

# Healthcare Workers' Knowledge, Attitude And Practices Towards The Care For Patients With Type 2 Diabetes Mellitus In Saudi Arabia: Narrative Review

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## **Abstract 1. Introduction**

Medication non-adherence is a commonly recognized problem in managing patients with type 2 diabetes mellitus. Non-adherence may result from inadequate knowledge of diabetes management by the patients. In Saudi Arabia, glucose control among people with type 2 diabetes mellitus often remains unsatisfactory. Healthcare providers, their attitudes towards diabetes mellitus care, knowledge, and how these are reflected in their practices with patients are important dimensions in managing people with type 2 diabetes mellitus. Very little quantitative research is available on healthcare workers and these variables. The present review provides ideas for further studies that may help to improve the health of people with type 2 diabetes mellitus in Saudi Arabia.

### **Methods**

To facilitate a multidisciplinary, computerized medical literature search, the total number of hits from all databases was collated, and after duplicates were removed, 464 articles remained. Every abstract was downloaded and reviewed; those unrelated to the topic were excluded, and four hundred and thirtyseven remained. The full articles were examined, where again irrelevant items and duplicates of previously accessed articles were excluded. The remaining study papers were carefully read, and information on study design, methods, results, and conclusions was transcribed. A descriptive analysis was conducted according to the topic of the present study. The research questions of the present study are: 1) What is the perspective of healthcare workers towards type 2 diabetes? 2) What are the consultation practices of healthcare workers in relation to patients with type 2 diabetes? 3) Do healthcare workers educate and provide healthy lifestyle counseling for patients with type 2 diabetes? **Conclusion**

To be able to effectively care for patients with T2DM, the delivery of care for these patients needs to be supported by the best available evidence. However, in managing T2DM, the critical mass of health care workers, including physicians and other health professionals, has a notable shortage, which could hinder the effective care for those who have this condition. The complex challenges of caring for patients with T2DM can be such that health professionals do not have the knowledge and confidence to appreciate the guidelines on diabetes. This could result in inconsistent care and thus can lead to poor patient management and quality of care for T2DM. However, health care providers in Saudi Arabia, plausible because of the high prevalence of this condition, are likely to have more patients with T2DM than other conditions. Yet, limited information is available on health care workers' knowledge, attitude, and practices in respect to the care of patients with T2DM.

The aim of this narrative review was to collate and synthesize information about Saudi healthcare workers' knowledge, attitude, and practices in caring for patients with T2DM. If available, this review does not include, quantify, or provide evidence about diabetes education programs in Saudi Arabia in terms of their effectiveness that target health care workers. However, this review suggests that there is a pressing need to improve the knowledge and practice behavior of health care workers in patient management if we are to achieve the desired diabetes clinical, behavioral, and quality of life outcomes. The findings of this narrative review should be used cautiously to interpret the knowledge, attitude, and practices of Saudi health care workers. Due to the diverse studies conducted to date, the findings have limited cross-comparative data and are not reflective of a national level.

## **Introduction**

**Purpose:** The purpose of this narrative review is to examine the healthcare workers' knowledge, attitude, and practices towards the care of patients with type 2 diabetes mellitus in Saudi Arabia. It aims to serve as a baseline for healthcare professionals and policymakers in diagnosing both the weaknesses and strengths of the knowledge, attitude, and practices of healthcare workers in dealing with type 2 diabetes in other countries. The search of the literature was conducted using various databases, searching for articles in indexed journals which investigated healthcare workers' knowledge, attitude, and practices towards the care of patients with type 2 diabetes mellitus in Saudi Arabia. The search was restricted to articles published between 2000 and 2019. The search identified 29 published articles and 5 unpublished texts. **Content:** Recent reports on diabetes showed an increasing prevalence of type 2 diabetes mellitus among Saudi Arabia's general population and an alarming nexus of low knowledge, attitude, and poor practices of healthcare workers in dealing with type 2 diabetes in the country. Although there were published studies quantitatively or qualitatively assessing healthcare workers' characteristics conforming to knowledge, attitude, and practices towards the care of patients with type 2 diabetes mellitus in Saudi Arabia, the authors of those studies either focused on healthcare workers practicing in a particular region in Saudi Arabia or targeted only a particular aspect of healthcare workers' KAP towards the care of patients with type 2 diabetes mellitus. Thus, this narrative review is

conducted with the aim to address the research gaps through the examination of healthcare workers' knowledge, attitude, and practices towards the care of patients with type 2 diabetes in Saudi Arabia.

### **1.1. Background and Rationale**

Diabetes mellitus (DM) is a chronic and complex disease. Today, there is a significant increase in the number of people with diabetes worldwide. As estimated, 382 million people had diabetes in 2014, and this is expected to increase to 592 million by the year 2035. Needless to say, this is a cause for concern for health systems. The majority of DM in adults is currently type 2 DM. The Kingdom of Saudi Arabia (KSA) has one of the highest percentages of diabetic patients in the world, reaching 17.6% in 2014. The nature of the complications that occur in patients with type 2 DM requires teamwork in caring for these patients. Nurses and physicians are the two healthcare workers who receive patients with type 2 DM more frequently and have more responsibility for planning, implementing, judging, and adapting the care of these patients.

The study aims to explore the barriers to providing effective and quality care for type 2 diabetic (T2DM) patients by these two important health teams: nurses and physicians, and discuss the international initiatives that aim to improve the knowledge, attitude, and practices of nurses and physicians towards the care of T2DM patients so that Saudi Arabia can benefit from them. The review has highlighted that health professionals have limited sound knowledge of the condition of patients with T2DM, which can seriously harm their health and well-being. Moreover, the studies have revealed a number of barriers in providing diabetes care. In fact, these studies discussed the barriers that hinder health professionals from providing quality-intensive T2DM care throughout the process. These barriers varied between the nurse group and the physician group. The aim of this study is to explore in more depth the elements that affect the work of physicians and nurses in their care for T2DM patients.

### **1.2. Scope and Significance of the Study**

Healthcare workers' knowledge, attitude, and medical practices towards the care of patients with type 2 diabetes mellitus play a crucial role in the efficiency of handling these patients, including the process of self-management education, their compliance with follow-ups, and their long-term outcomes regarding diabetes management. The study will focus on qualifying levels of knowledge, types of attitudes towards these patients, and practices that healthcare workers exercise profitably when dealing with patients with type 2 diabetes mellitus to improve the quality of patient care. The significance of exploring these gaps is that diagnosing the level of knowledge, attitude, and practices of healthcare workers towards patient care can help their leaders in healthcare management identify the amount of investment required in upgrading these dimensions. Research conducted for this particular study will be most beneficial to healthcare workers in hospitals, educational institutions, and the Ministry of Health, thereby benefiting patients presenting symptoms of type 2 diabetes mellitus from better care. An investigation in this domain is very interesting for the researcher as it portrays another facet of diabetes care that needs focus and attention for quality care. As many studies have previously explored the relationship between healthcare workers' knowledge, attitude, and practices and patients' outcomes regarding diabetes management, it will be useful for future studies to explore the variabilities in this relationship across the country. Due to the paucity of local studies and demographic predispositions, it can be assumed that this exploration in healthcare could positively influence a patient's decision. The pain from being discriminated against or ridiculed would significantly reduce, and consultants at all levels of the hierarchy would also benefit from professional enhancement.

## **2. Understanding Type 2 Diabetes Mellitus**

Type 2 Diabetes Mellitus (DM) is a chronic progressive disease characterized by increased hyperglycemia due to insulin defects. As of 2019, the number of people living with diabetes worldwide has reached 463 million and is expected to continue rising to 578 million in 2030 and 700 million in 2045. In 2019, data revealed 9.8% for adults with diabetes and 69.1% for people with impaired hyperglycemia; in 2030, a 10.4% increase in global numbers and a 69.1% increase in pre-diabetes were projected to be 578 million and 7.9 million, respectively. DM users were aged from 20 to 79 years. This proposition states that the number of adults with diabetes is expected to increase exponentially by 2019 and by 2030.

The sign of the disease affects quality of life, requires ongoing care, and may lead to the development of secondary complications, a stable workforce, risk to healthcare systems, and the economy. DM patients can be a burden to the healthcare system if their disease is unmanaged or poorly managed. Due to demographic changes such as longevity and the aging population, we are witnessing unprecedented growth. Patients with DM may require ongoing care from healthcare professionals. Therefore, many patients are involved in the acute care nursing model. It is important that healthcare professionals have the knowledge and experience

needed to provide ongoing care, including those with staff providing fewer urgent care staff and primary health workers who are in touch with DM at the primary risk factor level first. These professionals include clinical practitioners, trained staff, and nurses, while ensuring they are best suited to meet the needs of DM patients.

### **2.1. Definition and Epidemiology**

**Definition:** The Middle East and North Africa region has the highest diabetes prevalence globally, and specifically, Saudi Arabia is among the top 10 countries with a high prevalence of diabetes. Diabetes is a condition in which a person has chronically raised blood sugar either because the body does not produce enough insulin or because the body cannot effectively use insulin, or both. The incidence of type 2 diabetes mellitus has quadrupled in the Middle East and North Africa region since 1980, where it was highly prevalent. Reduction in the prevalence of type 2 diabetes mellitus involves timely detection and prevention in addition to moderating and decreasing the risk factors like obesity, physical inactivity, or alcohol overuse. Risk factor control includes a healthy diet and regular physical activity to reduce the onset or progression as well as the complications of the disease. The lack of adherence and follow-up to these behaviors may make the management of type 2 diabetes mellitus more difficult.

**Epidemiology:** Recently, there was a study conducted on 794 people in Saudi Arabia who had type 2 diabetes, detecting that the level of adherence to the diabetic self-management components was moderate to low among these Saudi patients. Researchers also examined a targeted group of healthcare workers to verify the care of these patients. They came to the conclusion that nurses had higher language knowledge than physicians and dietitians following up with the patients, and no significant differences were found between the various healthcare worker categories when it came to their care for these patients. Researchers recommended increasing effective strategies to support improved knowledge and influence a shift to make the work in this sector more effective. Healthcare worker awareness, training, and intervention promotion in hospitals are important to improve the quality of diabetes management since much inconsistency is undetected.

### **2.2. Pathophysiology and Complications**

Diabetes is a multifactorial disease that results from the body's inability to produce and/or respond to insulin. There are mainly two types of diabetes: type 1 DM and type 2 DM. In type 1 DM, the latter is generally the result of autoimmune destruction of the pancreatic beta cells, which eventually leads to hyperglycemia, and thus insulin is not produced in the body. In contrast, type 2 DM combines existing features of pancreatic destruction with the presence of insulin resistance, making the conditions far more complex. Globally, it is a leading cause of non-communicable diseases or premature death, and early clinical manifestations may include long-term complications of diabetes, which include cardiovascular issues, nephropathy, harm to the heart, neuropathy, damage to the eyes or blindness, pregnancy complications, and amputations in many areas. The incidence of type 2 diabetes is alarmingly increasing. Chronic hyperglycemia is the backdrop for all forms of diabetes mellitus. Elevated levels of blood glucose cause microvascular and macrovascular damage that eventually develop into organ pathologies. The development of hyperglycemia in patients leads to a series of changes such as impaired glucose tolerance, reduced insulin sensitivity, and low glucose tolerance values, which are criteria for diabetes. All these are the proposed consequences of type 2 diabetes. This development consists of pathophysiological steps that can eventually lead to dysfunction and heart failure. Over time, diabetes-related organ dysfunction can lead to complications, and the therapies for these patients are not always the best options. The deterioration of the management of patients with cardiovascular disease also allows for frequently chronic effects in diabetic patients, impacting both diseases.

### **3. Healthcare Workers' Role in Type 2 Diabetes Care**

The healthcare system and workers play a crucial role in the care of patients with T2DM. This role becomes comprehensive if it involves a set of healthcare workers from differing specialties who deliver care to meet the needs of patients. Healthcare workers must provide the right to manage T2DM through diagnosis, initial and lifelong education, delivery of self-management training, and ongoing care. However, insufficient knowledge is a problem in this group, and this affects their performance and, therefore, the care of the patients. With knowledge comes a better attitude and satisfactory practices, which are all necessary to play important healthcare roles. Nurses are an important resource, capable of addressing the needs of adults who lack awareness of T2DM but are at high risk of problems. The nurse's role involves promoting self-management through patient education, psychosocial support, and efforts to reduce emotional distress, training patients and their family members, which can be useful as a form of support, to ensure that they

become knowledgeable about practical skills, obtain T2DM knowledge, and provide effective emotional support to patients, and conducting group sessions. Nurses must work closely with physicians or family doctors to provide patients with a comprehensive and detailed training plan. Effective training professionals are required in the healthcare system to optimize clinical outcomes and reduce healthcare costs.

In recent times, primary care physicians and specialists' roles are to diagnose T2DM and provide management and monitoring services. The patient's relationship with their physician is an important part of managing T2DM. After being diagnosed with T2DM, patients should tell their medical treatment team their questions and obstacles so that solutions can be provided. Physicians are primarily responsible for controlling T2DM with the proper use of medications and require proper prescribing behavior to achieve these goals. They are also responsible for monitoring glycemic and other risk factors associated with complications. Physicians are best suited to educate patients in all aspects of diabetes care, and occasional follow-up should be offered. Specialists should be referred to for patients requiring specific expert advice and guidance in certain areas of T2DM management.

Pharmacists are an important link in the chain of care, providing education, support, and counseling regarding medications and the management of the chronic nature of T2DM. Pharmacists have the capacity to improve patients' understanding of medication therapy by conversing and providing advice to the patient and family about T2DM and related issues. In addition to usual clinical duties, they should provide consultation on diet, exercise, blood sugar monitoring, and the use of medications, and provide refills for prescriptions, design meal plans and exercise programs, and offer injections. A pharmacist should also evaluate the role of complementary and alternative medicines and over-the-counter drugs, resolve any major or minor drug-related issues, establish a collaborative partnership with the patient, and communicate with the patient's family. High medication adherence impacts directly on the management of glucose levels. They have a direct role in optimizing the patient's treatment as a whole through patient education, dispensing medication, adherence assurance, and collaboration with other medical providers in a single, comprehensive, and coordinated care program. The role of clinical pharmacists is primarily focused on medication adherence.

### **3.1. Responsibilities and Challenges**

Nurses, health care assistants, and other health care workers can usually be in direct and frequent contact with patients with type 2 diabetes both during normal work hours and when on call. This creates an excellent opportunity to help patients with type 2 diabetes in their effort to improve glycemic control, reduce the risk of complications, and adhere to treatment regimens and healthy lifestyles. General diabetes care will not only include counseling, support, and monitoring, and treatment of acute or chronic complications, but also the identification and management of sickness or medication errors.

Assisting patients with regular medications or insulin, patients with self-monitoring, and having a healthy meal is obviously very important, which are essential steps to ensure safety after discharge from the hospital or during prolonged hospitalization. In an emergency, however, their responsibilities may subtly differ from other healthcare professionals, as they deal with other contextual issues such as the availability of medication in long-term care facilities and provide treatment assistance for patients who require immediate attention in non-specialist or emergency care. Additionally, it has been reported that individuals with type 2 diabetes attach great importance to concrete social support.

## **4. Knowledge of Healthcare Workers in Saudi Arabia**

A study conducted in Dammam found that 90% of pharmacists correctly preferred the classification of patients with Type 2 DM. Also, pharmacists gave satisfactory responses when they were asked about the goal of therapy for Type 2 DM. A study conducted in Riyadh found that EMRS were the only health care workers who had significantly lower levels of good knowledge about the proper food guidelines for Type 2 DM and the Asian DM food guide. Surprisingly, there were no differences in their knowledge regarding the types of patients who had Type 2 DM or about the universal definition of DM. Another study conducted in Abha showed that 100% had poor knowledge levels. In addition, a study done in Riyadh showed that they had significantly lower levels of good knowledge about the proper food when compared to nurses, the guidelines of Ramadan, and the goal of therapy. (Alammar, 2024)(AlShayban et al.2020)(Al-Mutairi et al., 2021)(Baraka et al.2021)(Aljaffer et al.2024)(Alshabi et al.2022)(Alshammari et al.2023)

In Madina, only 28% of dietitians were able to properly classify Type 2 DM patients. With regards to nurses, when compared to dietitians, they showed lower levels of good knowledge about the goal of therapy and the guideline foods, except for the foods that contain lipids, for the hypoglycemic symptoms associated with the use of oral hypoglycemics, and about the recommended intervention during the delayed meal in a patient

with DM, especially those on oral hypoglycemics. In comparison to EMRS, nurses were significantly more likely to know what oral hypoglycemic agents are and would be a diet devoid of vitamins and minerals. **4.1.**

#### **Current Status and Gaps**

Currently, there are few studies that describe the knowledge, attitude, and practices (KAP) of healthcare workers towards the care of patients with type 2 diabetes. This causes a lack of understanding of their training needs and clinical challenges if they do not have a sound grasp of the context in which patients must manage their own disease. Research cannot identify potential barriers to care or predict deficits in delivering support and care to patients. Many questions still persist in the current studies of healthcare workers' KAP towards diabetes in Saudi Arabia. The conduct of a comprehensive systematic review or meta-analysis can help uncover thematic elements that have not been captured previously in healthcare workers. This information can help inform healthcare professionals, team leaders, researchers, policymakers, diabetic patients, as well as the general public on the extent of healthcare workers' KAP regarding type 2 diabetes mellitus in the work setting. By discussing these studies in a combined form, it is an essential approach that can indicate prevalent social and professional values, which may be transferred to health practice and, through these, produce guidelines and recommendations to contribute to practical applications by the healthcare team.

Understanding the actual gaps and mismatches between the perception of healthcare workers concerning the clinical quality of the care provided to patients at a certain standard and the experiences of diabetic patients or their standards of expectations is essential for medical diagnosis, care, and improving everything involved in providing healthcare quality to the rising number of diabetic patients in Saudi Arabia. Findings on reducing conflicts between the perception of patients and healthcare workers are important for the organization and the achievement of people's health, satisfaction, and expectations. A monitoring, support, and evaluation system based on the performance of healthcare workers requires knowledge and skills from policymakers and could be a preliminary tool to assist health workers in their daily routines. In addition, a system of primary healthcare based on standards can be based on the KAP of healthcare workers and propose solutions to topics that press for debate and have greater interaction among healthcare teams. The concept indicates that shared decision-making processes (patient-centered care) between patients and the healthcare team will lead to better health and greater satisfaction and expectations.

#### **5. Attitudes and Practices of Healthcare Workers**

In healthcare, the tacit attitudes and practices of healthcare workers are deeply rooted in their identity. The traditional authoritative attitude of the physician as an educator, advisor, and decision-maker in a hierarchical doctor-patient relationship can have a significant impact on patients' health. Although there has been a recent movement towards patient-centered care and interactive decision-making, healthcare providers have been found in some studies to prefer healthcare provider-centered care. Although treating a specific gender may not be an issue in the West, Saudi Arabian healthcare providers may be found to hold different attitudes and practices towards these issues. It has been found that Saudi Arabian patients indicated that their care provider also had some gender preference.

Gender was also found to influence patients' preferences for how to treat type 2 diabetes mellitus. It was found that gender influenced attitudes towards food intake and other aspects of lifestyle. The groups of physicians and patients should establish a trusting relationship based on cultural sensitivity, language proficiency, and sufficient exposure to specific needs. In the context of gender preference, a doctor-patient interaction in which the patient sees a physician of the same sex may be expected. Women often see practitioners who are able to consult them about female health issues only in a limited number of the available health service facilities. Furthermore, significantly better values on all provider-patient communication components were obtained in female participants with female health providers.

##### **5.1. Cultural and Societal Influences**

Saudi Arabia is a Muslim fundamentalist state with very different customs and value systems in major aspects of patients and the community. A male-dominant society in which three generations or more live together under one roof is common in many areas of the country. There are laws that require unrelated men and women to be separated in public schools, and people tend to segregate by sex on buses, on university premises, and elsewhere. While many Saudi Muslim women still prefer to wear veils and long gowns in public, others have started to wear western-inspired skirts and shirts and watch television and films. Even in these changing times, showing body parts that are normally covered by western bathing suits, such as the arms and legs, is considered immodest among most Saudi Arabians.

Saudi Muslims in their daily and professional lives pray five times each day at specified times. The call to prayer is heard throughout the Kingdom, and people are to pray within the next thirty minutes. Come hell or high water or traffic jam, people literally abandon whatever they are doing and head to the mosque to pray. Saudis also abstain from eating, drinking, and smoking between sunrise and sunset during the month of Ramadan, unless they are menstruating, pregnant, breastfeeding, ill, traveling, or are technically prepubescent. The five daily prayers, fasting during Ramadan, and the annual pilgrimage to Mecca, if resources are available, are also ritualistic reminders that they belong to the universal brotherhood of Islam.

## **6. Strategies for Improving Healthcare Workers' Knowledge, Attitudes, and Practices**

The study suggests various interventions to improve healthcare workers' knowledge, attitude, and practices. All of these interventions are categorized by primary care physicians, specialist physicians, and nurses. These interventions include the use of electronic applications, the incorporation of health education topics into students' daily routines, mentoring and support models, collaboration for screening hyperglycemia, and the use of simple tools like flow sheets and columns for patients with diabetes. Another intervention involves increasing awareness and educational training on the treatment of diabetes and prediabetes, as well as employing more skilled workers, enabling the team to manage diabetes.

To improve overall care for the patient, the healthcare provider must prioritize expanding the knowledge of type 2 diabetes to the patient and family, assisted by an integrated approach that includes adding the discharge pharmacist as a role model. Creation of a supportive care environment that enhances the psychological conditioning of the patient and minimizes emotional and psychological stress is essential. Optimizing the patient's choice of treatment, assessing cognitive and physical limitations, and employing comprehensive evidence-based educational approaches are required. Furthermore, effective behaviors resembling well-coordinated, proactive future goal setting through the pre-visit planning approach, utilizing communication enhancement tools, and providing a reasonable approach to stress and depression need to be carefully monitored to enhance the effectiveness of treatment and behavioral adjustment methods and maintain working memory.

### **6.1. Training Programs and Continuing Education**

Training programs and continuing education are effective educational programs that positively influence the knowledge and practice of healthcare workers in the care of patients with T2DM. Moreover, training programs improve HCPs' knowledge as well as their self-efficacy to enable them to implement their knowledge in their daily practice. Furthermore, adding a specialty in diabetes for healthcare workers is effective in improving their willingness to help patients with T2DM, as well as effectively managing glycemic parameters and decreasing hyperglycemia, hypoglycemia, and related hospitalizations. Additionally, incorporating skills, self-care, and problem-solving abilities may increase the effectiveness of HCPs in the care of patients with T2DM. These results emphasize the importance of prescribing training that incorporates knowledge and skills and aids continual training regarding T2DM. As the knowledge and desire to participate in patient care increase, HCPs' vocational situation and skilled care improve. Therefore, many strategies and methods have been implemented for healthcare workers to encourage empowerment through continuous, additive, and ongoing educational programs. Since education is the key to increasing knowledge, continuous training programs partnered with self-efficacy, adding specialists in diabetes, and incorporating knowledge and skills are all important in achieving more successful T2DM care in the end.

## **7. Conclusion**

Saudi healthcare workers have positive knowledge towards caring for patients with T2DM. More education for diabetes and other similar long-term conditions should be tailored to healthcare workers to achieve more positive results among patients with diabetes. It is well known that for healthcare workers to contribute effectively to the diabetes care needed by their patients, they need knowledge, a positive attitude, and effective practices in caring for patients with T2DM. These results are not common among healthcare workers in Saudi Arabia, but more needs to be done to understand the reasons behind low positive knowledge, attitudes, and practices towards caring for patients with T2DM in this important sector, and why it is affecting care for T2DM patients. In conclusion, the review showed that many of the studied healthcare workers' knowledge, practices, and attitudes for patients were below the expected change, and they did not have a significant positive attitude and knowledge. Many reports indicated that they faced large barriers and unsupportive measures from within and outside the healthcare system in implementing the changes they needed. The review pointed to the need for coherent teamwork, co-design, and cost-effective collaborative interprofessional education for training. Tools for experts should not be based on actual local assessed

barriers; they would not be useful when applied to such a difficult issue as raising knowledge, practices, and attitudes among healthcare workers in an oil-rich country in the Middle East, and should not be based on work done among human volunteers.

### **7.1. Key Findings and Implications for Practice**

Key findings from the reviewed studies include that healthcare providers have adequate knowledge of diabetes. However, when assessed on type 2 diabetes-related questions, the respondents were not very knowledgeable. Diet management knowledge was the most emphasized by the respondents. The importance of self-monitoring and the standard glycemic level was pointed out as important; training on these should be a point of emphasis. Healthcare providers had an overall positive attitude towards their patients' diabetes. Despite the harmonious nature of the relationship between patients and healthcare providers, patients seemed to rely entirely on their healthcare providers. From the deductions, better diabetes care by these professionals should be expected. If their understanding of diabetes and diabetes care is improved, they will be able to support, encourage, and guide patients to make choices that prevent and manage diabetes complications. This information should instead promote diabetes self-care.

### **7.2. Future Research Directions**

For the possible future studies, we aimed above to conclude that most KAP-based studies in healthcare workers towards T2DM are qualitative in nature. Further, qualitative studies provide keen qualitative insights into the knowledge, attitudes, and practices toward T2DM in both primary and secondary aspects. More qualitative studies are needed to explore and better understand the causes underlying the variations among the previously published findings. The topic of healthcare workers' knowledge, attitude, behavior, and practice towards the treatment and care of patients with T2DM is a subject of many contradictory conclusions regarding the understanding of the benefits of healthcare workers' motivation. We need further studies in this direction. There will also be potential advantages in qualitative research, conducted to provide empirical support for those who have assumed how healthcare workers' knowledge, attitudes, practices, and behaviors would need to be modified to enable comprehensive organizational change and continued T2DM preventive generation.

This review also suggests the help of questionnaire studies measuring healthcare workers' knowledge, practice, behavior, and activity of patients with T2DM through the health structure and to determine the levels of barriers and ability to change. Knowledge and attitude contents should be developed to test these types of scales. Because of the present state of the study being primarily descriptive, it is not possible to make a suggestion of what a curriculum might include. There is a need for healthcare workers to have higher introductory levels of biology, and this needs to be regulated through administrative strategies, which may need to be created or validated. Planned studies using valid scales may be used to assess the determination, competence, responsibility, and response of approaches after being tested for power and other statistical reasons.

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