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Review Article

Nutritional knowledge and related factors among patients with diabetes mellitus: A systematic review

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Abstract

This systematic review endeavors to investigate the extent of nutritional knowledge and related factors among individuals diagnosed with diabetes mellitus. A meticulous and methodical inquiry was conducted across various international electronic databases, including Scopus, PubMed, and Web of Science, alongside Persian electronic databases such as Iranmedex and the Scientific Information Database. Employing keywords derived from medical subject headings such as "knowledge", "diabetes", and "nutrition", the search encompassed literature up to February 1, 2024. The quality assessment of the studies incorporated in this systematic review was conducted utilizing the Appraisal Tool for Cross-Sectional Studies (AXIS tool). A total of 8,779 diabetic patients across fourteen cross-sectional studies were included in the analysis. The evaluation of nutritional knowledge among diabetic patients yielded a mean score of 53.90 out of 100. Numerous factors, including age, level of education, occupation, attitude, and family history of diabetes, demonstrated significant correlations with the nutritional knowledge of diabetic patients. Thus, policymakers and health administrators must prioritize interventions targeting these factors to enhance nutritional literacy among diabetic populations. Collaboration and support from healthcare professionals, particularly nurses, are instrumental in achieving this objective.

Keywords: Knowledge, Diabetes, Nutrition, Systematic Review.

1 | Introduction

Diabetes mellitus (DM) stands as a chronic ailment and ranks among the foremost causes of mortality worldwide. Characterized by a persistent elevation in blood glucose levels, this condition poses significant risks of cardiovascular and renal complications. Such complications, in turn, engender adverse effects on individuals, manifesting in diminished quality of life and decreased life expectancy [1, 2].

To prevent the spread of diabetes in today's societies, collecting information about the level of perception of people in society is the first step to designing and developing a program for the prevention of this disease. Therefore, education to diabetic patients will be more effective when we know the level of knowledge of the patients [3, 4]. In this regard, patients who know about diabetes self-care are usually people who can control their blood sugar better than others in the long term, and as a result, they face fewer complications [5, 6]. Patients have an important role in the control and treatment of diabetes, so it is vital to provide them with self-management training and diet therapy. These trainings can be done by health professionals such as nurses [7]. As it was said, the level of knowledge in diabetic patients is very important, one of the things that is very important is nutritional knowledge, which can be very decisive in the management of the disease [8]. A study conducted in Poland revealed that individuals diagnosed with diabetes exhibit a moderate level of nutritional knowledge [9]. Conversely, findings from a separate study conducted in

Saudi Arabia indicated that patients' nutritional knowledge is notably deficient [10].

Hence, recognizing the significance of nutritional knowledge levels among individuals with diabetes and the absence of a comprehensive review study addressing this aspect, the current review was undertaken to examine the extent of nutritional knowledge and related factors among diabetic mellitus patients.

2 | Methods

2.1 | Study registration and reporting

This systematic review was conducted adhering to the guidelines outlined in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist [11]. Furthermore, it is noteworthy that the present review was not registered in the International Prospective Register of Systematic Reviews (PROSPERO).

2.2 | Search strategy

A thorough and systematic exploration was conducted across diverse international electronic databases, including Scopus, PubMed, and Web of Science, as well as Persian electronic databases such as Iranmedex and Scientific Information Database. This search encompassed the period from the earliest records to February 1, 2024. Utilizing Medical Subject Headings terms, keywords pertinent to the subject matter, such as "knowledge", "diabetes", and "nutrition", were employed. For instance, within the PubMed/MEDLINE database, the search strategy entailed combinations such as (("knowledge") OR ("nutrition knowledge") OR ("dietary knowledge")) AND (("diabetes") OR ("type 2 diabetes")) AND (("nutrition") OR ("diet")). Boolean operators such as "OR" and "AND" were employed to consolidate search phrases. Both English and Persian equivalents were pursued, ensuring inclusivity across relevant databases. The search process was conducted independently by two researchers to ensure comprehensiveness and accuracy. Notably, gray literature, encompassing sources like expert commentary, conference presentations, theses, and research reports, was omitted from this systematic review. Gray literature, distinguished by its lack of formal publication approval by commercial publishers, whether in print or digital formats, was excluded from consideration [12].

2.3 | Inclusion and exclusion criteria

This systematic review focused on cross-sectional studies investigating nutritional knowledge among diabetic patients published exclusively in the English language. Experimental studies, reviews, case studies, conference proceedings, letters to the editor, and qualitative research employing qualitative designs were excluded from consideration.

2.4 | Study selection

For this systematic review, EndNote X8 served as the data management program. Adhering to the predefined inclusion and exclusion criteria, two researchers independently evaluated the titles, abstracts, and full texts of the publications, while also eliminating duplicate studies manually and electronically. In instances of discordance during the study selection process, a third researcher arbitrated the disagreements between the initial reviewers. Subsequently, meticulous scrutiny of the references was conducted to mitigate the risk of data omission.

2.5 | Data extraction and quality assessment

The data extracted for this review by the researchers encompassed several key elements, including the first author's name, publication year, location, sample size, male-to-female ratio, age, and principal findings. Evaluation of the included studies' quality was performed using the Appraisal Tool for Cross-Sectional Studies (AXIS tool), which comprises 20 items rated on a two-point Likert scale: yes (score of 1) and no (score of 0). This tool assesses three main domains: report quality (7 items), study design quality (7 items), and potential biases (6 items). Subsequently, AXIS categorizes study quality into three levels: high (70 to 100%), fair (60 to 69.9%), and low (0 to 59.9%) [13]. The assessment of data quality within the studies was conducted independently by two researchers.

3 | Results

3.1 | Study selection

As depicted in Figure 1, a comprehensive search of electronic resources yielded a total of 2,286 studies. Subsequently, 439 duplicate items were identified and removed from consideration. Among the remaining 1,847 papers, 118 studies were deemed ineligible for inclusion in this systematic review as they did not adhere to the cross-sectional study design criteria. Furthermore, 1,692 articles were excluded due to misalignment with the study's objectives. Thirteen additional studies were disregarded due to inadequate methodology or presentation of results, while five studies were excluded owing to insufficient data availability following a thorough examination of their full texts. Consequently, a total of fourteen studies were retained for inclusion in this systematic review.

3.2 | Study characteristics

As delineated in Table 1, a total of 8,779 diabetic patients participated across fourteen cross-sectional studies. Among the participants cited in references [8-10, 14-24], males comprised 50.75% of the cohort. The mean age of the participants was recorded as 59.46 years (SD=10.20). The geographic distribution of the studies included in this systematic review encompassed diverse locations, including India [8, 17, 18], Poland [9, 22], Sweden [20], India [19], Ireland [15], Trinidad and Tobago (n=1) [24], Jordan [16], Pakistan [14], China [21], Saudi Arabia [10], and Nigeria [23].

3.3 | Methodological quality of included study

As illustrated in Figure 2, all of the referenced studies [8-10, 14-24] were assessed as having high quality. Furthermore, it is noteworthy that nine studies [8, 9, 15-20, 22] did not provide explicit documentation of research limitations, while eleven studies [8, 9, 14-18, 20, 22-24] failed to disclose funding sources or conflicts of interest.

3.4 | Nutritional knowledge among patients with diabetes

As indicated in Table 1, the mean nutritional knowledge score among diabetic patients, as reported in six studies [9, 10, 15, 16, 20, 24], was recorded at 53.90 out of 100. This denotes a moderate level of knowledge among the study participants.

3.5 | Factors related to the nutritional knowledge of patients with diabetes

As delineated in Table 1, the educational attainment of diabetic patients [16, 21] and family history of diabetes [16] demonstrated a statistically significant positive association with nutritional knowledge. Conversely, nutritional knowledge exhibited a significant positive correlation with adherence to DM dietary recommendations [8, 18], as well as with metrics such as the percentage of energy derived from sugar, non-milk sugar intake, and fruit/vegetable consumption [15] alongside attitude [19]. Additionally, nutritional knowledge displayed a statistically significant negative relationship with age [9] and dietary glycemic index [15]. Moreover, the findings indicated a significant relationship between occupation and nutritional knowledge [16].

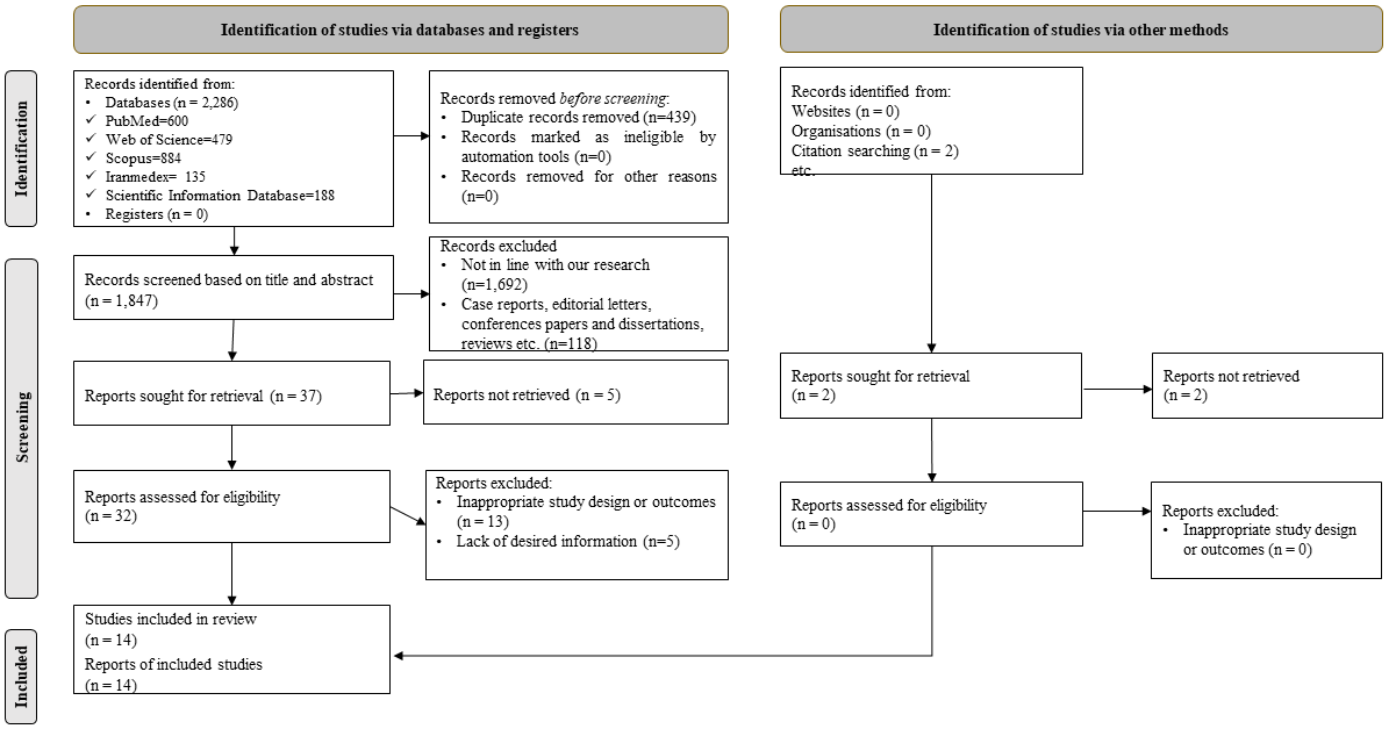

Figure 1. Flow diagram of the study selection process.

Table 1. Basic characteristics of the included studies in this systematic review.

First Author/ year	Location	Sample size	M/F ratio (%)	Age (mean±SD)	Key results	AXIS Score
Karlander *et al.*,1980 [20]	Sweden	317	41.64/ 58.36	58.47 (SD= 6.20)	The mean score of patients' knowledge about nutrition was 64.90 (SD= 8.90).	High
***Jain et al.*, 2012 [19]**	India	251	74.50/ 25.50	N/A	Level of knowledge: • 58.57% of patients had average knowledge. • 43.43% of patients had poor knowledge There was a positive relationship between knowledge and attitude (r=0.6).	High
Łuszczki *et al.*, 2015 [22]	Poland	300	65.00/ 35.00	N/A	Level of knowledge: • 73.67% of patients had good knowledge. • 26.33% of patients had poor knowledge	High
Breen *et al.*, 2015 [15]	Ireland	118	64.41/ 35.59	57.40 (SD= 5.70)	The mean score of patients' knowledge about nutrition was 59.20 (SD=16.40). There was a positive relationship between nutrition knowledge and mean EI: BMR ratio (P<0.005). Also, there was a positive relationship between nutrition knowledge and the percentage of energy from sugar (P<0.001). On the other hand, there was a positive relationship between nutrition knowledge and non-milk sugar intake (P<0.001). Also, there was a positive relationship between nutrition knowledge and fruit/vegetable intake (P<0.001). There was a negative relationship between nutrition knowledge and dietary glycemic index (P<0.002).	High
Napierała *et al.*, 2016 [9]	Poland	250	50.40/ 49.60	66.80 (SD= 9.70)	The mean score of patients' knowledge about nutrition was 52.70. There was a negative correlation between nutrition knowledge and age (rs= −0.14; P<0.01).	High
Webb *et al.*, 2016 [24]	Trinidad and Tobago	122	37.70/ 62.30	59.28 (SD= 11.69)	The mean score of patients' knowledge about nutrition was 5.40 (SD=0.98).	High
El-qudah *et al.*, 2016 [16]	Jordan.	180	0/100	N/A	The mean score of patients' knowledge about nutrition was 43.38. There was a positive relationship between education level and nutrition knowledge (P=0.001). Also, there was a positive relationship between family diabetes history and nutrition knowledge (P=0.014). there was relationship between occupation and nutrition knowledge (P=0.037).	High
Bano *et al.*, 2017 [14]	Pakistan	142	57.04/ 42.96	N/A	Level of knowledge: • 19.01% of patients had good knowledge. • 80.99% of patients had poor knowledge. There was a significant relationship between gender and knowledge (P<0.001).	High
Li *et al.*, 2017 [21]	China	6441	52.48/ 47.52	60.20 (SD= 13.14)	Level of knowledge: • 37.21% of patients had good knowledge. • 62.79.43% of patients had poor knowledge There was a positive relationship between females and nutrition knowledge (P=0.001). Also, there was a positive relationship between education level and nutrition knowledge (P<0.001).	High
Ansari *et al.*, 2019 [10]	Saudi Arabia	155	47.10/ 52.90	54.46 (SD=12.00)	The mean score of patients' knowledge about nutrition was 43.22 (SD= 14.85).	High
Olatona *et al.*, 2019 [23]	Nigeria	342	64.33/ 35.67	59.60 (SD= 13.00)	Level of knowledge: • 36.55 % of patients had good knowledge. • 52.92% of patients had average knowledge. • 10.53% of patients had poor knowledge.	High
Fanny *et al.*, 2021 [17]	Indonesia	30	N/A	N/A	Level of knowledge: • 90.00 % of patients had healthy knowledge. • 6.67% of patients had enough knowledge. • 3.33% of patients had Not enough knowledge	High
Harahap *et al.*, 2023 [18]	Indonesia	37	78.38/ 21.62	N/A	Level of knowledge: • 54.05 % of patients had good knowledge. • 27.03% of patients had average knowledge. • 18.92% of patients had poor knowledge. There was a positive relationship between nutrition knowledge and DM diet adherence (P=0.017).	High

First Author/ year	Location	Sample size	M/F ratio (%)	Age (mean±SD)	Key results	AXIS Score
Bar *et al.*, 2023 [8]	*Indonesia*	94	39.36/ 60.64	N/A	Level of knowledge: • 47.68 % of patients had good knowledge. • 55.32% of patients had poor knowledge. There was a positive relationship between nutrition knowledge and DM diet adherence (P<0.0001).	High

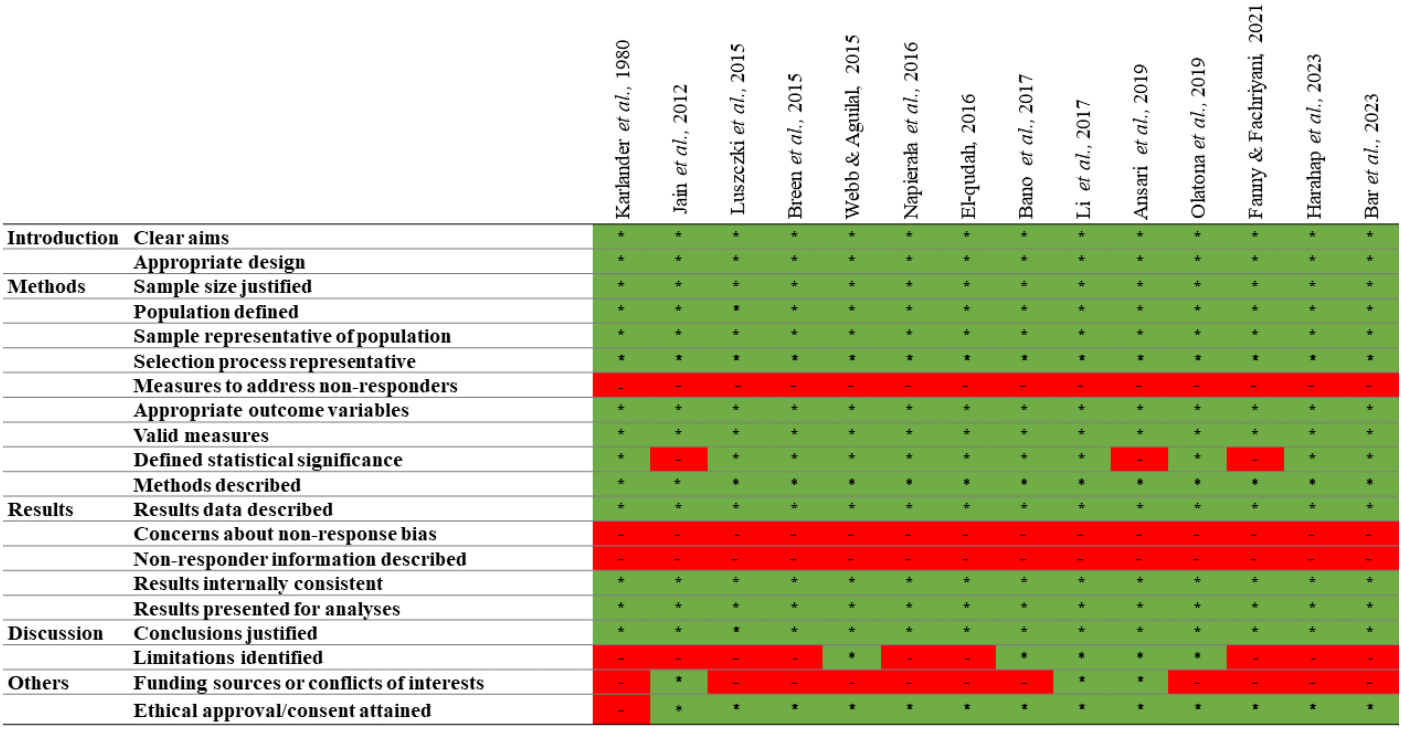

Figure 2. Assessment of the quality of the included articles.

4 | Discussion

The results of the current study, which included 8,779 diabetic patients in fourteen cross-sectional studies, showed that the knowledge of diabetic patients regarding nutrition is average. Factors including education level, age, family diabetes history, occupation, attitude, DM diet adherence, percentage of energy from sugar, and dietary glycemic index were related to the knowledge of diabetic patients.

DM represents a chronic condition characterized by insufficient insulin production by the pancreas or impaired insulin utilization within the body. Consequently, diabetic patients often experience hyperglycemia. Inadequately managed hyperglycemia poses significant risks of detrimental effects on various bodily systems, including nerves and blood vessels [25, 26]. Lifestyle modifications, particularly dietary management, stand as effective interventions for diabetic patients. Dietary adherence plays a pivotal role in the successful management of diabetes [27]. Therefore, possessing an adequate level of nutritional knowledge is paramount for diabetic patients. The findings of this systematic review revealed that the nutritional knowledge level among diabetic patients is moderate. However, this level of nutritional proficiency may be influenced by factors such as age, family history of diabetes, occupation, attitude, and educational attainment [9, 16, 19].

As demonstrated in this study, educational attainment emerges as a factor significantly associated with nutritional knowledge among patients [16]. Consistently, research conducted in Australia indicates a positive correlation between education level and nutritional knowledge, suggesting that individuals with higher education tend to possess greater nutritional knowledge [28]. Conversely, the present investigation highlights age as another factor influencing patients' knowledge [9]. However, findings from Australian studies suggest a contrasting relationship between age and nutritional knowledge, indicating a positive association between age and nutritional knowledge among individuals [29]. Therefore, health policymakers and managers are encouraged to consider these factors related to nutritional knowledge when devising strategies to enhance the knowledge levels of diabetic patients.

4.1 | Limitations

Several limitations were encountered in this systematic review. The heterogeneity observed among the included studies precluded the feasibility of conducting a meta-analysis. However, despite this limitation, the systematic methodology employed for data collection, organization, and analysis remained robust. Additionally, despite efforts to conduct a comprehensive search across various electronic databases, it is possible that some relevant studies in the field were inadvertently excluded. Moreover, the inclusion criterion restricted the review to studies published only in the English language, potentially leading to the oversight of studies published in other languages.

4.2 | Implications for nursing managers and policymakers

Given the critical role of dietary management and nutritional understanding in mitigating complications among individuals with diabetes, healthcare policymakers and administrators must enhance awareness and knowledge in this domain. This can be achieved through targeted efforts aimed at addressing factors associated with nutritional knowledge among diabetic patients.

4.3 | Recommendations for future research

It is recommended that additional interventional and comparative studies be undertaken to explore the impact of age, educational attainment, occupation, and family history of diabetes on the nutritional knowledge of diabetic patients.

5 | Conclusions

The outcomes of this systematic review, encompassing 8,779 diabetic patients across fourteen cross-sectional studies, indicate an average level of nutritional knowledge among this population. Thus, there exists an opportunity for policymakers and healthcare managers to enhance nutritional literacy among diabetic patients by prioritizing factors associated with nutritional knowledge, including age, education, occupation, attitude, family history of diabetes, adherence to DM dietary guidelines, percentage of energy derived from sugar, dietary glycemic index, and the collaborative support of healthcare professionals such as nurses.

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Authors' contributions

Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work: MRK, MA, PT; Drafting the work or revising it critically for important intellectual content: MRK, MA, PT; Final approval of the version to be published: MRK, MA, PT; Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved: MRK, MA, PT.

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Ethics approval and consent to participate

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Competing interests

We do not have potential conflicts of interest with respect to the research, authorship, and publication of this article.

Availability of data and materials

The datasets used during the current study are available from the corresponding author on request.

Using artificial intelligent chatbots

None.

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