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Dietary Knowledge Attitude Practice among Patients with Diabetes Mellitus: A Systematic Review

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Abstract

Diabetes mellitus (DM) is one of the chronic diseases comprising spectrum of physiological dysfunctions and metabolic disorders with higher prevalence worldwide. Increased prevalence of diabetes mellitus is strongly associated with the changing life styles. The role of diet in the aetiology of diabetes mellitus has been proven. The risk of diabetes can be reduced by having good quality food and healthy diet. Thus, this study has proposed a systematic review on dietary knowledge of diabetic patients. There were 4031 original research articles reviewed followed by PRISMA guidelines, among which only 11 articles satisfied all the considered inclusion and exclusion criteria and subjected to risk of bias analysis. According to the studied articles, the patients have poor knowledge on healthy diet and nutritional aspects of diabetes. The lifestyle and attitude of diabetic patients are not enough satisfactory, which may be due to the less education and economical status. Thus, the present systematic review has drawn a conclusion with requirement of increase awareness and education on healthy diet patterns among diabetes mellitus patients to develop their dietary status, selfcare and lifestyle, which will help to reduce the risk of diabetes progression in the patients.

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Keywords

Diabetes mellitus; Dietary Knowledge; Attitude; Practice; Self-management

Introduction

Diabetes mellitus (DM) is a group of metabolic diseases characterized by hyperglycaemia resulting from defects in insulin secretion and/or action. It is responsible for serious long-term damage, dysfunction and failure of different organs, like eyes, kidneys, nerves, blood vessels and heart (1), leads to life threat impact on individuals and societies worldwide. According to the statistical estimations diabetes is one of the among top 10 causes of death in human being, which caused 4 million deaths globally in 2017 (2). According to a latest international diabetes federation by 2045, diabetes can affect approximately 783.3 million people worldwide (3).

There are three main types of diabetes mellitus i.e., type I, type II and gestational, classified by American diabetes association (4). Among these, type II diabetes mellitus accounts for approximately 90%-95% of the total cases. Patients with type II diabetes are mostly having obesity. The increased risk of developing this type of diabetes is associated with age, obesity and lack of physical activities with normal or elevated level of insulin (1). Like type II diabetes mellitus, it has been estimated that immune mediated type I diabetes cases are also increasing and taking part in progression of diabetes prevalence (2). However, type I diabetes accounts for only 5-10% of all cases with rapid or sometimes slow B cell destructions in individuals (1). Apart from these,

gestational diabetes mellitus has also been recognized as a global public health burden, causes mortality in both mother and infant worldwide. Patients with gestational diabetes having high risk of developing type II diabetes mellitus and cardiovascular diseases (5). All these three types of diabetes mellitus have increased risk of lifelong health issues in the individuals; thus, proper medication is required at early stage.

However, it has been observed that the increased prevalence of diabetes mellitus is due to the changing lifestyles of people, which causes obesity and pushed to being overweight (6). Food intake including both type and quality of diet is one of the major factors, strongly associated with obesity, leads to diabetes progression (7). It has been studied that excessive consumption of oil, flour and sugar; high carbohydrate and fats, red meat, fried foods intake contributes to the development of diabetes (7). Meanwhile nutrients and fiber rich foods like fruits and vegetables reduce the risk of having diabetes mellitus. Thus, diet is one of the integral parts of the diabetes treatment and prevention (8). Healthy lifestyle, physical activities and proper dietary pattern according to the therapeutic objectives should be adapted by the individuals at early ages (6-8), because systematic lifestyle and healthy diet can reduce the risk of diabetes by 58-60% and positively affect the quality of life (9).

Meanwhile, as per the previous studies, the patients with high risk of type II diabetes mellitus have poor and unsatisfactory dietary knowledge and unable to understand the importance of diet in diabetes management (7). The significant positive relationship between dietary knowledge and practice of diabetes patients indicates their understanding of dietary guidelines which influenced their food selection and eating patterns. Self-dietary management is defined as the key step to provide knowledge on medications, and nutritional aspects knowledge to the diabetic patients by American diabetes association. Thus, to control diabetes mellitus patient's dietary knowledge, attitude and self-management practice should be improved (7).

By concerning every aspect, it has been observed that patients require reinforcement of education on dietary management, self-care, quality lifestyle for better understanding of diabetes management. Patients should have good and satisfactory knowledge about the diet, because effective dietary education may avoid the onset of diabetes and its complications (7). Therefore, this present study has proposed to do a dietary intervention by observing the dietary knowledge and practice of

diabetes mellitus patients through a systematic review, which can be useful for managing people by implementing new educational approaches and awareness to manage diabetes mellitus.

Materials and Methods

Article Collection

A systematic review of the literature was carried out by following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The research articles were searched in publicly available literature databases, including leading databases using MeSH terminologies "Dietary knowledge AND practice AND diabetes mellitus patients"; "Dietary knowledge AND attitude AND diabetes mellitus patients"; "Dietary knowledge AND questionnaire AND diabetes mellitus patients", "Dietary knowledge AND diabetes mellitus patients". The articles were screened by following the inclusion and exclusion criteria.

Inclusion Criteria

Articles with information on dietary knowledge, attitude and practice on healthy diet of diabetes mellitus patients.

- Articles should be written in the English language.
- Original research articles should be freely available in full length.
- Patient's information should be mentioned clearly.

Exclusion Criteria

- Review articles, letters to the editor, discussions, case reports, meta-analyses, abstracts, paid articles, articles in other languages, etc.
- Articles with unwanted data such as diseases except diabetes mellitus; other factors of diabetes instead of dietary information etc.
- Articles with missing patient information, without any information on patient's dietary knowledge.

Article Screening Process

The collected articles followed by the used MeSH terms were primarily filtered as open access research articles studied on human samples. The filtered articles were again screened based on the followed inclusion and exclusion criteria mentioned above. Articles with required information especially the observed dietary knowledge, practice and attitude on appropriate diet of

diabetes mellitus patients were subjected to further risk of bias analysis.

Data Retrieval

The collected articles were screened manually and retrieved the required data, including author's information, publication year, PubMed IDs, number of studied diabetes mellitus patients, population, knowledge and practice on healthy diet for diabetes mellitus, type of diabetes mellitus, no. of patients with good and poor dietary knowledge. The retrieved data were organized and analysed under PICO format as follows;

P: Population- Diabetes mellitus patients

I: Intervention- Number of patients with satisfactory dietary knowledge

C: Comparator- Number of patients with unsatisfactory dietary knowledge

O: Outcome- Overall knowledge and/or practice and/or attitude of patients on appropriate diet of diabetes

Risk of Bias Analysis

The retrieved data were analysed using the Cochrane risk of bias tool for randomized trials (RoB 2) through R programming. The risk of bias analysis was based on five possible domains of bias, i.e. (D1) Bias arising from the randomization process, (D2) Bias due to deviations from intended interventions, (D3) Bias due to missing outcome data, (D4) Bias in the measurement of the outcome and (D5) Bias in the selection of the reported result. The inputs under each domain lead to generating the graphical representation as "low risk of bias," "some concerns," or "high risk of bias" (7).

Results and Discussion

Study Selection

A total of 38,072 articles were searched through various online repositories, including PubMed (3180), ScienceDirect (36,672) and Cochrane database (220) followed by the used MeSH terminologies. Among these search results, only 4031 articles were further considered after filtered with open access research articles studied on human species in PubMed (1075), Science Direct (2956). The followed inclusion and exclusion criteria screened the articles again through which only 11 studies satisfied all the criteria and were subjected to risk of bias analysis, as those contained all the needful PICO data required.

Study Characteristics

The included studies were published between 2014 to 2022. A total of 2892 number of populations i.e., diabetes mellitus patients of varied aged group between 16-86 years old were involved in the considered studies, among which 1400 patients were considered under the intervention group i.e. had satisfactory or good dietary knowledge, and 1492 patients were under the comparator group i.e. had unsatisfactory or poor dietary knowledge (Table 1). It has been observed that most of the patients had poor and inadequate knowledge on appropriate diet for diabetes mellitus and needed to provide more awareness and education regarding the proper dietary intake like food and nutrition to the diabetes patients.

The knowledge test of the patients was done through questionnaires includes basic knowledge about diabetes especially food (about sugar, carbohydrate, fat, nutrients, vegetables, fructose related food etc), lifestyle, attitude and practice. The studies followed different scoring algorithms for the knowledge test of the patients to classify them under the intervention and control group i.e., satisfactory and unsatisfactory knowledge group respectively. Among the 11 studies, four studies observed higher number of patients under unsatisfactory knowledge group in comparison with satisfactory knowledge group. Whereas, remaining seven studies reported a greater number of patients under intervention group than the control group. However, the overall observation of all the studies was requirement of more awareness, self-management education and improvement in nutritious healthy diet for the diabetes mellitus patients at early onset.

The geographic locations of considered studies were Islamabad, Ethiopia, Ireland, South Africa, Saudi Arabia, North Africa, Italy, Australia and Nepal. All the patients were diagnosed with three main types of diabetes mellitus types i.e., type I, type II and gestational. The mostly studied type is Type II diabetes mellitus.

The duration of diabetes in studied patients varied between 3 years to 10 years. The followed medications by the patients were oral hypoglycaemic agents, insulin and combined therapy of both hypoglycaemic and insulin, whereas patients also had homeopathy and herbal medications reported in some of the articles. Most of the articles don't have mentioned about the disease duration and medication history of the patients.

The educational qualifications of the patients have also been considered in each study. From the available educational information, 34.54% of patients have primary and secondary education (Schooling) mostly. Very less patients i.e., 5.84% of patients have completed the higher secondary education. 15.28% of patients were illiterate and had informal education. The socio-economical status of the patients was varied between patients.

It has observed that the patients with higher education and good economic status have good diabetes dietary knowledge and acceptable dietary pattern and followed healthy lifestyle in comparison with less educated and below poverty individuals.

Statistical Analyses

All the observed data including randomization, intended interventions, outcome data, missing outcome and report selection under five domains were noted from the considered 11 articles and were subjected to the risk of bias analysis.

The risk of bias analysis was done for each study, which predicted a low risk of bias under each domain for all the eleven studies (Fig. 2). Only study 2 showed unclear risk of bias under domain 2 (D2) due to missing intended information. The overall study of biasness was represented in the risk of bias plot (Fig. 3), including “low risk of bias”, “some concerns of biasness” and “high risk of bias” represented with green, yellow and red colour respectively in the graph. The overall biasness has been observed as low risk of bias.

Diabetes mellitus is rising to an alarming epidemic level, which needs an early diagnosis and prevention. Apart from genetic associations, non-genetic factors like life style, diet and attitude are also highly influencing the prevalence of diabetes mellitus (4). Less physical activities and unhealthy food intake significantly proportional to the diabetes progression in individuals. To address this worldwide issue, this study has successfully done a PRISMA guideline based systematic review and screened eleven original research articles with all the required data on patient’s dietary knowledge for diabetes mellitus.

All the reviewed eleven articles by this present systematic review observed the dietary knowledge of the

diabetic patients throughout the world, by accessing their answers to the basic diabetic diet related questionnaires. Among the considered studies some studies were reported unsatisfactory diabetes dietary knowledge practice of patients (10-16). However, some patients evaluated with good and satisfactory dietary knowledge and attitude (17-20). But all the studies have mentioned about the requirement of dietary education and awareness to influence people about the nutritional values, healthy diet and lifestyle.

But meanwhile some studies were also discussed about the socioeconomical conditions of the patients, which are highly affect their type of life style and food habits. Not only knowledge but also accessibility, availability and affordability of food are displaying another possible cause of patient’s unhealthy diet and negative attitude and associated with dietary type (good/bad) (17, 21).

Lower socioeconomic condition or below poverty of people limit the accessibility and affordability of various food options, well-balanced diet, they required. Therefore, most of the patients to denied to acceptable lifestyle (10, 13, 18, 20).

Educational qualification was also taken into consideration as a cause behind poor diabetes dietary knowledge of the patients. In the reviewed studies, the participants (diabetic patients) were under primary and/or secondary education. Some of the participants are illiterate. People with illiteracy or low literacy had difficulties during reading the food labels and unaware of caloric content. People with less education had poor knowledge whereas high educated or professional people showed good dietary knowledge. Thus, education is also considered as an important influential factor (12, 13, 17).

However, Diabetes dietary knowledge is a significant contributor to the improvement of eating habits and lifestyle (21). High quality dietary education could expand patient’s knowledge towards consumption of preferred food including higher fiber, lower sodium, fat, sugar related food for diabetic health (22). It will help the individuals to measure their blood glucose, proper medications, adjust their dietary habits to reduce the difficulties long-term diabetes mellitus (23).

This present systematic reviewed articles showed statistically low risk of bias, representing confidential adequate reviewed data.

Table.1 The study selection was represented through the PRISMA flow diagram.

Sl. No.	Studies	No. of Cases	Satisfactory Knowledge	Unsatisfactory Knowledge	Study Location	Type of Diabetes Mellitus	Review
1	Shams <i>et al.</i> , 2016 (PMID: 28718543)	183	94	89	Islamabad	Type II	Public awareness programs are required
2	Ruszkiewiiz <i>et al.</i> , 2020 (PMID: 32519814)	303	165	138	Poland	Type I & Type II	The level of knowledge of the examined patients was unsatisfactory
3	Jemal <i>et al.</i> , 2022 (PMID: 36001578)	371	157	214	Ethiopia	Type 1 & Type 2	The proportion of good practice is found to be lower for both dietary
4	Breen <i>et al.</i> , 2015 (PMID: 26169113)	118	71	47	Ireland	Type II	Subjects have lower nutrition knowledge
5	Okonta <i>et al.</i> , 2014 (PMID: 26245424)	217	58	159	South Africa	Type II	Knowledge about diabetes mellitus is poor
6	Sami <i>et al.</i> , 2020 (PMID: 32102378)	350	152	198	Soudi Arabia	Type II	Diabetes self-management educational programs should be provided on a regular basis with a special emphasis on diet and its related components to improve the knowledge
7	Adam <i>et al.</i> , 2021 (PMID: 34394278)	238	130	108	Sudan, North Africa	Type II	Improvement should be increase in knowledge
8	Sami <i>et al.</i> , 2020 (PMID: 32019083)	350	250	100	Soudi Arabia	Type II	Poor dietary knowledge was observed related to the consumption of carbohydrates and food choices
9	Arghittu <i>et al.</i> , 2022 (PMID: 36141484)	321	224	97	Italy	Type I & Type II	The overall level of knowledge about the role of food and proper nutrition with respect to the risk of diabetes and its complications appeared to be generally unsatisfactory and inadequate
10	Sayakhot <i>et al.</i> , 2016 (PMID: 27495978)	56	35	21	Australia	Gestational	Improvement is required for significant dietary knowledge
11	Parajuli <i>et al.</i> , 2014 (PMID: 25344089)	385	48	337	Nepal	Type II	Poor knowledge about diabetes mellitus

Fig.1 PRISMA flow diagram of systematic review

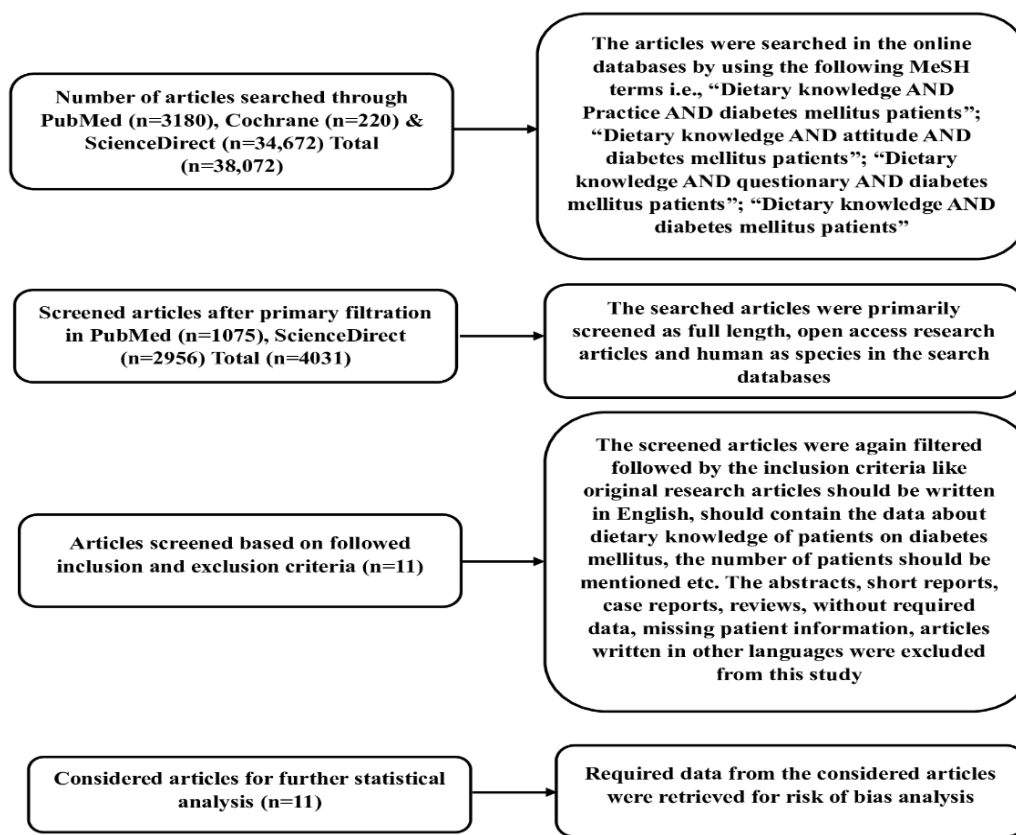


Fig.2 Graphical representation of risk of bias analysis of individual studies

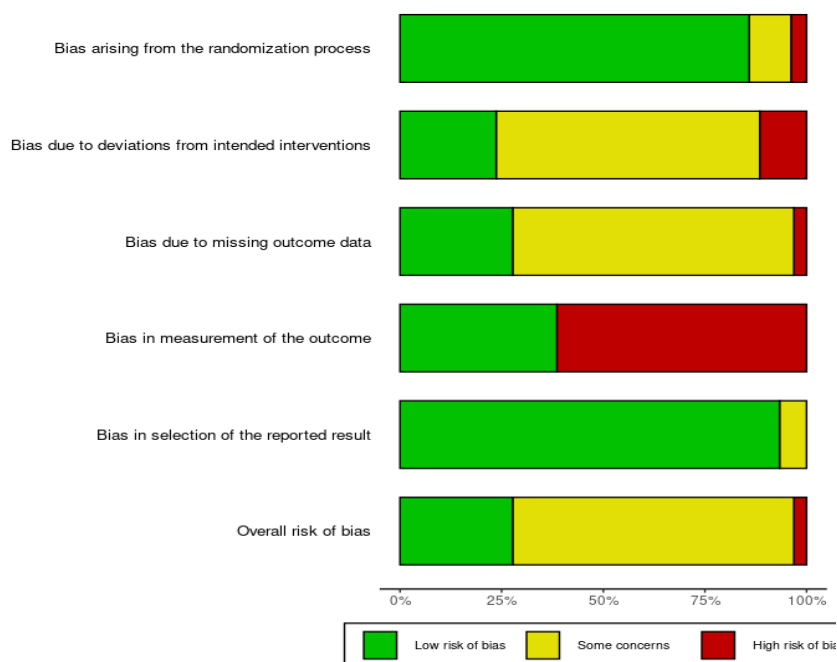


Fig.3 Schematic presentation of summary of risk of bias analysis

		Risk of bias domains				
		D1	D2	D3	D4	D5
Study	S1					
	S2					
	S3					
	S4					
	S5					
	S6					
	S7					
	S8					
	S9					
	S10					
	S11					

D1: D1
D2: D2
D3: D3
D4: D4

Judgement

 Unclear

 Low

This study has clearly represented the adequate dietary plan, healthy lifestyle practice, patient's dietary knowledge, influencing factors behind the good and poor diets, and the required education for improved self-care. This reviewed information may help the dieticians, nutritionist, doctors to guide the diabetic patients according to various therapeutic values.

In conclusion, the root of long term metabolic and physiological dysfunctions i.e., diabetes mellitus could be minimized by changing lifestyle including diet plans and self-management practice. According to the reported studies, diet is strongly associate with the prevalence of diabetes mellitus. The choice of food can affect patient's health care conditions at a higher risk. Thus, this study

has reviewed the patient's knowledge observational studies, and concluded that the diabetic patients are very poor in dietary knowledge and inadequate attitude towards the disease management, which can majorly hamper their lives as well as societies throughout the world. Therefore, the education and awareness should be maximized for the patients, through which they may concern about the nutritional aspects, medications, rich dietary patterns and self-care management.

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