

Exploring Diabetic Patients' Knowledge of Complications in Saudi Arabia: A Systematic Review

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Abstract

Diabetes is a very common condition in Saudi Arabia, which carries significant health and economic burdens. If left uncontrolled, diabetes can lead to severe complications that may threaten a patient's life. Therefore, efforts to prevent and manage the disease are crucial. Awareness and knowledge about diabetes and its complications play a key role in reducing its consequences. This study aims to assess the level of awareness regarding diabetes-related complications among diabetic patients in Saudi Arabia. We searched databases including PubMed, Web of Science, ScienceDirect, EBSCO, and the Cochrane Library. Using Rayyan QCRI, studies were screened based on title and abstract before a full-text review. The eight studies included in this review involved both male and female participants of various ages, with over half of the respondents being men. These studies focused on diabetic patients in Saudi Arabia and assessed their awareness of the complications associated with diabetes. Overall, the level of awareness among Saudi diabetic patients was relatively high, especially among those with higher education. To further increase awareness, healthcare providers in hospital settings can intensify efforts to educate patients and their families about the importance of proper diabetes management and prevention of its complications.

Keywords: Knowledge, Diabetes mellitus, Awareness, Diabetic patients, Complications, Saudi Arabia

Introduction

Diabetes mellitus is a metabolic condition that arises from issues with insulin production or function, resulting in elevated blood sugar levels (hyperglycemia) [1]. This disorder disrupts the body's ability to properly process carbohydrates, fats, and proteins [2]. Diabetes is primarily classified into three types: type 1 diabetes (T1DM), type 2 diabetes (T2DM), and gestational diabetes. T1DM is caused by an autoimmune response that damages insulin-producing beta cells in the pancreas, while T2DM results from insulin resistance, where the

body's cells do not respond effectively to insulin, leading to impaired glucose absorption.

T2DM is the most prevalent form, accounting for 90%-95% of all diabetes cases globally [3]. In 2014, the global prevalence of diabetes was estimated at 9% in men and 7.9% in women, a significant increase from the 1980 figures of 4.3% in men and 5% in women [4]. This rise is linked to lifestyle factors such as poor diet and physical inactivity, which increase the risk of developing diabetes. Diabetes affects not only the overall health and well-being of individuals but also contributes to high morbidity and mortality rates. In 2012, diabetes was responsible for 1.5 million deaths, making it the eighth leading cause of death worldwide [5-7].

Countries in the Middle East and North Africa (MENA) have higher diabetes prevalence compared to the global average. In 2017, the prevalence in the region was 9.6%, and this figure is expected to increase to 12.1% by 2045 [8]. This elevated prevalence is largely attributed to rapid urbanization, rising obesity rates, and an aging

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population in MENA countries [9]. Saudi Arabia, in particular, has seen a significant rise in diabetes due to lifestyle changes linked to economic development, including unhealthy eating habits and reduced physical activity. As a result, 23.9% of the Saudi population is currently affected by diabetes [10].

If diabetes is poorly managed, it can lead to various complications, including coronary artery disease, kidney failure, blindness, strokes, and foot ulcers, all of which contribute to severe morbidity and mortality [11]. The primary risk factor for the development of these complications is poorly controlled blood sugar. Managing these complications effectively is a major priority in healthcare systems. Public health initiatives in Saudi Arabia need to focus on encouraging behavioral changes to prevent and manage diabetes, which has become a widespread issue and carries a heavy financial burden. Early detection and proper education can significantly improve the quality of life for diabetic patients [12].

Objectives

This systematic review aims to assess the level of awareness regarding diabetes complications among diabetic patients in Saudi Arabia. The review focuses on studies published between 2017 and 2021, sourced from the PubMed database.

Materials and Methods

This systematic review followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-analyses) guidelines.

Study design

This research is both a meta-analysis and a systematic review of available literature.

Study condition

The review focuses on both recent and previous research examining the awareness of diabetic patients in Saudi Arabia concerning the complications of diabetes mellitus.

Search strategy

A thorough search was conducted across five major databases: PubMed, Web of Science, Science Direct, EBSCO, and the Cochrane Library, to identify eligible studies. Only articles published in English were considered. Searches were customized for each database,

and relevant terms were used. These terms were also converted into Mesh terms in PubMed, such as “knowledge,” “awareness,” “diabetes mellitus,” “complications,” “diabetic patients,” and “Saudi Arabia.” Boolean operators like “OR” and “AND” were applied to combine these keywords. The search results included studies with full-text access in English, open-access articles, and human clinical trials.

Selection criteria

The review included studies that met the following conditions:

- Cohort studies and designs, particularly retrospective cohorts, provided qualitative or quantitative data on the awareness of diabetic complications among patients in Saudi Arabia.
- Exclusion criteria:
- Studies not published in English.
- Studies that do not provide free access to their full text.

Data extraction

Rayyan QCRI was used to identify duplicates in the search results. Titles and abstracts were evaluated for relevance, and studies were selected based on the inclusion and exclusion criteria. Full-text evaluations were carried out for those studies that met the inclusion criteria. Disagreements were resolved through discussions between the reviewers. A data extraction form was designed to capture key details from the eligible studies, including study title, authors, design, participant demographics, study objectives, complications covered, year of publication, and notable findings.

Assessment of risk of bias

To assess the quality of the included studies, the ROBINS-I (risk of bias in non-randomized studies-of interventions) tool was used for the qualitative synthesis of the data. The reviewers also addressed any inconsistencies identified in the quality assessment.

Data synthesis strategy

Summary tables were constructed to provide an overview of the study characteristics and outcomes. After data extraction, decisions were made on how to handle the data from the studies. Studies that met the full-text inclusion criteria but did not provide information on awareness levels were excluded from the analysis.

Results and Discussion

Search results

The search process initially identified 220 articles, with 53 duplicates removed. After screening the titles and abstracts, 20 studies were excluded. A further 122 articles were retrieved, but 30 of these could not be accessed. Ultimately, 92 full-text articles were reviewed. After excluding 20 articles due to irrelevant outcomes, 38 for lacking sufficient data, and 42 for involving incorrect populations, a total of eight studies were included in the systematic review.

Characteristics of the included studies

The review incorporated eight studies, with the central theme being the level of awareness among diabetic patients in Saudi Arabia regarding diabetes-related complications. Six of the studies were cross-sectional in design [13-19], and two followed a longitudinal approach [13, 20]. The sample sizes ranged from 259 to 519 participants, covering various age groups, including elderly individuals, adults, and teenagers. All studies were conducted within Saudi Arabia.

A summary of these studies, outlining their objectives, main findings, and year of publication, is provided in **Table 1**.

Table 1. Overview of the characteristics of the included studies

Study	Study design	Location	Sample size	Complications studied	Awareness level	Study objective	Key findings
El Sheikh <i>et al.</i> [14]	Cross-sectional	Alahsa, Saudi Arabia	379	Cardiovascular complications	Moderate to high	To evaluate the awareness, attitude, and practices of type 2 diabetic patients regarding cardiovascular complications in Alahsa, Saudi Arabia.	More than half of the participants had a strong knowledge of diabetes and its complications. Factors such as age, gender, education, and family history of diabetes were significant predictors of awareness. Due to rising diabetes rates in Saudi Arabia, there is a need for increased awareness.
Basharheel <i>et al.</i> [15]	Cross-sectional	Saudi Arabia	259	Diabetic neuropathy	Low	To assess the awareness level of diabetic neuropathy among diabetic patients in Saudi Arabia.	The general knowledge regarding the symptoms of diabetic neuropathy was found to be inadequate. More studies are needed to examine the relationship between neuropathy occurrence and awareness levels.
Al Bshabshee <i>et al.</i> [16]	Descriptive cross-sectional	Southwestern Saudi Arabia	287	All complications	High	To measure the level of awareness and care practices related to diabetes complications among type 2 diabetes patients in a southern Saudi Arabian diabetes care center.	Educated young patients who consistently follow up with therapy are well-informed about diabetes complications. Doctors play a key role in providing information.
Alharbi <i>et al.</i> [13]	Literature review	Saudi Arabia	---	Diabetic retinopathy	Increasing	To educate diabetic patients on the prevalence of diabetic retinopathy (DR) in Saudi Arabia and identify major risk factors to improve disease awareness.	DR prevalence has increased significantly in Saudi Arabia. Key risk factors include advanced age, long-term diabetes, poor glycemic control, and hypertension. Education and awareness are linked to better outcomes and fewer complications.

Alhomayani <i>et al.</i> [20]	Systematic review	Saudi Arabia	---	All complication	Mixed	To review existing literature on the level of awareness and attitudes towards diabetes complications in Saudi Arabia.	The evidence on knowledge of diabetes complications is inconsistent. Further large-scale, multicenter studies are needed to provide more accurate data.
Fatani <i>et al.</i> [17]	Descriptive cross-sectional	Makkah, Saudi Arabia	299	All complications	Moderate	To assess Makkah residents' understanding of the signs and symptoms of diabetes complications and determine the incidence of such complications.	Effective patient education is essential to improve diabetes control. Educating patients on early signs of complications can prevent further deterioration and improve their quality of life.
Algshaneen <i>et al.</i> [18]	Cross-sectional	Saudi Arabia	519	Diabetic foot	Moderate	To assess the knowledge, attitudes, and practices regarding diabetic foot care among diabetes patients in Saudi Arabia.	There is awareness of diabetic foot issues in Saudi Arabia, including complications such as amputation. However, there are gaps in education regarding foot care for diabetics.
Alasiri <i>et al.</i> [19]	Hospital-based, cross-sectional	Jeddah, Saudi Arabia	357	Diabetic retinopathy	Low to moderate	To evaluate the level of awareness regarding diabetic retinopathy among Saudi diabetic patients.	

The present review investigates the level of awareness regarding diabetes complications among Saudi diabetic patients. The findings indicate that overall, diabetic patients in Saudi Arabia are relatively well-informed, especially among younger, more educated individuals who maintain regular follow-up care.

In a study by Al Bshabshe *et al.* [16], conducted on 287 diabetic patients at the Diabetes Clinic in Aseer Central Hospital, approximately 50.5% of participants showed a high level of awareness about diabetes and its complications, while only 9.8% demonstrated low awareness. Specifically, the study found that 45.6% of participants knew about kidney-related issues, 42.9% were aware of heart complications, 41.8% understood kidney problems, 39.7% recognized the risk of stroke, and 36.9% were informed about skin complications.

Similarly, Fatani *et al.* [17] reported that 80% of participants in Makkah City had a good understanding of diabetes complications. However, some earlier studies found lower awareness levels, with one study showing that 60% of participants were unaware of diabetes-related complications, and only 13.1% demonstrated adequate knowledge [21-23].

Fatani *et al.* [17] also identified the complications most recognized by participants: eye disease (72.9%), diabetic

foot (71.2%), kidney disease (56.2%), peripheral neuropathy (53.8%), sexual dysfunction (42.5%), heart disease (40.1%), high blood pressure (33.1%), sudden death (20.4%), and cerebrovascular disease (18.7%). In a similar study, Algshaneen *et al.* [18] found that 55.1% of participants had a strong understanding of diabetic foot complications, with higher levels of knowledge found in women and individuals with better education.

In contrast, Alasiri *et al.* [19] observed that only 61% of participants (218 out of 357) were aware of diabetic retinopathy (DR) as a complication of diabetes. Type 1 diabetes patients had greater awareness of DR (63.8%) compared to type 2 diabetes patients (36.2%). However, despite this awareness, only half of the participants attended eye check-ups, and less than 20% adhered to annual eye examinations.

The awareness of diabetic neuropathy was notably low in a study by Basharheel *et al.* [15], where participants averaged a knowledge score of 3.83 out of a possible Alhashim *et al.* [24] reported that just over half (56.4%) of participants were aware that diabetes could lead to neuropathy, and 27.5% didn't understand the causes of the condition. Similarly, a study by Shaikh *et al.* [25] found that only 30% of patients were aware of any

diabetes-related complications, and only 10% knew about diabetic neuropathy specifically.

Basharheel *et al.* [15] didn't find significant differences in knowledge between genders, but there were clear differences based on age and education level. Higher education was strongly linked to better awareness, a finding also echoed by El Sheikh *et al.* [14] in their research, which surveyed 379 diabetic patients. Their study found that 54.6% of participants had a basic understanding of diabetes and its complications, with heart disease (6.1%), diabetic foot (5.5%), and cerebrovascular disease (1.8%) being the most commonly identified complications. These figures were higher than those found in Fatani *et al.*'s study [17].

Lifestyle modifications play a crucial role in controlling diabetes and preventing complications. Studies [26] have demonstrated that regular exercise can improve blood glucose control, insulin levels, and overall diabetes management. Research by Dey *et al.* [27], Mansy *et al.* [28], and Ibrahim Abougambou *et al.* [29] examined diabetes knowledge and behavior, highlighting a lack of understanding about the importance of lifestyle changes for diabetes control. Studies [13, 15, 18] also noted that patients' awareness of the significance of blood sugar management and lifestyle changes in reducing the risk of complications was generally low. Education plays a major role in determining which complications a patient is more likely to face [27-29].

In general, the Saudi population is aware of diabetes risks. A large-scale study by Mahzari *et al.* [30] and Moradpour *et al.* [31] involving over 2,000 participants identified common risk factors for diabetes, such as obesity, family history, physical inactivity, and older age.

Conclusion

In conclusion, the awareness among Saudi diabetic patients regarding their condition and its complications is generally satisfactory. However, there remains a significant need for continued educational efforts to improve patient understanding. While self-management is a common practice due to the chronic nature of diabetes, patients must be fully informed on how to effectively manage their condition. This includes understanding the potential complications of diabetes and knowing how to prevent or address them. Enhanced diabetes awareness and education are strongly linked to better health outcomes and a reduction in complications.

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