AWARENESS OF DIABETIC PATIENTS REGARDING DIABETES COMPLICATIONS IN SAUDI ARABIA: SYSTEMATIC REVIEW

Amer Ahmed Balla Ahmed1, Mathayil Nazal Alruwaili2, Jalal Farhan Alanazi2, Dalal Farhan Alanazi2, Ahlam Sultan Alanazi2

1. Department of Endocrinology, King Abdulaziz Specialist Hospital, Al Jouf, Saudi Arabia.
2. Faculty of Medicine, Northern Border University, Arar, Saudi Arabia.

Introduction

Diabetes mellitus is a metabolic disorder caused by disturbances in insulin secretion, insulin movement, or both, and is diagnosed by the presence of hyperglycemia [1]. It is associated with improper carbohydrate, protein, and fat metabolism [2]. Diabetes is can be devided into three main types: type 1 (T1DM), type 2 (T2DM), and gestational diabetes. Type 1 diabetes is caused by the autoimmune destruction of beta cells within the islets of Langerhans, resulting in decreased insulin secretion. Type 2 diabetes is caused by a decrease in insulin motion as a result of insulin resistance through the use of frame tissues, which leads to disrupted glucose access to frame cells.

Kind 2 diabetes is the most common type of diabetes [3]. Type 2 diabetes affects around 90%-95% of diabetic patients. The global occurrence of diabetes mellitus in 2014 was estimated to be 9% in men and 7.9% in women, nearly double the 1980 figures of 4.3% and 5% in women and men, respectively [4], reflecting an increase in risk elements such as weight problems and unhealthy lifestyle choices. This can have an effect on patients' overall well-being as well as their quality of life [5]. It is also linked to morbidity and death. Diabetes mellitus was responsible for 1.5 million fatalities worldwide in 2012, making it the eighth leading cause of mortality [6]. Diabetes is regarded as a major global concern due to its high morbidity and mortality [7].

Middle Eastern and North African (MENA) countries have a higher prevalence of diabetes than other parts of the world; the superiority charge became 9.6% in 2017, and the charge is expected to rise to 12.1% by 2045 [8]. The high prevalence of diabetes within the MENA region is ascribed to the urbanisation process, high obesity rates, and the expanding elderly population in those countries [9]. This fashion is linked to the present economic boom in Saudi Arabia, which has brought about major lifestyle changes, with unsafe consuming behaviour and a lack of exercise becoming the norm. As a result, diabetes mellitus has risen to prominence, with 23.9% of the Saudi population suffering from it [10].
Poorly managed diabetes can cause a variety of headaches ranging from microvascular to macrovascular, including coronary artery disease, renal failure, blindness, stroke, skin ulcers, particularly within the foot, and so on, all of which can result in significant morbidity and mortality [11]. Diabetes is the most serious hazard to the progression and development of DM complications. As a result, diabetic problems associated with a long length of sickness become a top priority in healthcare. Public health interventions must consider how to change Saudi society's behaviour in order to better prevent and manage diabetes, which is the country's most frequent general ailment and has a high financial cost. Diabetes patients' quality of life may improve if the disease's signs are detected early. As a result, educating the person is critical [12].

**Objectives**
This systematic review aims to examine the literature to determine the level of interest in the consequences of diabetes mellitus among diabetic patients in Saudi Arabia. The literature was reviewed using the PubMed database between 2017 and 2021 for this review.

**Materials and Methods**
This systematic review was carried out according to the guidelines outlined (PRISMA stands for Preferred Reporting Items for Systematic Reviews and Meta-analyses).

**Study Design**
This was a meta-analysis and systematic review.

**Study Condition**
This review looks at newly and previously published literature on the level of awareness of Saudi diabetic patients about the various complications of diabetes mellitus.

**Search Strategy**
A systematic search of five major databases, including PubMed, Web of Science, Science Direct, EBSCO, and the Cochrane library, was done to incorporate the eligible literature. Our search was restricted to English and tailored to each database as needed. The following keywords were converted into Mesh terms in PubMed to find suitable studies: "knowledge, awareness, diabetes mellitus, complications, diabetic patients, Saudi Arabia." The relevant keywords were combined with the "OR" and "AND" Boolean operators. The search results included full-text publications in English, freely available articles, and human trials.

**Selection Criteria**
Our review included the studies with the following criteria:
- Cohort studies and study designs, primarily retrospective cohort provided qualitative or quantitative data on the perception of diabetic complications in people with diabetes in Saudi Arabia.

The following were among the exclusion criteria:
- Studies that are not done in English.
- No free access to studies.

**Data Extraction**
Rayyan (QCRI) [9] was utilised to discover duplicate features of the search strategy results. The researchers determined the adequacy of the titles and abstracts by assessing the pooled search results against a set of inclusion/exclusion criteria. The reviewers evaluated the whole texts of the papers that met the inclusion criteria. To resolve any disputes, the writers held a conversation. A data extraction form was built to contain the eligible study. The writers gathered information on the research titles, authors, study design, population survey, participant number, aims, complications mentioned, study year, and significant findings.

**Assessment of the Risk of Bias**
To assess the incorporated research quality, the ROBINS-I technique for non-randomized studies [13] was utilized for qualitative data synthesis. The reviewers identified and corrected any anomalies in the quality evaluation.

**Data Synthesis Strategy**
Summary tables with the gathered details from the relevant studies were produced to offer a qualitative overview of the included study components and result data. Following the completion of the data extraction in this systematic review, judgments were taken on how to best utilize the available data from the included study articles. Studies that satisfied the full-text inclusion criteria but did not offer data on the level of awareness were eliminated.
Results and Discussion

Search Results
The systematic search yielded 220 study papers, after which 53 duplicates were deleted. Twenty studies were removed after being subjected to title and abstract screening. A total of 122 reports were requested for retrieval, with just 30 items not being found. Finally, 92 articles were screened for full-text evaluation; 20 were excluded due to incorrect research outcomes, 38 were excluded due to insufficient data on the current topic, and 42 were excluded due to the incorrect population type. This systematic review contained eight eligible study papers.

Characteristics of the Studies Included
This review covered a total of eight papers. The major theme of most of this research ranged from the degree of awareness of Saudi diabetic patients on the various diabetes complications. The sex studies were cross-sectional [14-19], Two of them were longitudinal [13, 20]. The studies' sample sizes ranged from 519 to 259 people. The elderly, adults, and teenagers were among the age groups evaluated. All of the research listed were conducted in Saudi Arabia.

In the Table 1 we included the summary of the included previous studies with their main objectives, key findings, and the year of publication.

<table>
<thead>
<tr>
<th>Study</th>
<th>Study design</th>
<th>Location</th>
<th>Sample size</th>
<th>Type of complication</th>
<th>Awareness level</th>
<th>Study Objective</th>
<th>Key findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>El Shafei et al., 2021, 14</td>
<td>Cross-sectional study</td>
<td>Saudi Arabia</td>
<td>379</td>
<td>Cardiovascular complications</td>
<td></td>
<td>To assess type 2 diabetes patients' knowledge, attitude, and practise about DM complications in Alahsa, Saudi Arabia.</td>
<td>In our latest survey, more than half of the participants had a thorough awareness of diabetes and its consequences. Age, gender, educational level, and personal family history of DM have all been found to be important predictors of DM headache occurrence. However, due to the rising rates of diabetes incidence and prevalence in Saudi Arabia, interest and understanding are necessary.</td>
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<tr>
<td>Basharheel et al., 2020, 15</td>
<td>Cross-sectional study</td>
<td>Saudi Arabia</td>
<td>259</td>
<td>Diabetic neuropathy</td>
<td></td>
<td>To determine the level of awareness of diabetic neuropathy among diabetic patients in Saudi Arabia.</td>
<td>The level of knowledge of the Saudi population about diabetic neuropathy symptoms was found unsatisfactory. More research is needed to determine the relationships between the occurrence of diabetic neuropathy and patients' degree of knowledge regarding diabetic neuropathy.</td>
</tr>
<tr>
<td>Al Rakhisher, et al., 2020, 16</td>
<td>A descriptive cross-sectional study</td>
<td>Saudi Arabia</td>
<td>287</td>
<td>All complications</td>
<td></td>
<td>Every outpatient division of a diabetes care centre in a tertiary care medical facility in southern Saudi Arabia was evaluated to measure diabetes care practices and related awareness among patients with type 2 diabetes.</td>
<td>This study demonstrates that the exploration population, particularly educated young patients who stick to regular therapy follow-up, is well informed of diabetic problems. The doctor is an essential source of information for the patient.</td>
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<tr>
<td>Alzabarah et al., 2020, 17</td>
<td>A Review of the Literature</td>
<td>Saudi Arabia</td>
<td></td>
<td>Diabetic Retinopathy</td>
<td></td>
<td></td>
<td>In Saudi Arabia, the prevalence of DR has risen dramatically in recent decades. Important risk factors associated with DR include advanced age, long-term diabetes, poor glycemic management, and hypertension. Diabetes education and awareness are linked to improved outcomes and fewer complications.</td>
</tr>
<tr>
<td>Alhama, et al., 2020, 18</td>
<td>Systematic review</td>
<td>Saudi Arabia</td>
<td></td>
<td>All complications</td>
<td></td>
<td>To examine the literature to assess the level of knowledge and attitude toward diabetes complications in Saudi Arabia.</td>
<td>The evidence on diabetes complications knowledge is contradictory. Further large, multicenter studies should be considered to provide an accurate estimate of diabetes complications knowledge and practises.</td>
</tr>
<tr>
<td>Alhamdani, et al., 2018, 19</td>
<td>Descriptive cross-sectional study</td>
<td>Makkah, Saudi Arabia</td>
<td>299</td>
<td>All complications</td>
<td></td>
<td>To assess Makkah population understanding and recognition of diabetes complications signs and symptoms, and to quantify the incidence of diabetic complications occurrence</td>
<td>To broaden powerful patient education and improve sufferers' diabetic control and very own headaches, academic techniques are required. They will assist diabetic sufferers to enhance their self-knowledge and popularity of early symptoms and symptoms and signs of DM headaches, which will save you similarly deterioration, in order to enhance existence fine and boom existence expectancy for those sufferers. Diabetes, awareness, and headaches are all keywords.</td>
</tr>
</tbody>
</table>
Diabetes mellitus is a chronic condition that entails ongoing monitoring and management. Diabetes management issues can lead to a variety of life-threatening consequences [21]. One of the primary reasons of poor diabetes management is patients', caregivers', and physicians' lack of knowledge and behaviour regarding the impacts of diabetes and the importance of adequate blood glucose control [22]. The present systematic study examined the scientific literature to determine the extent to which Saudi diabetes patients were aware of the risks. In this study, we assessed that diabetic patients have a high degree of knowledge of diabetes complications, particularly among young educated patients who follow up regularly.

In Al Bshabshieh et al. [16], a good awareness level was estimated from a male and female mixed sample of 287 examine subjects made up of diabetic patients attending the Diabetes Clinic at Aseer Central Hospital [16], approximately 50.5% of the contributers recorded a high level of consciousness about DM and its complications, whereas only 9.8% had negative consciousness. They also stated that 45.6% of diabetic patients were aware of renal complications, 42.9% were aware of cardiac complications, 41.8% were aware of renal headaches, 39.7% were aware of stroke, and 36.9% were aware of dermatological complications.

These results were similar to Fatani’s et al. [17], reported a good awareness level about diabetes complications in Makkah City. Nearly (80%) of their participants were aware of complications of diabetes mellitus. Another study that was done previously reported lesser results. It showed the level of knowledge of the complications of diabetes mellitus and the majority did not have knowledge about diabetes complications (60.0 %), and only (13.1 %) had adequate knowledge [23]. The following complications were identified by participants in Fatani et al. [17]: eye disease (72.9%), diabetic foot (71.2%), renal disease (56.2%), peripheral neuropathy (53.8%), sexual impairment (42.5%), heart disease (40.1%), high blood pressure (33.1%), sudden death (20.4%), and cerebrovascular disease (18.7%).

Another study by Alghashem et al. [18] found that diabetic individuals had strong knowledge and attitude about diabetic foot as a frequent consequence of diabetes, with the majority of participants (55.1%) scoring 7-8 out of 8 items in Knowledge. Female gender and educational level were crucial factors in raising knowledge of a diabetic foot, with better educated individuals receiving higher evaluation scores.

According to Alasiri et al. [19], only 218 (61%) of 357 participants were aware of Diabetic Retinopathy (DR) as a diabetic consequence. Type 1 diabetes patients were much more aware of DR than type 2 diabetic patients (63.8% versus 36.2%, respectively). These findings are lower than the level of awareness about eye complications obtained by Fatani et al. [17]. According to Alasiri et al. [19], despite the fact that 218 (61%) patients were aware of diabetic retinopathy and 82 (22.9%) patients were aware it could result in blindness, only 179 (50%) of all respondents went for eye checkups and only 71 (19.8%) of patients were compliant on annual eye examination.

On the other hand, the level of knowledge of the Saudi population about diabetic neuropathy symptoms was found unsatisfactory in Basharheel et al. [15]. The study revealed that the average knowledge score for the whole cohort was 3.83 ± 2.893. The maximum knowledge score was 11, whereas the minimum score was zero. Alhashim et al. [24] performed a retrospective cross-sectional study, which reported that the mean score of the level of awareness was 7.1 ± 3.4. However, the number of individuals who know that DM can cause diabetic neuropathy was 56.4%. Furthermore, 27.5% did not understand why this condition occurs with DM. Besides, 20.4% of the individuals had no idea about DN [24]. Also, Shaikh et al. [25] performed a cross-sectional study to determine patients' awareness level regarding DN. When patients were assessed regarding their awareness of DN, only 30% of patients knew about the complications of DM; only 10% of patients knew about DN [25]. Basharheel et al. [15] did not detect a statistically significant difference in knowledge among both genders. However, there was a significantly different among different age groups (<0.001) and educational levels (0.008). An excellent academic level was found to be highly effective in the awareness level in Eman El Sheik et al. [14] as well. They included a total of 379 participants with diabetes.

Diabetes was most usually associated with hypertension. Her 54.6% of patients have a basic understanding of diabetes and its complexities. The most common DM complications identified by participants were: heart disease (6.1%), diabetic foot disease (5.5%), and cerebrovascular disease (1.8%). This is a higher level of awareness about these diseases as complications to diabetes than obtained by Ensaf Mohammad Fatani et al. [17].

Awareness about the positive effect of lifestyle modification in controlling diabetes and prevention of diabetic complications is a significant point to consider.
According to previous research [26], regular exercise improves fasting blood glucose, plasma insulin levels, glycemic control, and insulin resistance. Badedi et al. [27], Al-Aboudi et al. [28], and Ismail et al. [29] investigated diabetes knowledge and behaviour in three different contexts. In three studies [13, 15, 18], patients’ understanding of the importance of controlling blood sugar levels and making lifestyle changes to reduce the incidence of diabetes complexity was painfully low. Patients’ levels of education may influence the specificity of diabetic complications they may experience [27-29]. The Saudi people, in general, were aware of the dangers. Bani et al. uncovered diabetes complexity variables in a large community-based study [30, 31]. They enlisted 2,023 people from the general public and estimated their chance of developing diabetes. They state that the most often identified risk factors include a higher BMI, a family history of diabetes, physical inactivity, and advanced age.

**Conclusion**

In conclusion, we found that the awareness level of Saudi diabetic patients is relatively good, however; more effort should be done to patient education about such a vital subject. Although self-follow-up is common in diabetes because of its chronic nature, the patient should be aware of how to follow up and control his diabetes, and he must be aware of diabetes complications and how to avoid or deal with them. Diabetes awareness and Education Are interconnected with Improved consequence along with lesser complicity.

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**References**


