



Received: 29.03.2022

Accepted: 07.04.2022

Published: 08.04.2022

Citation: Spandana MS. (2022). Importance of Healthy Lifestyle, Medication Adherence and Regular Follow Up in Diabetic Patients: A Mini Review. International Journal of Preclinical & Clinical Research. 3(1): 11-16. https://doi.org/10.51131/IJPCCR/v3i1.22_17

* **Corresponding author.**

spandana.ms@researchneeds.in

Funding: None

Competing Interests: None

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Published By Basaveshwara Medical College & Hospital, Chitradurga, Karnataka

ISSN

Print: XXXX-XXXX

Electronic: 2583-0104

Importance of Healthy Lifestyle, Medication Adherence and Regular Follow Up in Diabetic Patients: A Mini Review

M S Spandana^{1*}

¹ Scientific Division, ResearchNeeds, Davangere, Karnataka, India

Abstract

Diabetes Mellitus is a chronic illness affecting a huge part of the world. The global prevalence of diabetes in the recent years has increased to a large extent to reach epidemic proportions. This is mainly due to the adaptation of new lifestyle affecting the quality of life in the recent times. The drastic surge in the occurrence of diabetes has transformed the disease into an alarming social, financial, clinical and public health issue. The disease is associated to numerous clinical manifestations that affect human health on a chronic term. Some common complications include cardiovascular diseases, neuropathy, retinopathy, nephropathy, cognitive disorders and dementia. There are a wide range of pharmacological treatment options for diabetes patients but it does not help in keeping the condition in control. Hence, it is important to include non-pharmacological interventions to manage the illness. A change in the present lifestyle is the most important intervention. Dietary patterns of the patients must be modified to achieve a greater regulation on fluctuation of the glycaemic levels in the body. Physical activity and exercise aid in a better utilization of glucose, along with increasing insulin sensitivity. Exercise must be planned according to the condition of the disease in the patient to avoid complications. Energy restriction through diet and exercise also helps in weight loss, further dealing with the complications associated with obesity. Furthermore, maintaining a better sleep hygiene, adherence to treatment and regular follow up are considered to be some of the interventions that support improvement of diabetic health. Hence, the present study concludes that these interventions provide a healthy lifestyle that can result in a better management of the disease.

Keywords: Diabetes Mellitus; Mediterranean Diet; Physical Activity; Exercise; Adherence

Introduction

Diabetes mellitus (DM) is the world's third-largest, chronic, non-infectious disease after cardiovascular diseases and cancer. DM and its complications threaten individual health and bring a heavy financial burden to the families and society.⁽¹⁾ Type 1 diabetes mellitus (T1DM) and type 2 diabetes mellitus (T2DM), as well as a tiny percentage of other forms of the disease, are frequently observed in clinical practise.⁽²⁾ With a rapid increase in the percentage of patients, the prevalence of T2DM has become a global health problem. According to the estimation of International Diabetes Federation there were 381.8 million people having diabetes in 2013. Furthermore, by 2035, the number of patients is expected to rise to 591.9 million.⁽³⁾ According to the American Diabetes Association, there were more than 22.3 million individuals with diabetes in the United States in 2012, accounting for about 7% of the population. Also, the overall projected cost of diabetes patients in 2012 was \$245 billion.⁽⁴⁾ China has a fairly large proportion (approximately 25%) of diabetes patients worldwide.⁽⁵⁾

The International Diabetes Federation (IDF) estimated that one out of every 11 adults in the world has diabetes, resulting in a global disease prevalence of 425 million people.⁽⁶⁾ Because of the global epidemic of obesity linked to lack of physical activity and poor eating habits, diabetes prevalence is anticipated to rise exponentially over time. As a result, physicians and other healthcare practitioners are facing the problem of managing a large number of diabetic patients in their daily clinical practice, and they are expected to have the knowledge and abilities to deal with such cases.⁽²⁾

T2DM occurs at various rates in people of different racial and ethnic backgrounds, therefore genetics and lifestyle patterns (such as a sedentary lifestyle and a high-sugar diet) might have a predisposing influence. Moreover, the risk of developing T2DM can also be affected by the level of adiposity. For instance, the prevalence of T2DM rises in proportion with increasing BMI. However, there are chances of developing the disease even among those with normal range of body weight.⁽⁷⁾ Excess adipose tissue in the body has a negative impact on almost all organ functions and physiological functions, along with an increase in the risk of cardiometabolic disease.⁽⁸⁾ According to large prospective studies, a rise in body weight over time significantly increases the risk of T2DM. Similarly, a 5 kg/m² increase in BMI from the upper limit of normal BMI (25 kg/m²) to the lower limit of obesity (30 kg/m²) more than doubles the risk of death from T2DM.⁽⁹⁾ However, evidences indicate that risk of acquiring the disease increases with increased BMI well before the diagnosis of clinical obesity.⁽¹⁰⁾

As diabetes is a condition that is strongly linked to adverse lifestyle choices, the first line of defence for diabetes management should be lifestyle modification. Although several pharmacological approaches have been linked to bene-

fit obesity and diabetes, their long-term effectiveness and sustainability are generally limited. Hence, in these patients, non-pharmacological interventions are highly significant. Over the last few years, improved understanding of the pathophysiology of diabetes has resulted in the development of various novel therapeutic approaches to manage this alarming global epidemic.⁽¹¹⁾ The cause of T1DM is absolute insulin deficiency and, therefore, management is done mainly with insulin. However, for maximum effectiveness, treatment of T1DM should also include physical activity and dietary changes. Obesity affects a portion of T1DM patients, increasing insulin requirements and adversely affecting metabolic regulation.⁽¹²⁾ Therefore, modification of lifestyle is vital even in patients with T1DM. Even though bariatric surgeries are most commonly performed on patients with T2DM, obese patients with T1DM have also demonstrated some benefits, including significant reduction in insulin requirements and a moderate improvement in diabetes control.⁽¹³⁾

The introduction of diabetes self-management education (DSME) may play a significant role in lowering diabetes-related complications and premature deaths in countries with limited resources and an escalating burden of diabetes.⁽¹⁴⁾ Diabetes is a chronic condition that requires self-management in the form of exercise and diet in addition to medication to avoid complications and improve health outcomes.⁽¹⁵⁾ The goal of DSME is to provide diabetes patients with valuable information, problem-solving skills, decision-making ability, resource utilisation, and the confidence to execute self-care tasks. Key self-care behaviors that may prevent acute and long-term diabetes-related complications include healthy eating, regular exercise, medication management, footcare, and adaptation to psychosocial challenges.^(16,17) In the developed world, DSME has been shown to be effective in preventing diabetes-related complications and premature mortality.⁽¹⁸⁾ Therefore, the present study focuses on evaluating the effects of diet, exercise, medication and regular follow up on the diabetic health of patients and screening the impact of a healthy lifestyle on treatment and prevention of diabetes.

Diabetes Self Management Education

DSME is a continuous process that helps patients gain the skills, knowledge and abilities they need to efficiently manage their diabetes on their own. It's an essential component of diabetes care and it's been proved to enhance patient outcomes.⁽¹⁹⁾ The American Association of Diabetes Educators (AADE) has outlined seven self-care behaviours for patients as reliable outcome measures of DSME: physical activity, healthy eating, medication adherence, monitoring, problem solving, risk reduction, and healthy coping.⁽²⁰⁾ Diet and physical activity are two of the most important parts of routine diabetes self-care.

Mediterranean Diet in Diabetes

The Mediterranean diet (MD) is a plant-based diet that is well-known for its numerous health benefits, particularly in the areas of cardiovascular disease and cancer. The MD also has a significant effect in diabetes patients. MD refers to the conventional dietary pattern of people living in Mediterranean countries, which was developed in olive-growing parts of the Mediterranean region (particularly Greece and Italy) in the late 1950s and early 1960s.⁽²¹⁾ The MD includes a lot of olive oil, legumes, vegetables, whole grains, fruits and nuts, a small quantity of whole fat dairy products and red meat, a modest quantity of poultry and fish, and a limited amount of wine. The MD has been discovered to be protective not only in healthy people, but also in women who have had gestational diabetes and those who have cardiovascular disease.⁽²²⁾ MD was reported to lower the incidence of T2DM by 52% in the PREDIMED-Reus nutrition intervention trial among non-diabetic adults who are non-diabetic with high cardiovascular risk.⁽²³⁾ MD has been shown to help T2DM patients achieve glycaemic control, reduce insulin resistance and cardiovascular risk factors (blood pressure, BMI, cholesterol, adhesion molecules and inflammatory markers) and improve liver and sexual function.⁽²⁴⁾ MD being rich in dietary fibre and vegetable fat shows a great potential to optimize weight loss in T2DM patients, hence tackling with the complications associated with obesity.

Physical Activity and Exercise

Physical activity refers to anybody movement that increases energy expenditure above the baseline. Exercise is a planned, structured and repetitive physical activity performed with the objective of improving physical fitness. Physical activity improves physical fitness, insulin sensitivity, cardiovascular risk factors, lipid level, body weight, blood pressure and overall well being, while lowering the risk of cardiovascular morbidity and death.⁽²⁵⁾ The benefits of exercise depend on several parameters such as frequency, intensity, duration, age of the patient, type of exercise and the adherence to the exercise programme. This is collectively termed as the FITT principle: Frequency (the number of times exercise is done), Intensity (the amount of effort for the exercise), Time (the duration of exercise) and Type (aerobic or resistance).⁽²⁶⁾

Physical activity improves glycaemic control in patients with T2DM, along with a reduction in bodyweight and blood pressure. It boosts high-density lipoprotein (HDL) cholesterol while reducing total cholesterol and low-density lipoprotein (LDL) cholesterol, therefore improving the adverse lipid profile.⁽²⁷⁾ Hence, there is a reduction in the risk of various cardiovascular events inherent to T2DM patients. Individuals with T2DM should also perform moderate- to high-intensity exercise for at least 150 minutes a week, spread over a

minimum of 3 days per week. They should not go without activities for more than two days in a row, or 75 minutes of vigorous physical exercise per week.⁽²⁸⁾ Adults should engage in muscle-strengthening activities involving all major muscle groups twice a week or more. Every individual should take a 30-minute break every 30 minutes to stand, move, or do other activities to minimise continuous sitting/sedentary activity.⁽²⁹⁾

Exercise-induced improvement in insulin sensitivity was found to last between 24 to 72 hours. Therefore T2DM patients should exercise regularly and avoid going more than two days without physical activity to retain the advantages. The positive impact is also linked to overall energy expenditure during exercise in a clear linear fashion.⁽³⁰⁾ In the physicians' health study, it was shown that men who exercised once a week had a higher relative risk of developing T2DM than men who exercised five or more times per week.⁽³¹⁾

Exercise training in the form of resistance, endurance and combined training consisting of both, has been shown to improve glycaemic control and diabetes outcomes in patients with T1DM in a recent systematic review and meta-analysis.⁽³²⁾ However, we must remember that there is a significant risk of hypoglycaemia both during and after exercise. Patients with T1DM may experience post-exercise hyperglycaemia as a result of a spike in counter-regulatory hormones during and after exercise. To avoid these consequences, insulin dosage may need to be adjusted in patients who do only a few unaccustomed physical activities occasionally.⁽²⁾

Diabetes and Poor Sleep Cycle

Sleep is a restorative process for the mind and the body. Proper sleep is necessary for the body's balanced metabolic and hormonal functions. Poor quality and deprivation of sleep contribute to changes in metabolic and hormonal activity, which can lead to T2DM. People who sleep for less than 6 hours a night are at a threat of acquiring diabetes, and hence, it is recommended to sleep for at least 7 hours each night.⁽³³⁾ Sleep deprivation results in reduced brain glucose usage and hormonal dysregulation, resulting in an overall increase of GH levels and evening cortisol levels, which may contribute to the development of T2DM.⁽³⁴⁾ Decreased parasympathetic activity, increased sympathetic activity and a rise in the levels of inflammatory markers may all play a role in these cases. Sleep deprivation causes obesity and weight gain through various mechanisms, including orexin system hyperactivity, overeating, and decreased energy expenditure.⁽³⁵⁾

Several studies have linked obstructive sleep apnea (OSA) to increased insulin resistance and the development of T2DM, even in non-obese patients. Although it is mostly an unrecognised condition, the total prevalence of OSA in T2DM ranges from 58–86%. Similarly, the reported prevalence of T2DM in

OSA ranges from 15–30%. Undiagnosed OSA affects a significant portion of the population with T2DM, causing glycaemic control to worsen.⁽³⁶⁾ OSA also raises the risk of cardiovascular disease. The effects of continuous positive airway pressure therapy on glycaemic management have revealed varied findings in studies. However, loss of weight significantly improves both glycaemic control and OSA.⁽³⁷⁾

Medicine Adherence and Follow Up

Adherence has been defined as the extent to which individual follows the instruction they are given for prescribed treatment. Thus, if a patient is prescribed an antibiotic to be taken as one tablet 4 times a day for a week for an infection but takes only two tablets a day, their adherence would be $(10/28) = 36\%$.⁽³⁸⁾ Adherence to treatment is complex health behaviour. Problems identified include the: individuals failing to initiate therapy, under using or overusing a treatment, stopping a treatment too soon and miss-timing or skipping doses.⁽³⁹⁾ High medicine adherence is associated with decreased hospitalizations, improved glycaemic control and lower medical costs. Adherence is lower when medications are not tolerated, taken more than twice daily, with skepticism about the importance of medication and concomitant depression. Phone interventions, case managers, integrative health coaching, pharmacists, point-of-care testing and education have all been shown to improve adherence in intervention trials.⁽⁴⁰⁾

Although strict adherence to a treatment regimen cannot guarantee normal blood glucose levels or the absence of problems, poor self-care can result in poor metabolic control.⁽⁴¹⁾ To assist patients in maintaining constant glycemic control, a wide range of intervention methods have been implemented.

Evidences suggest that patient participation in care and on-going follow-up are two techniques that are particularly successful in improving adherence to health behaviours and clinical outcomes.⁽⁴²⁾

Continued follow-up is essential to maintain the effects of a good diabetes care plan. According to studies, having a nurse follow up on a patient on a frequent basis can help assess their progress and encourage diabetes care related health behaviours.⁽⁴³⁾ This follow-up can be easily achieved using the telephone. Nurse phone calls are effective in closely monitoring the signs and symptoms of hypoglycaemia and hyperglycaemia, checking on patients' adherence to medications, healthy lifestyle behaviours, and providing health education. Case management with regular telephone follow-up has been found to improve symptom control, complication screening, and encourage healthy lifestyles as per studies.⁽⁴⁴⁾

Conclusion

Diabetes Mellitus is a global epidemic that is associated with various severe presentations and complications. Despite the existence of enormous pharmacological treatment options, it is tedious to control the development of the disease with just medication. Therefore, intervention of non-pharmacological management procedures is necessary to be implemented according to the pathophysiological mechanism of disease. Furthermore, educating patients on DSME must be prioritized. A modification in the diet and incorporation of regular physical activity and exercise is the key to starting a healthy lifestyle. Maintaining a proper sleep schedule, medicine adherence and frequent follow up are also highly recommended to control diabetes.

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