care providers who play a role in educating the patients and providing nutritional counselling. Several barriers were found which hinder students in their understanding and readiness to work with students who have diabetes; these barriers were limited practical experiences, inadequate detailed nutritional education, workload, and the lack of confidence in counselling diabetic patients.The study found that the basic theoretical knowledge of nutrition in the management of T2DM was found among all undergraduate students of Nursing, but there was a lack of practical counselling skills and clinical preparedness. The study suggests enhancement of the nursing curriculum, practice training, workshops, clinical exposure on the nutritional management of diabetes and patient education. The results

can help to reinforce nursing education and enhance future nurses' quality in providing diabetes care.

Keywords:
Type-2 Diabetes Mellitus, Nutritional Management, Undergraduate Nursing Students, Diabetes Education, Qualitative Research and Nursing Knowledge.

Chapter 1: Introduction

1.1 Background of the Study

Type-2 Diabetes Mellitus (T2DM) has been established as one of the most prevalent chronic metabolic disorders in the world and a growing health problem in both developed and developing nations. The disease is the result of a resistance to insulin produced by the body, or insufficient insulin production by the pancreas to keep blood sugar levels normal. In T2DM, a state of persistent hyperglycaemia may result in complications such as cardiovascular disease, kidney failure, neuropathy, retinopathy and delayed wound healing (American Diabetes Association, 2024). T2DM remains a significant burden on the health care systems, health care professionals and patients worldwide as diabetes becomes a growing problem and is associated with a number of long-term health consequences.

T2DM has become a significant problem in the last several decades due to the rapid urbanization, sedentary lifestyle, unhealthy diet and high levels of obesity. The International Diabetes Federation (2023) states that diabetes is a disease with an impact on millions of people worldwide and will affect many more people in the coming years. Likewise, World Health Organization (2023) stated that diabetes is one of the major causes of death and disability globally, especially in low and middle-income countries where access to preventive interventions and healthcare resources is inadequate. Thus, diabetes has become a significant public health problem, necessitating efficient management strategies and healthcare interventions.

One of the most important aspects of the prevention and management of T2DM is nutritional management. There is a link between appropriate dietary practices, glucose control, insulin sensitivity and the incidence of diabetes-related complications (Evert et al., 2022). Nutritional management involves planning healthy meals, eating a balanced diet of carbohydrates, eating more fibre, consuming less saturated fat and sugar and maintaining a healthy body weight.

Diabetic patients should follow the dietary recommendations closely as it may affect the glycaemic control and may lead to the progression of the disease if it is not followed properly.

While dietary management can be a key step for managing diabetes, it is also a critical factor in preventing the complications of diabetes, like hypertension, obesity, and cardiovascular diseases.

In Ojo's opinion (2021), patient outcomes and quality of life for patients with T2DM were significantly better when good nutritional management is achieved. Therefore, healthcare practitioners are expected to be able to give suitable nutritional advice and assistance to diabetic patients to facilitate the implementation of suitable self-management behaviours and lifestyle changes.

Nurses are among the healthcare professionals who have a significant role in the diabetes management as they are directly involved in the patient care, health promotion and patient education. Nurses are often involved in educating patients about diabetes, particularly concerning dietary changes, healthy lifestyle habits and medication compliance (Lewis et al.,

2023). Nurses will also help patients grasp the significance of self-management measures that are required for successful disease management. Thus, nurses need an adequate understanding and the competence needed when managing nutrition for people with T2DM in order to provide safe, effective and evidence-based care to patients.

Many of the nurses who will start their practice in the future are prepared in undergraduate nursing education to handle chronic diseases and offer well-rounded care to patients. All nursing students were expected to receive a sound theoretical and clinical knowledge of diabetes management as a part of

their education. This is especially significant when it comes to educational preparation, as nurses are commonly involved in giving dietary advice and education to diabetics in the hospital and community health care environments. Good knowledge about nutrition in diabetes among nursing students can help in educating patients, empowering them to take care of their diabetes, and minimizing the complications of diabetes.

Although nutritional management is a critical aspect of diabetes care, it has been reported that the knowledge of nurses and nursing students on the dietary management of T2DM is inadequate.Despite the importance of nutritional management in diabetes care, previous studies have reported the lack of understanding about the dietary management of T2DM among nurses and nursing students. Farzaei et al. (2023) found differences in nurse knowledge, attitudes and practices regarding nutrition management of diabetes mellitus. The study identified gaps in nutrition counselling and urged ongoing training of health care professionals in diabetes care. Likewise, Elmahdy & Anwer (2024) reported that the nutritional care management for the diabetic patients of the nurses had low level of knowledge and practice. It is clear from these findings that there is some lack of adequate training among health care professionals on nutrition counselling and dietary management options for diabetics.

Educational deficits in diabetes management and patient education have also been found in nursing students in research studies. It was found that Almutairi, Hosseinzadeh and Gopaldasani (2021) found that nursing students lacked the knowledge regarding diabetes and suggested that they need to improve educational program in diabetes care. Similarly, Malhi et al. (2025) reported low level of awareness of the undergraduate nursing students about diabetes and its associated risk factors. Based on the results, there is a need to provide additional education and clinical experiences for nursing students in the area of nutrition management and chronic disease care.

The education strategies have been identified as effective strategies to gain knowledge among nursing students in the management of diabetes. Perez-Cornejo et al. (2021) emphasized the need for nutrition education to promote knowledge about obesity and diabetes management among healthcare students. In the same way, Alzaben et al. (2023) found that training programs about diabetes and its effects on university students' diabetes-related knowledge and practices were significant. The results showed that educational and awareness programs have the potential to have a positive impact on students' knowledge about nutritional management and healthful lifestyle practices.

Unhealthy nutrition habits and sedentary lifestyle, along with limited public understanding of diabetes prevention and management, are the contributing factors to the increasing burden of T2DM in Pakistan which has turned into a serious health care problem. In today's scenario, Pakistan is one of the countries having the maximum number of patients with diabetes in the world. As the prevalence of diabetes continues to rise, there is a growing demand for qualified health care professionals who are able to deliver quality diabetes education and provide nutrition counseling. Diabetic patients' health needs are often the responsibility of nurses, and it is expected that nursing students were well equipped to respond to these needs in health-care institutions, especially in educating patients.

However, few qualitative studies have been conducted in Pakistan to understand the knowledge and perceptions of undergraduate nursing students on nutrition management of T2DM. Most of the previous studies have concentrated mainly on quantitative measurement of levels of knowledge and not in detail on students' perceptions and experiences and on challenges to their learning. However, qualitative research provides an opportunity to gain deeper understanding regarding participants' viewpoints, experiences and learning needs (Creswell and Poth, 2023). Using qualitative inquiry, researchers may be able to investigate the factors that influence nursing students' understanding of nutritional management, then discover the obstacles that hinder the effective learning in the nursing education program.

In addition, there are a number of factors that might affect nursing students' learning experiences, such as diabetes education curriculum content, teaching methods, clinical placement and access to diabetes education materials. Satisfactory clinical training may be lacking and diabetes nutrition education is not given enough attention in nursing education, which could adversely impact nursing students' abilities in managing diabetes. Qualitative research conducted to explore students' experiences and perceptions can then help health care providers and educators pinpoint areas of unmet learning and develop solutions for enhancing nursing education related to diabetes.

This study is qualitative in nature and its purpose is to find out the knowledge of undergraduate students towards the nutritional management of Type-2 Diabetes Mellitus. The study aims to understand the perceptions and educational experiences and challenges of the nursing students about nutrition care of diabetic patients. These experiences could give insight into the good and bad aspects of existing nursing education programs on diabetes care.

The result of this research could have a significant role in nursing education and nursing practice. The study could be helpful for nursing education providers to identify the areas in need of improvement in the undergraduate nursing curriculum from the perspective of diabetes management and nutritional counselling. In addition, the results could be used to guide health care institutions for creating diabetes care training programmes and educational workshops to enhance nursing students' skills in diabetes care.

Furthermore, enhancing the nursing students' awareness of nutritional management can have a positive impact on patient education and health outcomes. Adequate knowledge and confidence on diabetes' nutritional management among nurses enable them to effectively counsel and support diabetic patients. Enhancing patients' education can facilitate the adoption of better self-management behaviours, reduce treatment adherence problems and improve glycaemic control among people with T2DM.

This study is also significant in view of the fact that it is one of the growing studies in the field of nursing related to chronic disease management in the Pakistani context. Results could be used to base future educational interventions and inform policy makers in diabetes education in nursing homes. In addition, the study could stimulate further qualitative research on the experiences and competencies of nursing students in caring for patients with chronic disease and managing patient nutrition.

1.2 Problem Statement

Type-2 Diabetes Mellitus (T2DM) is a rapidly growing, chronic disease affecting people across the globe, and it must be managed effectively with nutrition to minimize complications and enhance patient outcomes. Nurses are a crucial part in educating diabetics about dietary choices, lifestyle changes, and self-management. However, in the previous study, the lack of knowledge and understanding was found among the nursing students regarding the management of nutrition in diabetes mellitus (Farzaei et al., 2023; Almutairi, Hosseinzadeh and Gopaldasani, 2021).

Not much qualitative work has been done in Pakistan about the attitudes and knowledge of undergraduate nurses on nutritional management of Type-2 Diabetes Mellitus. If the nursing student does not have adequate knowledge, this can have a negative impact on patient education and diabetes care in the health care setting. Hence, it is important to assess the knowledge level of undergraduate nursing students on nutritional management of T2DM to find the gap in their knowledge and to enhance nursing education and training programmes.

1.3 Research Objectives

The main aim is to assess the nutritional knowledge among undergraduate nursing students about Type 2 Diabetes Mellitus. The other Specific Objectives are:

- To assess the knowledge of undergraduate nursing student about dietary management in Type-2 Diabetes Mellitus.
- In order to determine the perception of the nursing students about the significance of

nutritional management in diabetes mellitus.

- To examine factors that may impact nursing students' understanding of the nutrition management of T2DM.
- To determine the nutritional management education needs and training opportunities of undergraduate nursing students.

1.4 Research Questions

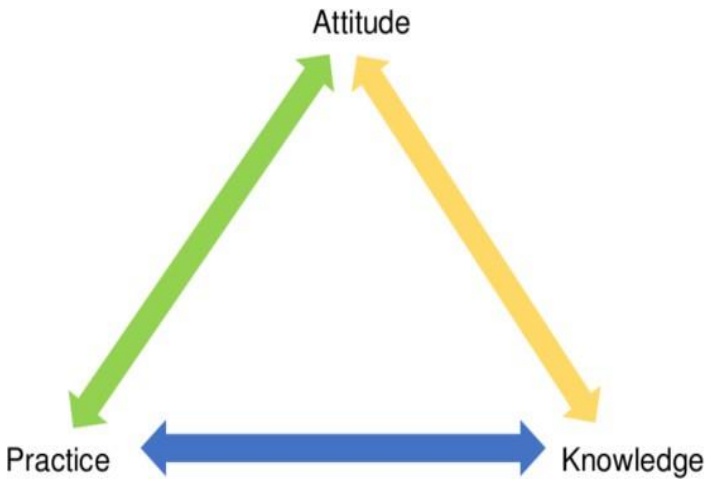
- What knowledge do undergraduate nursing students have regarding the nutritional management of Type-2 Diabetes Mellitus?
- What is the perception of the importance of nutritional management in the care of diabetes among undergraduate nursing students?
- What are the factors that affect the knowledge of nursing students about nutrition management of T2DM?
- What are the problems faced by the Nursing Students in learning about the nutritional management of Type-2 Diabetes Mellitus?

1.5 Theoretical Framework

Knowledge–Attitude–Practice (KAP) Theory

The Knowledge–Attitude–Practice (KAP) Theory is applied as a guideline for this study, as it assumes that people's knowledge and understanding shapes their attitudes and perceptions, which then determine their practices and behaviours. In the health and nursing field, the theory is employed to test knowledge, beliefs and practices about a disease, health promotion and patients' care (Polit and Beck, 2021). It is believed that the knowledge possessed by the undergraduate nursing students on the nutritional management of Type-2 Diabetes Mellitus is an important aspect which will affect their attitude towards diabetes care and their readiness to provide them effective nutritional counselling for managing the patients with Type-2 Diabetes Mellitus within the frame of this study. Proper information about dietary management, healthy eating habits and diabetes self-care can have a positive impact on nursing students' confidence and diabetes clinical work (Ahn et al., 2024).

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The KAP theory also implies that inadequate knowledge could lead to negative attitudes, understanding and healthcare practice. Diabetes management and nutrition counselling have been

found to be areas of concern for nursing students and nurses in previous studies (Farzaei et al., 2023; Almutairi, Hosseinzadeh and Gopaldasani, 2021). Likewise, Malhi et al. (2025) found that undergraduate nursing students were not aware of the consequences of diabetes and its risk factors. Educational activities and awareness campaigns have been identified as effective strategies to enhance knowledge and encourage positive health behaviors for managing diabetes. Alzaben et al. (2023) found that university students' awareness programmes about diabetes had a significant impact on increasing the level of diabetes-related knowledge and healthy lifestyles
among students. Perez-Cornejo et al. (2021) also emphasized the role of nutrition education and how it positively impacts the knowledge of healthcare students on obesity and diabetes management.

The theoretical perspective that underpins the present study explains the process of how the knowledge acquisition of undergraduate students in nursing might affect their diabetes nutritional management related perceptions, attitudes and future nursing practices. It also emphasizes the need for increased educational exposure, clinical training and awareness programmes to improve the skills of nursing students on diabetes care and patient education.

Significance of the Study

The study is important as Type-2 Diabetes Mellitus is one of the most prevalent chronic diseases in the world today and the nutritional management of the condition is crucial for the alleviation of complications and in the enhancement of patients' quality of life. Nutritional management is recognized as a basic pillar of diabetes management because proper nutrition can help to keep blood glucose levels in check, slow or stop the progression of the disease and prevent long-term complications of DM. Nurses are important agents of change when it comes to educating patients who have diabetes about healthy eating habits, lifestyle changes, and self-management. Thus, proper knowledge among undergraduate nursing students about the nutritional management is important because it would guarantee the effective patient education and quality healthcare delivery. The results from this study could also help in the field of nursing education to identify the lack of knowledge among the undergraduate nursing students with regard to nutritional management of Type-2 Diabetes Mellitus. The research study can help nursing educators and institutions to assess the effectiveness of existing nursing curriculum with regard to diabetes care and nutritional counselling. The results might also inform the education and training of better teaching strategies, education programs and clinical training that would improve nursing student competencies in managing diabetes. This study could also have implications for healthcare institutions and policy makers as it offers qualitative understanding of how the education and
learning process around nutritional management of diabetes from the perspective of the nursing students. Knowledge of the educational obstacles can facilitate the design of workshops, awareness programmes and professional training sessions to enhance nursing knowledge and practice related to diabetes. Improved nursing education can ultimately bring the quality of care provision to the patients who suffer from diabetes to the hospital and community health care settings. Furthermore, the study might add to the existing knowledge of nursing about the management of chronic disease in the Pakistani context. There are very few qualitative studies available that examined knowledge and experience of undergraduate nursing students about the nutritional treatment of Type-2 Diabetes Mellitus in Pakistan. Hence, the study should offer significant evidence to future researchers who are dealing with the study of diabetes education, nursing practice and healthcare training.

The study is also important because knowledge enhancement about the nutritional management of the nursing students could contribute positively towards the patient outcome. Nurses who are knowledgeable about the dietary management strategies are more likely to be able to offer effective dietary counselling to the diabetic patients and to motivate the patients to engage in healthier lifestyles behaviors. Better diabetes knowledge and

self-management may lead to a decrease of diabetes complication, better glycaemic control and better patients' quality of life.

Operational Definitions

Type-2 Diabetes Mellitus (T2DM): Type-2 Diabetes Mellitus is a long-term metabolic disorder in which blood sugar is high due to resistance and insufficient insulin production by the pancreas (American Diabetes Association, 2024).

Nutritional Management: Nutritional Management involves the management of diet and healthy eating habits to help prevent complications of Type-2 Diabetes Mellitus, maintain healthy body weight and control blood glucose levels.

Knowledge: Knowledge is defined as the understanding, awareness and information of undergraduate nursing students about dietary recommendations, nutritional care management for patient with Type-2 Diabetes Mellitus.

Nutritional Education: Nutritional education is the learning and teaching process which focuses on enhancing knowledge and understanding of healthy nutrition and nutritional management in diabetes care.

Diabetes Self-Management: Diabetes self-management includes the actions and behaviors a diabetic patient takes to manage their blood glucose, such as healthy eating, taking medications as prescribed, exercising and monitoring blood glucose levels.

Dietary Counselling: Dietary counselling involves the provision of diet and health care advice and education by healthcare professionals to patients on how to plan their diets and adopt health care behaviours to help manage diseases.

Chapter 2: Literature Review

2.1 Type 2 Diabetes Mellitus (T2DM) Overview

Type-2 Diabetes Mellitus (T2DM) is a chronic metabolic condition where the blood glucose levels are high due to insulin resistance and reduced insulin secretion. It is one of the most prevalent non-communicable diseases globally and has emerged as a significant public health concern, impacting millions of people of all ages (American Diabetes Association, 2024). The disease progresses slowly and tends to co-occur with obesity, low physical activity, poor diets, genetic risk and age. If not treated properly, T2DM, with its associated hyperglycaemia, can cause major complications in the cardiovascular, renal, neurological and visual systems. The International Diabetes Federation (2023) reports that the prevalence of diabetes has risen dramatically in the last few decades and has reached one of the most important causes of morbidity and mortality today. Likewise, the World Health Organisation (2023) has stated that diabetes is a significant cause of early mortality, disability and a lower quality of life especially in countries with low and middle income, where there may be limited health care resources. This rise in T2DM has put a strain on healthcare systems because of rising hospitalisation rates, healthcare expenditures, and the demands for chronic care.

T2DM is believed to occur from a combination of insulin resistance in peripheral tissues and from the progressive loss of function of pancreatic beta cells, which are responsible for insulin production (American Diabetes Association, 2024). At first, the body tries to make up for the insulin resistance by creating more insulin, but, over time, the pancreas' function becomes less efficient and glucose control is lost. This means that chronic hyperglycaemia occurs and leads to tissue damage and organ dysfunction. There are several risk factors that play a role in the onset of T2DM. Excessive body fat, or insulin resistance, is one of the strongest risk factors for obesity. However, sitting and not exercising are also risk factors for the development of diabetes, as well as poor nutrition (Ojo, 2021). In addition, family history, hypertension, smoking and ageing are linked with the possibility of having T2DM. The widespread urbanisation and the changes in lifestyles have contributed to the ever increasing rise of diabetes all over the world. Diabetes mellitus type 2 has been linked to several acute and chronic complications which adversely impact on the quality of life of patients. Chronic complications may be cardiovascular diseases, diabetic nephropathy, neuropathy, retinopathy and peripheral vascular diseases (Lewis et al., 2023). Diabetic patients are at increased risk for cardiovascular complications which are one of the

most common causes of death in diabetes. Other complications of poor glycaemic control include diabetic foot ulcers, infections, slow wound healing, which may cause disability and hospitalisation. So, early diagnosis, management and a good self management is crucial to prevent complications associated with diabetes.

To manage diabetes, one needs to take a multi-modality approach which includes medicine, regular monitoring, and nutritional management, in addition to exercise. Of these strategies, dietary management is particularly important in the prevention of complications and maintaining blood glucose levels (Evert et al., 2022). An active role by the patient and ongoing education on healthy lifestyle are also important to diabetes management. Healthcare professionals, especially nurses, are directly involved in diabetes management and patient education. Nurses help patients understand their treatment plans, how to take medications, and monitoring their blood sugar, as well as making dietary changes required for effective disease management (Lewis et al., 2023). Thus, proper nursing knowledge about diabetes management is crucial for effective diabetes care and better health outcomes.

Studies conducted in the past have identified issues with health care providers' knowledge of diabetes management. The study conducted by Farzaei et al. (2023) revealed that knowledge, attitudes and practices on nutritional management of diabetes mellitus were different among the nurses. Also, Elmahdy & Anwer (2024) found that lack of knowledge among the nurses regarding nutritional care management of diabetic patients. In addition, Hu and Jiang (2024) found that there were disparities between nursing professionals' understanding and competencies related to diabetes management in healthcare systems. There has also been a great concern about educational preparedness among the nursing students. According to Almutairi, Hosseinzadeh and Gopaldasani (2021), the nursing students showed their inadequate knowledge of diabetes care and patient education. Similarly, Malhi et al. (2025) had found that there was a lack of awareness regarding diabetes and its risk factors among undergraduate nursing students. These results suggest that the education strategies and clinical training programmes in diabetes care should be improved. Qualitative research also has been conducted about the experience and educational requirements of healthcare professionals and patients when managing diabetes. Diabetes self-management is considered to be the key to proper diabetes management, which necessitates education, family support and healthcare guidance (Tetteh, Saah and Amu, 2024). Kashani, Abazari and Haghani (2020) noted some problems with diabetes self-management education such as lack of educational support and insufficient healthcare support. Likewise, Yazdani et al., (2021) found obstacles to the success of the diabetes self-management education programmes. The rise in the prevalence of T2DM and its complications highlight the need to enhance the skills of healthcare workers in diabetes management and nutrition. The importance of undergraduate nursing education in preparing the next generation of nurses to meet the increasing diabetes care demand in health care is, therefore, highlighted.

2.2 Prevalence and Burden of Type-2 Diabetes Mellitus in Pakistan

The prevalence of Type-2 Diabetes Mellitus has exponentially increased in Pakistan, making it one of the most alarming public health issues of the country with associated complications. The number of people suffering from diabetes in Pakistan is today one of the highest in the world and the situation is worsening due to unhealthy lifestyle, urbanisation, obesity and lack of awareness about prevention and management of the disease among the public (International Diabetes Federation, 2023). Diabetes has become a huge burden in Pakistan, posing significant challenges to the health system and health workers. The World Health Organization (2023) states that diabetes is a major cause of morbidity, mortality and expenditure on health services in developing countries. Lack of healthcare access and poor health education in Pakistan leads to many people not being diagnosed or being diagnosed late. As a result, serious complications usually occur prior to timely

treatment and management. The increasing occurrence of T2DM in Pakistan is attributed to several reasons. The lifestyle changes have been brought about by the rapid urbanisation, such as the increase in processed food consumption, decrease in physical activity and sedentary activities. Obesity and overweight status are becoming a common problem in adults as well as younger population, which is to increase the risk of insulin resistance and development of diabetes (Ojo, 2021). Moreover, cultural diet habits with high carbohydrate and high sugar consumption are also responsible for poor glycaemic control and high prevalence of diabetes. Poor awareness of the diabetes prevention and healthy living among the public further
compounds the disease burden in Pakistan. There are many people who don't know what is good eating and good exercise and routine health surveillance. Thus, in many communities, diabetes prevention and intervention efforts are inadequate.
The cost of diabetes is also high. Diabetes treatment and diabetes care involves taking diabetes medications, checking blood glucose regularly, making medical appointments, and treating the complications of diabetes regularly. Patients with diabetes also tend to be more likely to incur high health care costs due to expensive medical treatment and hospitalisation for related complications like cardiovascular diseases, renal failure and neuropathy (Lewis et al., 2023).
Nurses have a significant role in combating the ever growing burden of diabetes in Pakistan, by educating, counselling and supporting patients in managing diabetes. Diabetic patients are seen regularly by nurses in hospital and community health care environments, and nurses often must educate them on healthy eating habits, taking of medications and lifestyle changes. Hence, the nursing student needs to have a good knowledge about the care of diabetic patients and nutrition counseling before entering into professional practice. But, a few studies have revealed gaps in diabetes related knowledge among nursing students and health care workers in Pakistan. Khan Farooq (2020) noted that there is a lack of understanding of nutrition education and diabetes management among nursing students. Likewise, Qadri et al. (2025) revealed that there was the lack of awareness among nursing students about the factors associated with diabetes in young adults in Pakistan. Limited diabetes-related knowledge was also observed among undergraduate nursing students by Malhi et al. (2025).
Several studies in Pakistan have also emphasized on the role of diet in the treatment of diabetes. Bano et al. (2017) found that food knowledge and behavior pattern among diabetic patients was poor, and this had a negative impact on glycaemic control. This study was conducted before the period of the study but shows the continuing concerns on nutritional awareness among the Pakistani population. The educational interventions have been shown to have a positive effect on diabetes related knowledge for university students, as well as for healthcare students. Awareness programmes were found to have enhanced knowledge, perception of risk and healthy practices of diabetes by university students by Alzaben et al (2023). Perez-Cornejo et al., (2021) also highlighted the need for nutrition education to enhance the knowledge of healthcare students about obesity and diabetes management.
It is the increasing burden of this diabetes in Pakistan that highlights the need for effective healthcare education programmes to enhance the competence of healthcare workers in the care and nutritional management of diabetes. Healthcare professionals are expected to be well equipped to meet the health care demands of a diabetic patient, and play a role in the prevention and management of diabetes, which is why it is crucial for nursing students to be prepared to do so.

2.3 Nutritional Management of Type-2 Diabetes Mellitus

One of the most important aspects of prevention and management of Type-2 Diabetes Mellitus is nutritional management. Dietary management is one of the important factors that helps control blood sugar levels, maintain healthy body weight and reduce the risk of complications associated with diabetes (Evert et al., 2022). Nutritional management also helps to optimize patients'

metabolic health and their quality of life in the management of diabetes. In people with T2DM, dietary changes are frequently advised as initial treatment. Balanced Carbohydrate intake, reducing intake of saturated fats and refined sugars, increasing fibre intake and appropriate portion control. Good nutrition plays a significant role in better glycaemic control and preventing obesity, hypertension and cardiovascular diseases that are normally associated with diabetes mellitus (Ojo, 2021). Medical nutrition therapy is evidence-based approach to treating blood glucose levels, and it helps to prevent long-term diabetes-related complications, per the American Diabetes Association (2024). Nutritional management is important, including individualised meal planning and dietary counselling as patients' dietary needs may differ by age, health status, physical activity and cultural factors. Nutrition interventions need to be carefully assessed and ongoing patient education. Nurses and other health care practitioners are integral to the management of nutrition and diabetes education. A nurse can provide dietary counselling, health education on healthy eating and encourage self-management practices needed for effective diabetes management (Lewis et al., 2023). Nurses also help patients to understand the significance of taking medications, exercise and monitoring their blood glucose levels and nutrition changes with the medication changes.

Although nutritional management is important, there are few studies that have investigated nutritional knowledge levels of nurses and nursing students and have reported poor nutritional knowledge. Farzaei et al, 2023, found out that nurses lacked nutritional management knowledge and practices of diabetes mellitus. In the same way, Elmahdy and Anwer (2024) reported that the nurses also lacked knowledge about the nutritional care management strategies for diabetic patients. Ang et al. (2025) also found that nurses' knowledge, attitudes and practices vary in nutrition management in the health care setting. Another educational concern is the level of educational preparedness of nursing students towards nutritional management. The study conducted by Almutairi, Hosseinzadeh and Gopaldasani (2021) revealed that nursing students lacked knowledge about diabetes care and nutritional counselling. Ahn et al. (2024) pointed out that diabetes education programs were essential in enhancing the skills of the nursing students in diabetes management and patient education. Likewise, Perez-Cornejo et al. (2021) highlighted the need to educate health students on nutrition to enhance knowledge on obesity and diabetes management. Educational and awareness programmes have been found to have a positive impact on the knowledge of the healthcare students about diabetes management. Alzaben et al. (2023) found that diabetes awareness programmes at universities led to better awareness and healthy practices related to diabetes among students. Targeted education intervention thus seems to be necessary to improve the knowledge of the nutritional management and healthy lifestyle counseling among nursing students. Qualitative research also has been conducted on factors that impact the successful management of nutrition and diabetes self-management education.

Kashani, Abazari and Haghani (2020) noted that several obstacles were encountered while implementing diabetes self-management education programmes such as lack of educational resources and lack of healthcare support. In the same vein, some obstacles that reduce diabetes education effectiveness were cited by Yazdani et al. (2021) such as patient lack of motivation, ineffective communication in healthcare and inadequate educational planning.Other factors that determine nutrition management and diabetes self-care practices are family support and healthcare guidance. A key factor in successful diabetes self-management is family engagement, as emphasized by Busebaia et al. (2023). Similarly, Tetteh, Saah and Amu (2024) highlighted that awareness and education of patients as well as support from caregivers can have a positive effect on diabetes self-management behaviors.

Nurse-led interventions have been shown to be effective in improving diabetes management outcomes. Dailah (2024) found that nurse-led interventions were effective in tackling the management of diabetes in patients through

helping to improve their education levels and self-care behaviours. Likewise, Niu et al. (2021) concluded that the NsLED web-based intervention proved effective in promoting diabetes self-management for T2DM patients. Sun et al. (2025) also found that nurse-led self-management education had positive outcomes on glycaemic control and diabetes-related outcomes. Considering the role of nutritional management in the control of diabetes, it is imperative that nursing students and health care personnel are well educated to deal with such demands. Essentially, when the nurse is knowledgeable about the diet and counselling of the person with diabetes, he or she can play a major part in improving the
self-management of diabetes, helping to keep patients from developing complications, and helping the person with diabetes become more comfortable and healthier.

2.4 Role of Nurses in Diabetes Care and Nutritional Counselling

Nurses are a key part of the management of Type-2 Diabetes Mellitus, being directly involved in patient care, health promotion, disease prevention and patient education. The management of diabetes is a continuous process that involves lifestyle changes and following diet and medication plans; thus, nurses are vital health care workers who can help patients throughout the process (Lewis et al., 2023). In the health care environment, the nurse has frequent contact with the diabetic client and may be required to guide him or her with the management of blood glucose, administration of medication, healthful diet and self-care. Nutritional counselling is one of the main work of the nurses in diabetes. Nutritional counselling includes teaching patients about balanced diet plans, carbohydrate control, portion control and healthy eating habits that are important for glycaemic control (Evert et al., 2022). Nurses help patients understand how food affects their blood sugar, allowing them to learn to make good food choices and lead healthier lives. Nutritional counselling can be a key to better adherence to treatment and lessen diabetes-related complications. The American Diabetes Association (2024) highlighted that diabetes self-management education and support is an integral part of diabetes treatment and must involve trained health care workers such as nurses. The nurse assists the patient to learn self-care skills
they need to have in order to manage the condition effectively. These skills include taking medications, checking blood glucose, eating a diet and avoiding complications, and exercise.

Effort has been made to highlight the competencies of nurses in managing diabetes and nutritional counselling, as revealed in several studies. According to Farzaei et al. (2023), the quality of diabetes care provided to patients is related to the knowledge, attitude and practices of nurses. Inadequate nutritional knowledge among nurses may have a negative impact on the outcomes of counselling and managing diseases, the study reported. Likewise, Elmahdy and Anwer (2024) found that the knowledge and practices of nurses regarding nutritional care management of diabetic patients in the clinical setting were deficient. There were also differences between the competencies of nurses in their skill to manage diabetes in healthcare institutions found by Hu and Jiang (2024). The study pointed out that the healthcare professionals who had better educational preparation were more aware of the diet counselling and diabetes care practices. Similarly, Kudoh, Shibayama and Hidaka (2022) revealed that knowledge and attitudes of nurses had a significant impact on diabetes-related oral management and practices for diabetes patient care. Individuals with diabetes are increasingly in need of nurse-led interventions to promote effective self-management behaviours and to improve diabetes outcomes. According to Dailah (2024), nurse-led interventions had a positive effect on the disease management of the diabetic patients by enhancing health education, adherence to treatment and self-care behaviours. Likewise, a study by Niu et al. (2021) showed that nurse-led Web-based interventions were effective in enhancing self-management among people with T2DM. Next, Sun et al. (2025) reported that nurse-led self-management education programs have been found to be effective in enhancing glycemic control and

health outcomes for people with diabetes.

The nurse also gives emotional and psychological support to diabetic patients. Chronic conditions such as diabetes can lead to stress, anxiety and emotional burden because of the ongoing management of the condition. Nurses provide support for dealing with these emotional issues and promote healthy behaviors that are important for longterm disease management (Young-Hyman et al., 2021). Diabetes education, therefore, is critical to high quality diabetes care and nutrition counseling among nurses. But, research studies have shown gaps in knowledge

about diabetes management among healthcare professionals. Ang et al. (2025) revealed that there was a difference in the diet understanding and practices of nurses among those who cared for adults admitted to hospital. The study suggested that ongoing professional development and education should be provided to enhance nurses' skills in nutritional counselling and chronic disease management. In nursing education, it is the duty of undergraduate nursing students to acquire adequate knowledge about diabetes care, both theoretically and practically, before they start their nursing profession. An educational session provided should cover diabetes pathophysiology, medication management and strategies to educate patients on nutrition. Clinical exposure and practical training is also important in enhancing the competencies of nursing students on diabetes management. A systematic review by Ahn et al. (2024) showed that diabetes education programmes had a significant effect on improving students' diabetes-related knowledge and diabetes related self-efficacy. Likewise, Perez-Cornejo et al. (2021) pointed to the benefits of nutrition education for students' knowledge of obesity and diabetes management in healthcare. The findings showed the significance of including the complete diabetes education and nutritional management content in nursing programs. The rising incidence of T2DM all over the world is a serious issue that requires a highly competent nurse who can deliver effective patient education and nutritional counselling. The role of nurses in providing proper understanding about diabetes care can be a significant contribution towards better glycaemic control, prevention of complications and improve quality of life among diabetic patients. So, it is vital to enhance nursing education and enhance students' understanding on the nutritional management, as it is a critical part of good diabetes care.

2.5 Knowledge of Undergraduate Nursing Students Regarding Diabetes Management

Undergraduate nursing students' knowledge about diabetes management is deemed to be important as they are future health care providers who are accountable for providing patient care and health education. Proper knowledge of diabetes management allows the nursing student to give proper counseling, encourage healthy lifestyle behaviors and help diabetic patients to control the disease. However, some studies have demonstrated a lack of knowledge of diabetes care, diabetes nutrition and patient education among nursing students. Theoretical knowledge

and clinical skills are also expected to be acquired by students during their undergraduate nursing education to enable them to manage chronic conditions like T2DM. The physiology of diabetes, insulin administration, nutrition and patient teaching are addressed to the nursing student in the classroom and as a part of their nursing education. However, the impact of the educational programmes can vary from one programme to another depending on the curriculum content, the way the programme is delivered and the exposure to clinical contexts and the availability of educational resources. Almutairi, Hosseinzadeh and Gopaldasani (2021) examined the knowledge level of nursing students about diabetes care and concluded that they lack knowledge about diabetes management and patient counselling. This study highlighted the need for enhancing educational programs about diabetes in nursing curricula to enhance their competencies in managing chronic diseases. Likewise, Malhi et al. (2025) found that the awareness of diabetes and diabetes risk factors among undergraduate nursing students was found to be inadequate.

Similarly, Qadri et al. (2025) found gaps in the knowledge of the nursing students about factors

associated with early onset diabetes among youth in Pakistan. As a result, the researcher is convinced that there is a need for more educational assistance and training on DM and nutrition counselling for under graduate nursing students. Educational interventions have been shown to have a positive impact on the understanding of students in nursing about diabetes care in research studies. Ahn et al. (2024) reported that diabetes education programmes significantly
improved nursing students' knowledge, attitudes and confidence related to diabetes management. Educational workshops, seminars and awareness programmes thus become very important to improve the competencies and readiness of nursing students to the clinical work they are expected to undertake. Perez-Cornejo et al. (2021) noted that nutrition education is an effective intervention to enhance students' knowledge about obesity and diabetes management in healthcare students. Likewise, Alzaben et al. (2023) observed that diabetes awareness programmes were effective in enhancing diabetes-related knowledge, risk perception and healthy practices among university students. The results from this study suggest that the use of structured education programs can improve the knowledge of nursing students about nutrition management and the care of chronic diseases.

Poor education knowledge can have a detrimental impact on patient education and healthcare quality in nursing students. Nurses often need to deliver dietary counselling and education on self-management to diabetic patients, and inadequate knowledge of nutrition management can impact the effectiveness of patients' counselling and disease management outcomes. It is evident that nurses should prepare themselves for continuous education in order to overcome the deficiencies identified by Farzaei et al. (2023) in their knowledge and practices in the nutritional management of diabetes mellitus. Another critical influence on the understanding of nursing students on diabetes management is clinical exposure. Through practice, students gain experience of learning in hospital and community healthcare environments, and are able to use their theoretical knowledge in real clinical scenarios, developing communication and counselling skills to facilitate educating patients. But, inadequate clinical experience and practical training sessions can have a detrimental impact on students' skills in diabetes care.

Interprofessional Diabetes Education (IDE) was found to enhance health-care students' knowledge and learning experiences about diabetes management (Račić et al., 2017). While the study was conducted prior to the selected time period, it emphasizes the need for interdisciplinary education strategies to enhance students' abilities to manage chronic diseases.

Studies also suggest that the attitude and perception of the students affect the learning outcomes of diabetes management. Lee et al. (2023) found that self-efficacy and attitudes of healthcare professionals had significant impacts on diabetes education and management practices. Positive attitudes towards diabetes care can then be a positive influence on the motivation of students to learn and practice the principles of diabetes management nutrition during clinical practice. In Pakistan, little qualitative research has been done on the experiences and perceptions of undergraduate nursing students about nutritional management of T2DM. The majority of the studies available have emphasized only quantitative measurement of the levels of knowledge but have not examined, in depth, students' educational difficulties and experiences. Qualitative exploration therefore might be helpful in gaining insight into factors that affect diabetes knowledge and readiness of nursing students. It is especially important to enhance nursing education programs and train students to have better skills in the management of chronic diseases, because diabetes is a growing burden. Students who have a good understanding and
confidence in diabetes nutritional management could play a significant role in the improvement of patient education, encouraging healthy lifestyle behaviours and optimizing health outcomes for diabetic patients.

2.6 Educational Interventions and Diabetes Awareness Programmes

To enhance the knowledge, attitudes and practices on diabetes management among healthcare professionals, nursing students and general population, educational intervention and diabetes awareness programmes are very important. Effective educational programmes provide information to the individual to help them prevent the disease, nutrition management, behaviors of self-care, and lifestyle modifications that are necessary to manage Type-2 Diabetes Mellitus. Education for health care workers is viewed as a key part of diabetes care as diabetes is a chronic condition that requires ongoing self-management and patient engagement. However, it is essential for patients to understand the role of good diet, exercise, medication and regular monitoring in the management of glycaemic control (American Diabetes Association, 2024).

Thus, healthcare professionals, particularly nurses, should be well-trained to deliver proper education and counselling to the diabetic patients. There have been several studies that have documented the benefits of educational interventions for diabetes-related knowledge and self-management practices. A systematic review by Ahn et al. (2024) reviewed diabetes education programmes for nursing students and found a significant improvement in the knowledge, confidence, and self-efficacy of the students in managing diabetes. Based on the study it was concluded that structured educational interventions positively affect students' readiness for the clinical practice and patient education tasks.

Likewise, Perez-Cornejo et al. (2021) found that nutrition education programs had a positive impact on the knowledge of healthcare students about issues of obesity and diabetes management. Such educational efforts that target healthy eating and chronic disease prevention can thus improve students' skill sets in diabetes care and nutritional counselling.

University students have also been the focus of diabetes awareness programmes, showing positive effects. The study by Alzaben et al. (2023) revealed that diabetes awareness programmes had a significant impact on enhancing the knowledge, healthy lifestyle and risk perception of university students. Participants were provided educational sessions to educate them on the importance of maintaining a healthy lifestyle through proper nutrition, exercise, and prevention of diseases. There is a need for educational interventions to enhance HCPs knowledge, skills, and attitudes related to diabetes management as well. Farzaei et al. (2023) emphasized an ongoing education for nurses for better knowledge and practices in NMDM. Similarly, Ang et al. (2025) suggested educational and professional development programs to enhance nurses' knowledge about nutrition management in health care facilities.

Interprofessional education is also known to enhance the understanding of students from Healthcare professions about diabetes care. Račić et al. (2017) reported that interprofessional diabetes education taught knowledge among medical, dental and nursing students by creating a collaboration learning. The study is not from the selected reference period, but illustrates the importance of interprofessional learning and working in chronic disease management.

The use of technology to deliver diabetes education is gaining momentum. Niu et al. (2021) found that nurse-led web based interventions were effective in enhancing diabetes self-management behaviours in patients with T2DM. Online educational platforms and digital learning resources can, therefore, contribute to patients' and health care students' understanding of diabetes and diabetes self-care. Educational interventions also led by nurses have had positive impacts on diabetes maintenance outcomes. The study by Dailah (2024) showed that nurse-led interventions resulted in better patient education, adherence to treatment and management of diabetes among patients with the disease. Likewise, Sun et al. (2025) found that nurse-led self-management education programmes resulted in significant improvements in glycaemic control and self-care practices among people with T2DM. Although there is evidence that educational interventions are beneficial, there are also some barriers that may impact their effectiveness. The factors that negatively impact diabetes self-management education programmes were identified as lack of educational planning, lack of

resources, and lack of healthcare support by Kashani, Abazari and Haghani (2020). Likewise, Yazdani et al. (2021) found that a lack of motivation, communication barriers, and inadequate educational strategies hindered the effectiveness of diabetes educational interventions.

Educational interventions could be part of the training within nursing education programmes, such as lectures, workshops, seminars, simulation training, and diabetes care-related clinical training. The use of these strategies can help increase students' knowledge about nutritional management and about patient communication and chronic disease management. The practical experiences and clinical exposure are also significant since the students get to experience the theoretical lessons in real healthcare environments. There is limited qualitative evidence available in Pakistan about effectiveness of diabetes education programme among undergraduate students of nursing. But with the rising rate of diabetes, it is important to further reinforce the educational strategies and diabetes awareness programmes in nursing institutions. Better diabetes education could help to improve the nutrition counseling skills of nursing students, as well as education in patient care and in general, lead to improved health care for people with diabetes.

2.7 Challenges and Barriers Affecting Nutritional Management Education

It is important to educate the patients with Type-2 Diabetes Mellitus about the importance of effective nutritional management which would help in managing diabetes and healthy lifestyles behaviours. Despite this, there are some challenges and barriers that influence the provision and comprehension of nutritional management skills training for nursing students, health care professionals and diabetic patients. These barriers can have a negative impact on the effectiveness of patient education, self-management and health outcomes. Poor nutritional management education is one of the important issues around nutrition which the health care professional and nursing students lack knowledge about diabetes care and dietary counselling. Farzaei et al. (2023) reported that the knowledge, attitudes and practices of the nurses regarding the nutritional management of diabetes mellitus were inadequate. Poor awareness about diet management hindered nurses' nutritional counseling and patient education, the study noted.

Likewise, Elmahdy and Anwer (2024) noted that the knowledge and practices of the nurses regarding nutritional care management for the diabetic patients were low.

Diabetes management educational challenges may also occur in the undergraduate level of nursing where there may be a lack of curriculum content, not enough clinical experiences, and not enough hands-on training. Almutairi et al. (2021) found a lack of knowledge about diabetes care and diabetes nutrition counselling among nursing students. Similarly, Malhi et al. (2025) reported low level of awareness among the undergraduate nursing students about diabetes and

associated risk factors. This leads to the conclusion that there is a need to boost educational strategies in nursing institutions and to improve training programmes. Another significant obstacle that impacts nursing students' knowledge about nutritional management is limited clinical exposure. Through hands-on experiences, students get a chance to put theory into practice and learn how to communicate with patients and build their confidence in counselling them. But, lack of clinical experience can have adverse impacts on students' readiness to care for a diabetic patient in a healthcare environment. Students in nursing with no clinical experience with diabetes may show a lack of confidence and competence in nutrition counselling and patient education.

The learning environment and instructional approaches also affect students' learning outcomes for diabetes management. Poor access to current learning materials, lack of application of evidence-based teaching strategies, and lack of nutrition management content in the nursing program may have an impact on students' knowledge of diabetes. Ahn et al. (2024) emphasized the need for organized educational programs and diabetes education programs to enhance the skills of nursing students in diabetes management.

Nutritional management education may be further

impacted by communication barriers. Good diabetes education stems from good communication between health care provider and patient. Nurses are expected to adhere to the principle of "cultural competence" when communicating information about nutrition and self-management with patients that provides for an understanding of the information in a way that is comprehendible to patients' educational and cultural levels. On the other hand, some barriers like communication difficulty and language barriers, as well as limited patient literacy, can decrease the effectiveness of diabetes education programmes and nutritional counselling (Yazdani et al., 2021).

Nutrition management practices and diabetes education may also be affected by cultural and social factors. Patients may find it difficult to make the dietary changes recommended by a health care provider in some cultures and communities because of traditional food and eating patterns or preferences. Ojo (2021) highlighted that poor adherence to dietary recommendations and poor dietary practices are major factors involved in poor glycaemic control and diabetes-related complications. Healthcare professionals are thus required to be culturally competent and have communication skills to deliver patient-centred nutritional counselling.

Another challenge in the nutritional management education is lack of motivation of the patients and healthcare students. Emotional stress, financial constraints or limited support within the family may make it difficult for some patients to have healthy eating habits. Likewise, if educational programme is not engaging and practical, nursing students can show low interest in CDM. The lack of educational planning and insufficient engagement with patients were highlighted as key challenges to diabetes self-management education by Kashani, Abazari and Haghani (2020). The management and adherence to diabetes diet recommendations are influenced by family and social factors. According to Busebaia et al. (2023), the more involved the family is in the treatment adherence and diabetes self-management behaviours, the better. However, a lack of support from family can limit patients' capacity to adopt healthy nutrition and healthy life changes. Thus, whenever feasible, healthcare providers must take family members into consideration when conducting diabetes education. Limited access to the health care system can also impact on nutritional management education. Nurses in many health facilities often have heavy workloads, lack staff, lack time and cannot provide education or counselling to patients.

Though nurse-led interventions have proven to be effective, Dailah (2024) noted that there are organizational challenges that limit healthcare professionals to delivering comprehensive diabetes education.

Other nutritional management problems related to economic factors also exist. Financial constraints in buying nutritious food or obtaining health care services may be a problem for many diabetic patients. Economic constraints can thus influence compliance with recommended dietary habits and have adverse consequences on the outcomes of diabetes. The socioeconomic factors of the patient should be taken into account when providing nutritional counseling and setting up a realistic dietary plan for the patient. There is a limited number of studies in Pakistan which has focused on the educational issues of undergraduate nursing students about nutritional management of T2DM. But the evidence available indicates that there is a need for enhancement of the skills of students in nursing care programmes within the competence area of diabetes care and counselling in relation to their skills. These barriers can be overcome through educational workshops, simulation based learning, clinical training and curriculum development, which could help enhance and develop the understanding of nursing students about nutritional management. To improve the outcomes of healthcare delivery for diabetic patients, the barriers to nutritional management education need to be addressed. Well trained nursing students and health workers with good knowledge and practice can be more effective in educating patients, promote healthy lifestyle behaviours and help to improve diabetes self-management practices.

2.8 Review of Previous Qualitative Studies and Research Gap

Qualitative research is a significant way to understand the experiences, perceptions and understanding of individuals about the health and disease management situation. In relation to Type-2 Diabetes Mellitus, qualitative research has offered a wealth of information on patient experiences, healthcare professionals' opinions and educational difficulties regarding diabetes management and nutritional counselling. Qualitative research can provide a more in-depth view of the experiences and perspectives of participants, which can lead to a better understanding of the phenomena of healthcare (Creswell and Poth, 2023).

There have been a few qualitative studies that have examined the experiences of patient education and diabetes self-management. Tetteh, Saah and Amu (2024) carried out a qualitative study on the educational needs and diabetes self-management practices of diabetic patients and caregivers. The literature revealed the significance of healthcare education, family support and good communication in the development of successful diabetes self-management behaviours.

The problems experienced by participants in terms of diet were mentioned as problems, financial restrictions and lack of health services which are negatively affecting the disease were mentioned. Likewise, Kashani, Abazari and Haghani (2020) studied the barriers to implementing diabetes self-management education programmes in Iran. A lack of educational planning, patient motivation, and healthcare support and communication between providers and patients were some of the barriers identified in the study. The researchers highlighted the need to enhance the approach to diabetes education and healthcare support systems to enhance diabetes self-management education. Yazdani et al. (2021) also performed a qualitative content analysis to explore the barriers to the effectiveness of diabetes self-management education. The study found that poor patient engagement, inadequate Communication within Healthcare and inadequate education resources were negatively impacting diabetes education outcomes. The participants also emphasized the importance of patient-centered education and better communication in healthcare for better self-management practices.

Qualitative research has also examined health workers' experiences and skills in dealing with diabetes management. Farzaei et al. (2023) conducted a study on the knowledge, attitudes and practices of nurses about the nutritional management of diabetes mellitus to find educational gaps in the nutritional counselling practices of nurses. The results indicated there is a need for ongoing educational interventions and professional development for nurses to enhance their competence in caring for diabetes. Research which has targeted diabetes education preparation in the healthcare students has also underscored this point. It was also found that nursing students were lacking in knowledge about diabetes care (Almutairi, Hosseinzadeh and Gopaldasani, 2021) and thus urged the enhancement of educational programs on chronic care. In addition, Ahn et al. (2024) showed that diabetes education programmes are effective in the development of knowledge, confidence, and readiness of nursing students for clinical practice.

Previous literature has discussed the effectiveness of educational interventions and awareness programs to enhance diabetes-related knowledge and SMBs. Alzaben et al (2023) reported that, the awareness program about diabetes had positive effect on the knowledge and healthy lifestyle among students of university. Perez-Cornejo et al. (2021) also pointed out the effectiveness of nutrition education in increasing knowledge among healthcare students about obesity and diabetes.

Literature reviews of diabetes management and nutritional education by health care providers and students have been conducted, but there are gaps in the literature. Firstly, many studies have adopted quantitative research designs based on level of knowledge measured but failed to explore in depth students' experiences, perceptions and educational challenges. The quantitative studies can provide statistical data related to knowledge and attitudes, but may not be sufficient to fully explain the factors that influence students' understanding of nutrition management.

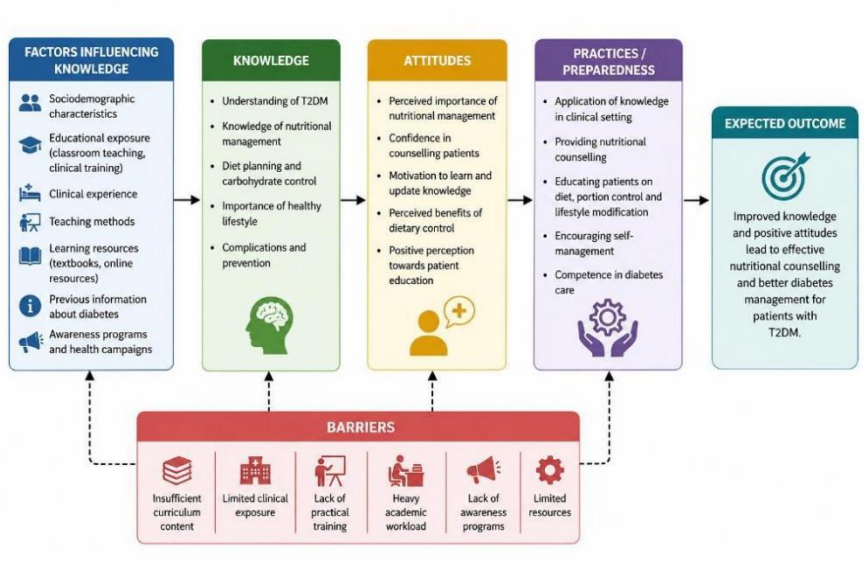
Secondly, there is a lack of qualitative study which has specifically investigated the knowledge among university students regarding nutritional management of Type-2 Diabetes Mellitus in Pakistan. The majority of the studies available have been conducted either on diabetes awareness or diabetes competence of healthcare professionals without considering the lived experiences and perceptions of nursing students in relation to nutritional counselling and diabetes education.

Thirdly, limited clinical experiences and training opportunities, low content on disease knowledge in the curriculum and lack of practical training, are some of the reported educational barriers that could impact nursing students' competencies on diabetes care. But, qualitative evidence is limited and few studies explore the effect of these on the understanding of nutritional management of T2DM among undergraduate nursing students in Pakistan.

In addition, the cultural, social and institutional aspects that affect diabetes education have not been sufficiently investigated among the nursing students in Pakistan. It is crucial to have this understanding as cultural beliefs, healthcare systems and educational environments can differ in education and counselling. The present study thus set out to fill some of the above gaps by undertaking a qualitative study of the knowledge of undergraduate nursing students on the nutritional management of Type-2 Diabetes Mellitus. The study aims to deepen the understanding of the perceptions, education and challenges of the nursing students, through a qualitative approach to inquiry, of diabetes nutritional management. The results can be used to bolster nursing education programs, improve clinical training and the quality of patient care in Pakistan.

2.9 Conceptual Framework

The use of the Knowledge–Attitude–Practice (KAP) model in this study is based on the concept that various educational and personal factors contribute to the knowledge of the nutritional management of Type-2 Diabetes Mellitus (T2DM) among undergraduate nursing students. The framework includes the following sociodemographic characteristics, educational exposure, clinical experience, teaching methods, learning resources and previously acquired information as factors that are important for students to develop their knowledge about the nutritional management of diabetes. This knowledge has an impact on the attitude of students such as their perception about importance of nutritional management, confidence in counselling diabetic patients, and motivation to improve their understanding of diabetic care. Positive attitudes also help to promote good practice and preparedness, such as the use of knowledge in clinical practices, giving nutritional advice and educating patients about ways to promote health through lifestyle changes and self-management. The framework also highlights a number of challenges including the lack of curriculum content, limited clinical exposure, lack of practical training, heavy academic burden and limited educational resources that may have a negative impact on the student's acquisition of knowledge and skills during the practical phase. In summary, the framework showed that better education and positive attitude may lead to better performance of nursing students in providing nutritional management and diabetes treatment service in patients with T2DM.



Chapter 3: Research Methodology

3.1 Research Design

This study was involve the use of a qualitative exploratory research design to explore the knowledge of undergraduate nursing students about nutrition management of Type-2 Diabetes Mellitus (T2DM). As it is a qualitative approach, it is appropriate to gain in-depth understanding of participants' perceptions, experiences and understanding of nutritional management and diabetes care (Creswell and Poth, 2023).

3.2 Study Setting

The study was carried at the Department of Nursing, Peace Institute of Nursing and Health Sciences, affiliated with Dow University of Health Sciences. The setting is chosen as the undergraduate nursing students have theoretical and clinical education on management of diabetes and patient care.

3.3 Study Population

The study were on undergraduate nursing students who study in the bachelor level of nursing study of Dow University of Health Sciences

3.4 Sampling Technique

Participants were selected using purposive sampling technique which affords the opportunity to obtain relevant and detailed information on the topic of study. In qualitative research, often the purpose is to select participants, in the sense of purposive sampling, who are of suitable knowledge and experience with the research phenomenon.

3.5 Sample Size

Data saturation was used to determine the sample size. Approximately 20 – 30 undergraduate nursing students were included in the study. Data collection were ongoing until saturation
has been achieved, which is when further themes and information does not arise from the participants' responses.

3.6 Inclusion Criteria

- Students of a four-year nursing course, studying in the undergraduate level.
- Students who are willing to participate in the study.
- Students who have had clinical experience with medical-surgical or diabetes clinical care.

3.7 Exclusion Criteria

- Nurses with a refusal of the study.
- Students missing during the data collection period.
- New students who have not had clinical

experiences in diabetes care.

3.8 Data Collection Tool

The data were gathered by applying semi-structured interview guide that the researcher developed based on the literature study and the research objective. By the end of the interview, the interview guide will have open-ended questions about students' knowledge, perceptions and experiences of nutritional management of Type-2 Diabetes Mellitus.

3.9 Data Collection Procedure

With the approval of the ethical committee and the institutions, participants were approached and told about the purpose of the study. Prior to data collection, written informed consent were obtained. Personal interview in a calm and safe space in institution were done individually.

The duration of each interview were about 20-30 minutes. With participants' permission, interviews were audio-recorded to ensure accurate data collection. Field notes will also be kept in the interview process.

3.10 Data Analysis

Thematic analysis as described by Braun and Clarke (2022) were used to analyse the collected data. Interviews were verbatim transcribed and the researcher will reread the transcripts to look for important patterns and themes. The responses were categorized and themed based on the experiences and perceptions of the participants on nutritional management of T2DM.

3.11 Ethical Considerations

Ethical approval from the relevant ethical review committee were sought before carrying out the study. Participants were explained about the purpose of the research, that information were confidential and that they have the right to withdraw at any time from the research without penalty. All participants will have been provided with informed consent prior to interviews. All participants were anonymous and personal information were kept confidential.

Chapter 4: Results / Findings

4.1 Introduction

The findings of the study undertaken to explore the knowledge of undergraduate nursing students on nutritional management of Type-2 Diabetes Mellitus (T2DM) has been presented in this chapter. The data were obtained by interviewing the undergraduate nursing students of the Department of Nursing, Peace College of Nursing and Allied Health Sciences, affiliated with Dow University of Health Sciences using semi-structured interviews. The interviews gave detailed information about the understanding, perception, education and challenges of participants in the nutrition management of T2DM. Data collected were analysed by thematic analysis. Following numerous review cycles of the interviews and coding of the transcripts, there were several themes and subthemes that arose from the responses given by the participants. The results are reported by the themes and with direct quotations from participants to further explain and validate the results.

4.2 Demographic Characteristics of Participants

The total number of students involved in the study were 25 undergraduate nursing students. Participants were from varying grades and had clinical experience with medical/surgical nursing and diabetes care. The majority of those who participated were female students, which is typical of the gender distribution in the nursing programmes.

Table 4.1 Demographic Characteristics of Participants

Participant Code	Age	Gender	Academic Year	Clinical Exposure
P1	20	Female	2nd Year	Yes
P2	21	Female	3rd Year	Yes

P3	22	Male	4th Year		Yes
P4	20	Female	2nd Year		Yes
P6	23	Male	4th Year	Yes	
P7	20	Female	2nd Year	Yes	
P8	22	Female	4th Year	Yes	
P9	21	Female	3rd Year	Yes	
P10	22	Male	4th Year	Yes	
P11	20	Female	2nd Year	Yes	
P12	21	Female	3rd Year	Yes	
P13	23	Male	4th Year	Yes	
P14	22	Female	4th Year	Yes	
P15	20	Female	2nd Year	Yes	
P16	21	Female	3rd Year	Yes	
P17	22	Male	4th Year	Yes	
P18	21	Female	3rd Year	Yes	
P19	20	Female	2nd Year	Yes	
P20	23	Male	4th Year	Yes	
P21	22	Female	4th Year	Yes	
P22	21	Female	3rd Year	Yes	
P23	20	Female	2nd Year	Yes	
P24	22	Male	4th Year	Yes	
P25	21	Female	3rd Year	Yes	
P5	21	Female	3rd Year		Yes

The age of the participants were between 20 and 23. Most respondents indicated that they had learned how to manage diabetes in their medical-surgical nursing classes and they had seen diabetes care in the clinical setting. But there was a wide gap between the confidence and practical knowledge of the participants in providing nutritional counselling.

4.3 Emerging Themes and Subthemes

Thematic analysis of the interview transcriptions led to the emergence of the six main themes in participants' responses to the study's questions about their knowledge, perceptions and experiences in relation to the nutritional management of Type-2 Diabetes Mellitus.

Theme 1: Knowledge about Type-2 Diabetes Mellitus

All participants showed general knowledge about Type-2 Diabetes Mellitus and explained that it was a disease that is long-term and linked to high blood glucose levels. The majority of participants reported that the disease is due to the body failing to use insulin properly or to producing not enough insulin.

One participant stated:

"Type-2 diabetes is a disease in which the blood sugar levels in the body become elevated due to the lack of insulin activity." (P4)

Another participant explained:

"Diabetes is a condition in which the body cannot control the amount of sugar in its blood, and must be managed throughout life." **(P13)**

The participants recognized unhealthy eating patterns, overweight and obesity, family history and physical inactivity as the most common risk factors for T2DM.

"The chances of getting diabetes are higher if people do not have good eating habits, are overweight, and do not exercise."(P11)

"Diabetics are more likely to be those who consume poor foods and do not engage in physical activity." (P2)

Others also identified stress and sedentary lifestyle as factors.

"Diabetes is also caused by stress, and the modern sedentary lifestyle." (P18)

Participants showed an understanding of the problems of poor blood sugar control. Participants talked about kidney disease, cardiovascular diseases, hypertension and visual impairment.

"Diabetes can make eyes and kidneys go bad if not properly managed."(P6)

"Diabetes can cause heart disease and nerve damage if it is not under control." (P20)

Participants had a good grasp of the basic knowledge of T2DM, but there was some confusion about the specifics of the disease process and long-term care.

"We know the fundamentals, but sometimes it can be hard to get the details of diabetic management." (P9)

The results showed that there was a general awareness of T2DM among the participants, but there were areas for improvement in their knowledge of the disease and nutritional care.

Theme 2: Knowledge about Nutritional Management

Nutritional management was always mentioned by participants as one of the key elements in diabetes care. The majority of participants felt that good eating habits are key to keeping blood glucose levels under control and avoiding T2DM-related complications.

One participant stated:

"One of the most important components of diabetes management is diet control." (P7)

Another participant mentioned:

"Diabetic patients can better manage their blood sugar levels and stay healthy with a healthy diet." (P14)

It was often acknowledged that participants need to consume less sugar and avoid unhealthy foods like sweets, soft drinks and fast food.

"Sugar, carbonated drinks should be avoided by diabetic patients." (P22)

"Diabetic patients should have less of the fast food and oily food." (P5)

Balanced diet and portion control were also mentioned by many participants as important in the

management of diabetes.

"Patients should eat their meals in "balanced portions" rather than too much." (P17)

"Overconsuming carbohydrates raises blood-sugar levels which is why planning meals is important." (P1) Participants appreciate the importance of fibrous food, fruits and vegetables to diabetic patients.

"Patients with diabetes should eat vegetables and fibre-rich foods." (P16)

Participants also highlighted the importance of regular meal schedules and fluids with diabetes management.

"Avoid eating meals at irregular times, or ingesting too much fluid." (P10)

The other key topic discussed was lifestyle modification. Participants felt that having a healthy diet should go hand in hand with exercise and weight management.

"Combined, exercise and healthy eating are more effective for improving the control of diabetes." (P20)

"Diabetic patients should walk and be healthy weight." (P12)

Although the general knowledge about nutritional management was high, a few participants reported low confidence in providing detailed nutritional counselling and meal planning.

"Basic diet instructions are known, but sometimes detailed counselling is difficult." (P23) "More training is needed to be a practical nutritional counsellor." (P8)

The results indicated that the participants had limited knowledge of dietary counselling, but they had fundamental knowledge about the nutritional management.

Theme 3: Attitudes Towards the Role of Nurses in Diabetes Care

The importance of nurses role in diabetes management and patient education was strongly felt by the participants. The majority of the participants felt that nurses were responsible for educating the diabetic patients about dietary management and taking their medications and making lifestyle changes.

One participant stated:

"Diabetic diet and a healthy lifestyle are explained to the patients by nurses." Another participant explained:

"With more time spent with patients, nurses should educate them well." (P3)

Patients' education was emphasized as a key factor for reducing diabetes complications and enhancing the patient's management.

"It was suggested that patient education is required since many patients are not aware of proper management of diabetes." (P15)

"Education of patients about food choices can be helpful for their health." (P11)

Some of the participants thought that nurses should give emotional support and motivation as well as dietary counseling.

"Nurses need to promote patients to adhere with healthy diets and treatment regimens." (P24)

"Patients have to be motivated and supported to keep up with lifestyle changes." (P6)

Participants were aware of the significance of the role of the nurse in diabetes management but noted that some were not very confident about their practical counselling skills.

"While there are theoretical aspects, sometimes practising it is difficult in counselling." (P21)

"There is a need for greater confidence in discussing dietary plans with patients." (P18)

The participants also proposed that the training of communication skills would enhance the effectiveness of the nutritional counselling of nurses.

"It would be advantageous to enhance communication and counselling skills during nursing training." (P4)

The results show that participants were aware of the role of nurses in the care and management of diabetes and there was a need for practice in regards to nutritional counselling, but there was also a need for confidence.

Theme 4: Educational Experiences and Learning Sources

The participants shared their experiences and sources of learning that helped them to develop understanding about the nutritional management

of Type-2 Diabetes Mellitus. The majority of the participants reported that theoretical knowledge about diabetes management was obtained mainly from classroom lectures and medical-surgical nursing courses.

One participant stated:

"Most of the information that we know about diabetes is learned in lectures or classroom." (P3)

Another participant mentioned:

"Medical-surgical nursing classes helped us to learn about diabetes and nutritional management." (P12)

The participants described that the theoretical classes gave them basic knowledge about diabetes pathophysiology, food management, and diabetes complications of uncontrolled blood glucose.

"Diabetic diet, insulin management and diabetic complications are explained by teachers in lectures." (P7)

"In the theory lesson I learnt about the control of carbohydrates and a healthy diet (P15)."

As well as classroom learning, participants felt clinical exposure was also a significant learning experience to them. Students stated that during the clinical rotations, they had seen the care of diabetic patients, which helped them in their practical understanding of the disease management and counselling the patients.

"Diabetic patients' management in hospitals was known to us due to the clinical rotations." (P18)

"During clinical practice, it was very beneficial to see diabetic patients, and it helped us in our learning." (P9)

Among the participants, some explained that it made them more aware of patient education and lifestyle modification when dealing with diabetic patients.

"In clinical practice, we noticed nurses giving patients information on diet and exercise." (P21)"

"It helped us understand something about how patients interact, which led to an improvement in our understanding of the diabetes management process." (P4)

Participants identified practical opportunities for nutritional counselling, but despite the advantages of clinical exposure, some did not feel these were a strong area.

"I see patients but I don't get to give them a lot of information about food much." (P10)

"There is a need for "clinical learning" related to nutrition management to be improved."(P16)

They also shared their experiences with workshops, seminars and awareness programmes. The post-diabetes awareness programmes, received by some students, were perceived by them to be beneficial in enhancing their awareness and knowledge about nutrition management and patient counselling.

"Diabetes awareness seminars made us realize about prevention of diabetes and healthy lifestyle practices." (P25)

"Workshops enhance our confidence and practical knowledge in managing diabetes." (P14)

But, many participants indicated that such educational activities were not held on a regular basis.

"There should be more workshops organized for nursing students on diabetes." (P1) "Knowing more about nutritional counselling would help us to be better practitioners" (P22).

Other important sources of information were online learning resources for several participants. Students stated that they utilized online articles, video clips and social media platforms as resources to enhance their understanding of diabetes management and healthy eating habits.

"We use online resources and videos to learn more about diabetic diet management." (P5)

"Social media and internet resources are helpful resources for keeping up to date with what I know." (P11)

Some participants think that online educational platforms are accessible to the latest information and guidelines about diabetes care.

"It is beneficial to use online learning since the latest information on diabetes can be easily accessed." (P19)

Regardless of these learning opportunities, participants mentioned a need for more formal educational courses and hands-on training exercises in the area of nutritional counseling and diabetes management.

"More practical examples of how to plan a diabetic meal." (P8)

"There is a need to emphasize more on patient

counselling skills in educational activities." (P20)
The results show that participants considered classroom teaching and clinical exposure as the most important sources of learning however they felt that there was a lack of practical nutritional counselling training and educational activities in diabetes management.

Theme 5: Challenges and Barriers
Participants pointed out some challenges and barriers related to their understanding of nutrition management of Type-2 Diabetes Mellitus. Limited practical exposure of nutritional counselling and diabetes education was one of the common barriers that were discussed. Many of the participants described a gap between theoretical information on diabetes management and then seeing it in practice; the practical counselling and patient interaction was still inadequate.
"Theory knowledge about diabetes is taught but there is less counselling opportunities about diabetes in practice." (P6)
"Practical application of nutritional counselling is not emphasized as much in clinical rotations."(P17)
Some participants noted that they did not feel confident in educating the patients about meal planning and diet management issues due to lack of practical experience.
"The need of the hour is to sometimes feel hesitant in explaining diabetic diet plans to patients." (P23)
"There is a need to be more confident and trained for the practical part of counselling. (P2)"
A lack of detailed education on the issue of nutrition management in the nursing curriculum was another challenge that was identified by participants. Participants felt that diabetes nutrition was covered superficially in the lectures without full explanation and implementation.
"There is not enough detailed teaching regarding diabetic meal planning." (P21)
"More comprehensive information on nutrition and lifestyle management is needed." (P13)
Participants also reported heavy academic work as a difficulty. Students commented that self-learning and deeper understanding about nutritional management of diabetes was limited by assignments, examinations and clinical activities.
"Diabetic nutrition is difficult to concentrate on because of assignments and heavy workload" (P10).
"so we have a lot of subjects and not enough time to cover the details of nutrition management." (P5)
Lack of confidence was also talked about by several participants as a barrier to patient counselling and communication.
"Knowledge of theory is easy, but it is hard to confidently counsel patients." (P18) "We sometimes fear to do wrong advising on diet." (P24)
Some participants also mentioned the problems of communication barriers and patient's non-cooperation.
"Some patients do not take their diet correctly which can be difficult." (P4)
"Sometimes, it is not easy to explain diet plans to patients who are not educated." (P15)
Limited educational resources, lack of workshops, were also mentioned by participants to be affecting their learning experiences.
"There should be more educational materials and workshops for students of nursing." (P1)
"Learning were enhanced if practical demonstrations are provided in relation to nutrition for diabetics." (P22)
These results show that the participants had multiple educational and practical challenges that had an impact on their understanding of nutritional management of T2DM.

Theme 6: Ideas for Improvement
The participants gave several suggestions to enhance undergraduate nursing education about the nutrition management of Type-2 Diabetes Mellitus. The majority of the participants pointed out the need to enhance the practical training and improve clinical exposure in diabetes care.

One participant stated:
"It would be useful to have more practical sessions to enhance counselling skills." (P5)

Another participant explained:
"During clinical practice, students should be provided with opportunities to give nutritional counselling." (P16)
The participants thought that the hands-on learning

activities and simulations would help them gain confidence and knowledge about the dietary counselling.

"More practical examples of diabetic meal planning would benefit our learning." (P20)

"Practising counselling skills could be helpful for students through simulation activities." (P9)

Another large group of recommendations made by participants was for curriculum improvement. There was a consensus among many students that there is a need to include more content on nutrition management and diabetes education in the nursing curriculum.

"More detailed information on diabetic nutrition should be included in the curriculum." (P19) "It is recommended to have separate teaching sessions on nutritional management." (P3)

It was also suggested that the nursing education programmes should include current information and guidelines on diabetes care based on evidence.

"Regularly teach Updated information about diabetes management should be taught." (P14) "It is advisable to talk in lectures about recent recommendations on diabetic diet" (P7).

It was suggested by a few participants to conduct regular diabetes management forums, seminars and awareness creation sessions.

"Increased knowledge and confidence can be achieved through seminars and awareness programmes (P25)".

"There should be frequent patient counselling and diabetic nutrition related workshops." (P11)

Participants felt that interactive education activity is important to increase both theoretical knowledge and the ability of communication.

"Interactive workshops were helpful in gaining insight into patient education." (P22)

Increased clinical experience was also seen as a crucial factor in boosting the skills of nursing students in diabetes management.

"During clinical rotations, it is recommended that students should spend more time in diabetic wards." (P18)

"Students need to participate more in counselling patients, as this pertains to their clinical work." (P4)

There was also a recommendation for the involvement of dietitians and diabetes educators during clinical training by some participants.

"The dietitians' advice would help to increase their knowledge about meal planning."(P6)

"Students should "watch" diabetes educators conduct patient counseling." (P12)

The results show that the participants were very enthusiastic to see the improvements in practical training, curriculum development and educational activities on diabetes nutritional management.

4.4 Summary of Findings

The results of the study showed that the general knowledge of the undergraduate nursing students was found to be present about Type-2 Diabetes Mellitus and they had knowledge about importance of nutritional management in controlling blood glucose level and preventing the complication associated with Type-2 Diabetes Mellitus. Participants felt that the following factors were important in the care of diabetes: healthy diet, carbohydrate control, balanced meal planning, and lifestyle modification. The study also identified that the participants viewed nurses as key health care workers who were important in educating patients, dietary counselling, and promoting diabetes self-management. Major sources identified to be contributing to the knowledge of participants about diabetes management were classroom teaching, clinical exposure, and online learning materials.

Participants demonstrated simple knowledge but indicated there were multiple challenges that impact their understanding and preparedness for the management of nutrition with T2DM. Most frequent barriers reported were limited practical exposure, lack of detailed nutritional education and the complex load of academic work, combined with a lack of confidence in patient counselling. The participants suggested the strengthening of competencies of the nursing students with the introduction of a nutritional counselling module in nursing courses, more practical training, workshops, and improved clinical exposure to enhance their competencies in diabetes care.

Chapter 5: Discussion, Conclusion and Recommendations

5.1 Discussion

This study was undertaken to gain insight into the knowledge of undergraduate nursing students about nutritional management of Type-2 Diabetes Mellitus. The results indicated that participants had a general knowledge and awareness of diabetes and the significance of nutrition management for diabetes control and prevention of its complications. Participants noted that eating healthy, managing carbohydrates and having a well-balanced meal planning and physical activity are important parts of diabetes management. The findings are in line with the findings of Almutairi, Hosseinzadeh and Gopaldasani 2021 that indicated nursing students had basic knowledge about diabetes care and nutritional management, but needed more educational support to enhance their practical skills. The findings also revealed that the respondents identified the vital role of nurses in patient education and diabetes care. The respondents felt that nurses have a role in guiding the diabetic patients on healthy eating, taking medicine, changing lifestyle. Farzaei et al. (2023) reported similar results, emphasising the importance of the role of nurses in nutritional counselling and diabetes care. Similarly, Dailah (2024) highlighted that nurse-led interventions have positive effects on patients outcomes and diabetes self-management behaviors. The results of the present study thus validate the need for the enhancement of the competencies of the nurses with regard to nutritional counselling and patient education. The participants had a good theoretical knowledge about nutritional management but many lacked confidence in giving detailed dietary counselling to the diabetic patients. The participants described that lack of practical counselling during training was an issue, impacting their preparedness and communication skills. The results are similar to the findings of Elmahdy and Anwer (2024), that found that nurses have gaps in their practical knowledge and counselling skills in the management of nutrition care for diabetic patients. In a similar vein, Ang et al. (2025) found that there were inconsistencies between nurses' competencies on nutrition management and the need for ongoing educational training. The present study additionally found the primary sources of students learning about the management of diabetes were classroom lectures and clinical exposure. The participants agreed that medical-surgical nursing education courses and clinical rotations enhanced their theoretical understanding and awareness about the care of diabetic patients. But, students voiced grievances about the shortage of workshops, seminars and practical demonstration on nutritional counselling. These results are consistent with

those of Ahn et al. (2024) who found that the educational programs and diabetes awareness campaign had a significant effect on enhancing the knowledge and confidence of nursing students in managing diabetes.

A number of factors that impact the nursing student's understanding of nutrition management were revealed during the study. Limited practical exposure, lack of detailed nutritional education and heavy academic workload along with lack of counselling confidence were reported as major challenges. The same results were found by Kashani, Abazari and Haghani (2020) who identified lack of educational planning and lack of healthcare support as obstacles in the way of diabetes self-management education. Other researchers have also found that communication problems and lack of educational resources negatively impacted diabetes education effectiveness (Yazdani et al., 2021). The subjects of the present study suggested the need to improve nursing education by providing better hands on practice, education of the curriculum and increasing diabetes awareness programmes. Practical demonstrations, workshops and more participation in patient counselling were thought to help to enhance the confidence and competencies of students in relation to nutritional management. Perez-Cornejo et al. (2021) also found similar results, as they highlighted the need for nutrition education to enhance the knowledge of healthcare students on diabetes management and health promoting lifestyle habits. The overall results of the study showed that undergraduate nursing students

have basic knowledge on the nutritional management of Type-2 Diabetes Mellitus, but there is a need to be better equipped in counselling skills, basic knowledge and preparedness to deal with the clinical situation. It emphasizes the need for better education plans, better practical training methods and organized diabetes awareness programs to build up the skills of the nursing students related to diabetes nutritional management and diabetes patient education.

5.2 Conclusion

The study revealed that the undergraduate students of nursing had some knowledge of the general knowledge about Type-2 Diabetes Mellitus and knew the significance of the nutritional management in diabetes mellitus. Participants showed awareness about healthy dietary habits and the concept of controlling carbohydrates and lifestyle change as a key aspect of diabetes. It was also found that pupils had a positive view of nurses as healthcare workers who educate patients and provide them with nutritional advice. The study noted that there were certain gaps in students' preparedness in regard to nutritional management of T2DM which were educational and practical. The participants reported limited practical exposure, lack of detailed nutritional education and lack of confidence in patient counselling as major challenges. Thus, the study concludes that there is need for strengthening the competencies of nursing students to diabetes nutritional management and patient education through improvements in their nursing education, practical training and clinical learning opportunities.

5.3 Recommendations

- More detailed information on the nutrition management of Type-2 Diabetes Mellitus should be included in the nursing curriculum.
- There is a need to boost practical training sessions and simulation-based learning activities on nutrition counselling.
- Nursing students should be regularly educated through workshops, seminars and awareness programmes on how to manage diabetes.
- More opportunities should be provided for students to be involved in patient counselling and diabetes education in clinical rotation.
- The updated evidence-based guidelines on the nutritional management of diabetes should be integrated into the nursing course in educational institutions.
- Further qualitative and quantitative studies are recommended to investigate the competence and learning needs of nursing students in diabetes management in various health care institutions.

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