Non-pharmacological interventions to manage type 2 diabetes mellitus

Mamoona Javed*

Department of Gastroesophageal Reflux, University of Hygiene and Tropical Medicine, Romford, London, UK

Abstract

Objective: To explore the effectiveness of non-pharmacological interventions in the management of Type 2 Diabetes Mellitus in Saudi Arabia.

Data Sources and Methods: A systematic search of medline, embase, Science Direct, central and Google Scholar was conducted to identify the relevant articles. A detailed inclusion-exclusion criterion was developed and implemented to screen the abstracts and full-texts. We extracted study data from eligible studies into a data extraction form and categorised into various themes to answer our research question.

Study Selection and Themes: Thirty-one studies categorised into three themes were included in this review. The evidence was compiled to report the effectiveness of physician-patient communication and the impact of physician knowledge and skills to help patients to manage their diabetes. This review also evaluated patients' attitude, behaviour and care plan compliance to control their diabetes mellitus. Moreover, this review explored the evidence of effectiveness of other non-pharmacological interventions including exercise and herbal remedies.

Conclusion: There is some evidence that good physician-patient communication, patients' disease knowledge and disease management skills, exercise and certain herbal remedies are effective to control Type 2 Diabetes Mellitus. However, majority of these studies were conducted focusing on specific regions and with a small sample size using convenience sampling. Given the importance of non-pharmacological interventions in the management of T2DM, there is an urgent need for conducting large clinical studies to address this gap in the evidence.

Keywords: Type 2 diabetes mellitus, Non-pharmacological interventions, Physician-patient communication, Herbal remedies.

Accepted on 21 April, 2021

Introduction

Diabetes mellitus, a complex metabolic disorder, is related to different underlying causes for hyperglycaemia. Type 2 Diabetes Mellitus (T2DM), the most common type of diabetes, constitutes 90% of all diabetes [1]. T2DM, also called insulin resistance, causes weakness, tiredness and exhaustion in patients along with other symptoms, including frequent urination, excessive thirst, drowsiness, blurred vision. These symptoms cause a chemical imbalance in the blood related to high levels of blood glucose. Over time, high blood glucose can cause damage to blood vessels which can damage the organs these vessels supply, which can lead to further health complications. Damage to micro blood vessels can cause loss of sight, nerve damage and kidney disease. Damage to macro blood vessels can lead to cardiovascular complications such as heart disease, stroke and poor blood circulation.

Diabetes is one of the fastest-growing health challenges of this century, with the number of adults living with diabetes has more than tripled over the past 20 years. The rising prevalence of diabetes mellitus is the result of a complex interaction among genetic, environmental, socioeconomic and demographic factors. This continued surge in mainly due to the dramatic rise in T2DM, which is the seventh leading cause of mortality. The latest atlas by International Diabetes Federation reported that approximately 54.8 million adults (12.8%) aged 20-79 years had DM in the Middle East and North Africa Region (MENA). Diabetic population in the MENA region is estimated to be double by 2045. Saudi Arabia is ranked 4th in the top five countries for the number of people with diabetes (20-79 years) among the MENA countries. IDF predicts that approximately one-quarter of Saudi adults will have diabetes [2].

Although T2DM is labelled a chronic progressive disease, it is reversible if diagnosed and treated promptly at early stages. Pharmacological interventions are available to control this ailment. However, self-management and lifestyle changes are critical in diabetic care and attaining T2DM control. This disease not only affects health-related quality of life but also is a substantial economic burden on healthcare [3]. In addition to that, T2DM negatively affects patients' quality of life, limits their social activities and reduces their energy and vitality. Furthermore, inadequate glycemic control may lead to micro- and macro vascular complications. Therefore, it is essential to learn which pharmacological interventions are most effective and how to improve patients' knowledge and skills to enable them to play their role in their journey back to a normal or near-normal life.

This review is, therefore conducted to summarise the currently available literature, to understand Saudi patients' knowledge, attitude and behaviour to manage their T2DM.

Objectives

Objectives of this review include

To understand the impact of patient-physician communication

To learn the extent of physicians' knowledge and skills

To determine the breadth of patients' knowledge and understanding of their disease

To review patients' willingness to learn and educate themselves about their illness

To explore the use of non-pharmacological interventions

Materials and Methods

We systematically searched Medline, Embase, Science Direct, Cochrane Central Register of Controlled Trials (CENTRAL) and Google Scholar for this review. All five databases were searched from inception to retrieve the relevant literature. A search strategy was developed using relevant keywords, Medical Subject Headings and the controlled vocabulary used by each database. The search strategy used for Medline and Embase is reported in the Supplementary Material [4].

All published clinical studies were eligible for inclusion in this review. We, however, excluded letters to the editor, editorials, expert opinions, case studies and case series. The search was narrowed by applying filters to limit the studies only to the English language and human. The search was designed to retrieve the studies conducted on the Saudi population. However, we also included the studies which encompassed any other population in addition to the Saudi population.

The studies were screened in Microsoft Excel [5]. Primary research studies relevant to T2DM in the Saudi population, reporting patients' knowledge, attitude and adherence to the treatment regimen and lifestyle changes, and the physician's perspective was included in our research.

Results

Physician's knowledge and communication

Physician-patient communication is essential to build a patients' trust in their physician and prescribed treatment. IntroDia, a large multinational study of patient-physician communication during early T2DM treatment, was conducted to investigate the patients' experiences on the prescription of an additional Oral Antibody Drug (OAD) [6]. The authors surveyed 4235 T2DM patients in 26 countries (including Saudi Arabia) via an online self-report questionnaire. The data were also collected on the overall Patient-Perceived Communication Quality (PPCQ) and the patients' efforts to delay new addition in their treatment regimen. The authors used Exploratory Factor Analysis (EFA) to group conversation elements into patient- perceived dimensions to identify the underlying factors. They found that PPCQ was positively associated with Encouraging (β=+1.252, $p<0.001$) and Collaborative (β=+1.206, $p<0.001$), but negatively associated with Discouraging (β= −0.895, $p<0.001$).

Better PPCQ at add-on was associated with lessdiabetes distress, greater well-being and better self-care at the present time. The authors found that 46% of Saudi patients requested their doctor to delay additional medication, however,remaining 54% who did not discuss the matter with their physician reported significantly better mean PPCQ, lower diabetes distress, improved well-being and self-care [7].

The two-way communication not only encourages the patients to discuss their condition and relevant experiences with their physician but also motivates them to follow strict compliance with their care programme. However, physicians must have sufficient knowledge and skills to do their job. A study conducted to assess the knowledge among PHC physicians reported that just under three-quarters of primary care physicians do not have sufficient knowledge. Similar results were reported, who noted that two-thirds of the physicians did not even know the correct angel of insulin injection and over a quarter of physicians did not know the exact diagnostic criteria of T2DM.

Patients' knowledge, attitude and behaviour

Patients' attitude, behaviour and care plan compliance are highly contributive to the success of T2DM management. Dietary attitude plays a significant role in T2DM management. Right dietary knowledge and education are critical for T2DM patients to make essential changes in their dietary attitude. However, there appears to be a significant gap in people's knowledge and understanding of food selection and the impact of food choices on diabetes. We have found a large number of studies reporting a lack of awareness among T2DM patients. Reported poor dietary knowledge in Saudi adults with type 2 diabetes mellitus. Similar results were published in other observational studies conducted in diabetic Saudi women. Likewise, inadequate knowledge and attitude were reported in a study conducted to understand T2DM patients knowledge regarding Ramadan fasting [8].

Adherence to prescribed medications is a crucial factor in T2DM control and management. Medication adherence is, however, affected by people's beliefs about medicines and diseases. An observational study conducted to investigate patients' perceptions and beliefs about their illness found a strong association between non-adherence and beliefs about medicines and God locus of health. There is also a strong association between disease knowledge and medication adherence. Patients with good knowledge and understanding of their medical condition are more likely to follow their prescribed regimen. Reported similar results for diabetes self-management, emphasising the importance of T2DM knowledge for patients. Lack of knowledge and relevant skill also prevent the patient from using prefilled injections. However, evidence suggests that most of the patients are willing to learn more about their condition and its management and that the patients' attitude change positively following suitable guidance and education. Patients' glycaemic control significantly improved ($p<0.05$) following 12-month Multidisciplinary Intensive Education Programme (MIEP). Patients felt more confident and willing in injecting

medications. Similar results were reported. The authors enrolled 465 diabetic patients on a health education programme to evaluate the impact of diabetic health education on glycaemic control for T2DM patients. After 12-month, there was a significant reduction in HbA1c ($p<0.012$), demonstrating the effectiveness of training on glycaemic management [9].

In addition to education programmes delivered by the care team, T2DM patients explore online health resources to search for tips and advice to control their disease. Although, this seems appealing that people are interested to learn and make an effort to manage their condition; it is likely that they come across and follow misleading information without evaluating its credibility.

Self-management is an integral part of T2DM care plan. However, evidence suggests that patients do take foot care and medication intake seriously but pay the least attention to exercise and blood sugar testing behaviours. Although monitoring of blood glucose is one of several steps in T2DM management, it has a positive impact on glycemic control and is an effective intervention in reducing HbA1c in diabetic patients. The patients, however, need to take to manage their illness by incorporating lifestyle changes and care-plan compliance. In addition to this, family support and an excellent patient-physician relationship also contribute to better glycemic control [10].

A major cause of non-adherence is lack of knowledge. The patients' illiteracy, inadequate skills to inject insulin and unawareness about the consequences of non-adherence are the main contributors in non-adherence. Surprisingly, non-adherence is higher in T2DM patients with comorbidities. T2DM patients with comorbidities are generally more susceptible to Medicine-Related Problems (MRPs), and non-adherence to treatment regimens can cause complications of their already existing medical conditions. Therefore, there is a need to incorporate a comprehensive knowledge and education programme into the patients' care plan covering all aspects of self-management, lifestyle changes, medicine-related problems and consequences of non-compliance.

There is, off course, a financial cost attached to educate people. This cost is undoubtedly less compared to T2DM treatment and management cost, which add to humanistic and epidemiological burden as well. A survey conducted to understand whether the knowledge reduces T2DM economic loss reported that the T2DM control and management cost was less in patients who had sufficient knowledge about their care programme and were following physician's guidelines.

Use of non-pharmacological interventions

Two-third people with diabetes live in urban areas, which refers to fast-paced lifestyles such as relying upon processed fast food, inactivity and low time investment in learning the knowledge and skills to control their ailment. Lack of physical activity is a strong determinant of obesity and T2DM, which in turn can lead to cardiovascular disorders and diabetes complications [11].

Some non-pharmacological interventions such as mulberry tea claim to be effective in reducing postprandial hyperglycemia in T2DM, however, this study was conducted in Indian population using small sample size; therefore the results are not generalisable to the wider public, especially to non-Indian population.

Probiotics reduce chronic inflammation in T2DM patients. A double-blinded placebo-controlled randomised trial concluded that daily supplementation of multi-strain probiotics for six months significantly lowers insulin resistance and improves glycemic control.

T2DM patients often suffer from concomitant diseases such as obesity and hypertension. The care programme for these patients should be designed accordingly, promoting lifestyle changes with the emphasis on walking routines. Walking for over 10 minutes daily significantly reduces the risk of T2DM. Moreover, physical activity not only improves glucose uptake into the cells but also prevents the progression of T2DM if incorporated in care-plan before the initiation of insulin therapy.

Lifestyle changes are critically important in preventing the development of T2DM. For instance, people, especially those who have diabetes running in their families, should refrain from khat chewing as the evidence suggests that what chewing is associated with developing T2DM.

Conclusion

This review has demonstrated Saudi patients' knowledge, behaviour and attitude to manage their diabetes. Quality of included studies was subjectively assessed by authors. Surprisingly, an unexpectedly large number of studies failed to answer their research question and hence did not meet the study objectives. We found many studies discussing T2DM from one perspective or the other. However, most of them are small cross-sectional studies (small sample size) focusing on specific areas/regions of the country, which means the results are not generalisable to the wider population. The issue is also highlighted. In addition to that, many of these studies have reported subjective results and did not provide any evidence of statistical significance. Majority of the studies failed to control for confounding variables, neither has taken any consideration of effect modification, which cause doubts on the credibility of these results [12].

Recommendations

Extensive and high-quality studies, with the sample size representative of Saudi T2DM populations, are required.

Education programme to inform patients and carers about HbA1c, high waist-hip ratio, consequences of poor adherence to medication and importance of a healthy diet and physical activity, as well as training to use injectable medications are highly recommended.

References

1. Ahmed AM. History of diabetes mellitus. Saudi Med J 2002;23:373-78.

2. Patlak M. New weapons to combat an ancient disease: treating diabetes. FASEB J. 2002;16:1853.
3. Chen L, Magliano DJ, Zimmet PZ, et al. The worldwide epidemiology of type 2 diabetes mellitus: Present and future perspectives. Nat Rev Endocrinol. 2011;8:228-36.
4. Azevedo M, Alla S. Diabetes in sub-saharan Africa: kenya, mali, mozambique, Nigeria, South Africa and zambia. Int J Diabetes Dev Ctries. 2008;28:101-08.
5. Zimmet P, Alberti KG, Shaw J, et al. Global and societal implications of the diabetes epidemic. Nature. 2001;414:782-87.
6. Yach D, Hawkes C, Gould CL, et al. The global burden of chronic diseases: overcoming impediments to prevention and control. JAMA. 2004;291:2616-622.
7. Hu FB, Manson JE, Stampfer MJ, et al. Diet, lifestyle, and the risk of type 2 diabetes mellitus in women. N Engl J Med. 2001;345:790-97.
8. Lang IA, Galloway TS, Scarlett A, et al. Association of urinary bisphenol A concentration with medical disorders and laboratory abnormalities in adults. JAMA. 2008;300:1303-10.
9. Rother KI. Diabetes treatment–bridging the divide. N Engl J Med. 2007;356:1499-1501.
10. McCarthy MI. Genomics, type 2 diabetes, and obesity. N Engl J Med. 2010;363:2339-350.
11. Alberti KG, Zimmet P, Shaw J, et al. The metabolic syndrome–a new worldwide definition. Lancet. 2005;366:1059-62.
12. Garcia-Roves PM. Mitochondrial pathophysiology and type 2 diabetes mellitus. Arch Physiol Biochem. 2011;117:177-87.

*Correspondence to

Dr. Mamoona Javed

Department of Gastroesophageal Reflux

University of Hygiene and TropicalMedicine

Romford

London

UK

E-mail: mamoonajav@gmail.com