



(REVIEW ARTICLE)



Self-management of type-2 diabetes

Praveen¹ and T. Johnsy Rani^{2*}

¹ Director, Research and Innovation Council, Srinivas University, Mangalore, India.

² Associate Dean, School of Nursing, Joy University, Tirunelveli, India.

International Journal of Science and Research Archive, 2023, 10(02), 156–161

Publication history: Received on 17 September 2023; revised on 05 November 2023; accepted on 08 November 2023

Article DOI: <https://doi.org/10.30574/ijrsra.2023.10.2.0870>

Abstract

Type-2 diabetes or adult-onset diabetes is the most common type of diabetes which usually begins when a person is in his or her mid-50s. It is a major, lifestyle-related disease with increasing occurrence at a national level. It occurs when the body cannot make sufficient insulin or the body cannot utilize the produced insulin. It is the foremost reason for premature deaths. Inappropriately managed, it can result in several health problems, including heart disease, stroke, kidney disease, blindness, neuropathy, leg and foot amputations, and death. Slight modifications in lifestyle can significantly decrease the probability of getting the disease. So, self-management skills are very much essential to manage and control this disease. Still, with proper testing, treatment, lifestyle changes, healthy eating, drinking water and avoiding dehydration, taking medications as prescribed, promoting walking, exercises, and other physical activities, conducting self-foot checks, and monitoring other signs and symptoms caused by diabetes have useful effects on the management of diabetes, encouraging adherence to this pattern is possessing great public health importance.

Keywords: Diabetes; Type 2 diabetes; Self-management skills; Testing; Healthy eating, Exercising; Treatment adherence

1. Introduction

The word diabetes is a Greek word meaning a siphon i.e., a tap. As patients with diabetes have polyuria and pass urine like a siphon, the 2nd century AD Greek physician, Aretus named the condition so¹. It is one of the major non-communicable and fastest-growing public health problems in the world. It is difficult to treat and expensive to manage². Mainly, there are three types of diabetes such as type 1, type 2, and gestational diabetes. In type 2 diabetes, the body doesn't use insulin well and thereby cannot keep blood sugar at normal levels. About 90-95% of people have type 2 diabetes. It is usually diagnosed in adults and takes over many years to develop³.

According to the International Diabetes Federation (IDF) Diabetes Atlas (2021), 10.5% of the adult population (20-79 years) has diabetes. Almost half of them are unaware that they are living with the condition. IDF projections show that by 2045, 1 in 8 adults, approximately 783 million, will be living with diabetes, an increase of 46%. More than 90% of people with type 2 diabetes are driven by socio-economic, demographic, environmental, and genetic factors. Urbanization, an aging population, decreasing levels of physical activity, and increasing overweight and obesity prevalence are the key contributors to the rise in type 2 diabetes⁴.

Genetic vulnerability and environmental effects appear to be the most significant factors accountable for the development of this condition. The fact designates that obesity and physical inactivity may be the reasons for the increasing encumbrance of diabetes in the developed world. Opportunely, as environmental factors are modifiable, disease manifestation from these factors is mainly preventable. Type-2 diabetic individuals are at a high risk of developing a variety of incapacitating complications such as cardiovascular disease, peripheral vascular disease,

* Corresponding author: T. Johnsy Rani Orcid-ID: 0000-0002-8851-2718; Email: johnsyrani20@gmail.com

neuropathy, retinopathy, and blindness that can lead to debility and premature death. It also levies important medical and economic problems. Symptoms of diabetes may occur suddenly. In type 2 diabetes, the symptoms can be mild and many times, it may take years to be noticed. Symptoms like feeling very thirsty, needing to urinate more often, blurred vision, feeling tired, and losing weight unintentionally are found⁵. Diabetes damages blood vessels in the heart, eyes, kidneys, and nerves in its chronic stage. Diabetics are more prone to developing health problems including heart attack, stroke, and kidney failure. It can also cause permanent vision loss by damaging blood vessels in the eyes. Another important complication of diabetes is problems with the feet from nerve damage and poor blood flow. This can cause foot ulcers and may lead to amputation⁶. While there is no cure for diabetes, with treatment and self-management strategies, a person can live a long and healthy life⁷. There are many things to concentrate on in self-management which have been discussed below.

2. Self-monitoring

Diabetes can be self-monitored with a blood glucometer⁸. Levels of glycated hemoglobin and blood glucose are important indicators of diabetes control. Measuring glycated hemoglobin requires a blood test in a doctor's office, but blood glucose can be measured at home. Doctors recommend that diabetics using insulin should check their glucose levels⁹. The number of these checks changes from person to person, but doctors usually recommend checking blood glucose levels before and after meals, at bedtime, and before exercising¹⁰. Diabetics who are not taking insulin also should check their blood sugar levels. Self-monitoring can provide information about the effects of dietary changes, physical activity, and medication on blood sugar levels. With a blood glucometer, a person can measure their blood sugar level at any time. Continuous glucose monitors are also available which provide real-time information about blood sugar levels. These automatically measure levels every 5 minutes through a small sensor inserted under the skin. When used appropriately, this type of technology can improve health outcomes¹¹.

3. Maintenance of healthy weight

Achieving and maintaining a healthy weight is important for people with diabetes or prediabetes¹². When doctors closely monitor weight loss progress, a person is more likely to achieve their goals¹³. According to research, for people with excess weight, modest, consistent weight loss can help manage type 2 diabetes and slow the rate at which prediabetes becomes diabetes¹⁴. It was also found that making dietary modifications can reduce glycated hemoglobin levels by 0.3% to 2% in type 2 diabetics. Diet therapy can also result in advances in the quality of life¹⁵. To facilitate these lifestyle adjustments, the American Diabetes Association (ADA) recommends consulting a registered dietitian with expertise in diabetes and weight management¹⁶.

4. Consumption of balanced meals

Adhering to a menu plan is one of the most challenging facets of diabetes self-management¹⁷. For most diabetics, dietary modifications alone are not sufficient to control blood sugar levels as it worsens over time¹⁸. The ADA recommends using a combination of medication and nutrition therapy to reach blood sugar targets¹⁹. The basis of menu planning includes portion control and preferring healthful foods. The diabetes plate method is the common tool intended to benefit people to control their calorie and carbohydrate intakes. It consists of mentally dividing the plate into three sections. Half of the plate should contain non-starchy vegetables, a quarter can contain grain-based and starchy foods, and the remaining quarter should contain protein²⁰.

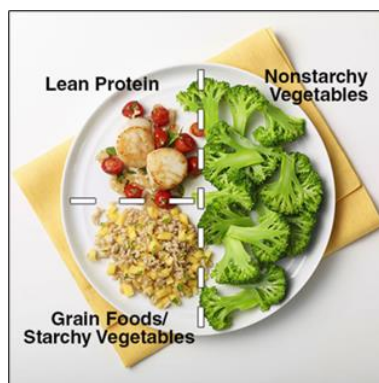


Figure 1 Diabetes plate method

5. Engagement in regular exercise

Regular exercise may help control blood sugar levels. According to research shreds of evidence, exercise helps to regulate blood sugar levels, reduces cardiovascular risk factors, helps weight loss, and advances well-being²¹. Researchers also found that engaging in a planned exercise program for at least 2 months lowered glycated hemoglobin levels by an average of 0.66% in participants with type 2 diabetes. The ADA recommends exercising for a minimum of 10 minutes per session and achieving a total of 30 minutes of exercise on weekdays²². If a person exercises every day or on alternative days, insulin resistance may reduce²³. In addition, avoiding long periods in a seated position for more than 30 minutes at a stretch is most important²⁴. Breaking up sedentary periods has to be practiced²⁵.

6. Taking medications as prescribed

Taking diabetic medication as prescribed prevents further complications²⁶. If a person not-adheres to their medication it leads to lower success rates in achieving clinical targets, increased complications, increased likelihood of early mortality, and increased overall healthcare costs. Medication non-adherence has lots of influencing factors such as psychological, demographic, and social factors²⁷. The cost of treatment and difficulties with healthcare providers and the healthcare system are the key elements²⁸. Diabetics with good support networks take their medication as prescribed²⁹.

7. Conduction of self-foot checks

Checking the feet every day is essential. Looking for cuts, redness, and other changes in the skin and toenails, including warts or other spots that the shoes could rub, and the bottom of the feet is a good habit. Washing the feet every day using warm water and soap is advisable. Don't soak the feet because that can dry out the skin. After drying the feet, use talcum powder or cornstarch between the toes, to soak up moisture that leads to infection. Don't apply lotion between the toes. Corns and calluses have to be removed safely with the help of a physician. Thick skin on the feet can rub and lead to sores and removing it the wrong way could damage the skin. So, medicated pads or liquid removers can be used. Trimming the toenails should be done straight across with a clipper. If it's hard to trim toenails, or if they're thick or curved into the skin, a podiatrist (foot doctor) can help to do it. To protect feet, wearing well-fitting shoes and socks or slippers when walking is good. It's good not to walk barefoot, even indoors. Shoes should be smooth inside. A seam or pebble in the shoe could rub the skin raw. Protecting the feet from heat and cold by applying sunscreen on exposed skin and not walking barefoot helps a lot. In cold weather, wearing warm socks instead of warming the feet near a heater or fireplace is required. Keeping the blood flowing in the feet by putting up the feet when sitting is needed. Wiggling the toes and circling the feet throughout the day helps. It's good not to wear tight socks. Getting plenty of activity that's not too hard on the feet, such as walking is beneficial. Getting the feet checked at health care visits even if there is no noticeable problem³⁰.

8. Drinking water and avoiding dehydration

Dehydration and diabetes can go hand-in-hand. Thirst and dry mouth are signs of mild dehydration and are often the first indicators of diabetes. When there is increased blood sugar for an extended period, the kidneys must work harder to filter and remove the excess glucose. This happens using the process called urination. It's this increase in urination that leads to dehydration, especially if lost fluids are not replaced. Keeping the blood sugar within a normal range helps the body maintain a healthy fluid balance and helps to stay hydrated. Drinking water not only fights dehydration, it can also help the body get rid of excess glucose. Diabetics should drink plenty of fluids about 1.6 liters (L) or 6.5 cups per day for women; and 2 L or 8.5 glasses per day for men. But although water is a great all-around drink and highly recommended for increasing fluid intake and preventing dehydration, other drinks are effective for dehydration, too. To add flavor to plain water, a few squeezes of fresh lime or lemon juice can be added. Hydration can also be done by drinking caffeine-free herbal teas, skim milk, and sugar-free coffee. However, avoiding energy drinks, fruit juices, and sodas is optimal as these contain a lot of sugar and can further increase your blood sugar³¹.

8.1. Stop smoking and alcoholism

The ADA advises prediabetics or diabetics to avoid tobacco products, including e-cigarettes. Smoking increases the risk of less blood sugar control, cardiovascular disease, premature death, and diabetes complications. Alcohol should be taken only in moderation². Moderate alcohol consumption is defined as one drink per day for women of any age and men over 65 years old and two drinks per day for men less than 65 years of age. One drink equals a 12-ounce beer, 5 ounces of wine, or 1.5 ounces of distilled spirits. It is the function of the liver to release stored sugar to counteract falling

blood sugar levels. But if the liver is tired of processing alcohol, the blood sugar level may not get increased from the liver. Alcohol can result in low blood sugar for about 24 hours. Alcohol can aggravate diabetes complications, such as nerve damage and eye disease³².

9. Conclusion

Diabetes is a chronic disease condition that is not curable. Type 2 diabetes chances increase as age advances. Diagnosis of the disease usually happens late due to the non-realization of symptoms. The classic symptoms of diabetes are polyuria, polyphagia, and polydipsia. Oral hypoglycemic agents and insulin are the treatment options. These medications can only control but cannot cure the condition. So managing the condition through lifestyle modifications is very important. Self-management skills are very much essential to bring effective lifestyle modifications. If the disease is self-managed properly, diabetics can be prevented from suffering due to complications of the disease and thereby they can have a better quality of life. It is the responsibility of health professionals including nurses to empower them with self-management skills which ultimately help to reduce the burden on the health sector.

Compliance with ethical standards

Disclosure of conflict of interest

This is my own work. No conflict of interest to be disclosed.


References

- [1] Rani, J. (2016). Effectiveness of honey dressing on diabetic wounds. *International Journal of Nursing Science Practice and Research*, 3(1):1-6p. <https://doi.org/10.37628/ijnspr.v3i1.232http://repositorytnmgrmu.ac.in/4573/1/3004217johnsyranit.pdf>
- [2] Asif, M. (2014). The prevention and control the type-2 diabetes by changing lifestyle and dietary pattern. *Journal of Education and Health Promotion*, 3,1 <https://doi.org/10.4103/2277-9531.127541>
- [3] Centers for Diseases Control and Prevention. Diabetes home. What is Diabetes? [https://www.cdc.gov/diabetes/basics/diabetes.html#:~:text=Diabetes%20is%20a%20chronic%20\(long,your%20pancreas%20to%20release%20insulin.](https://www.cdc.gov/diabetes/basics/diabetes.html#:~:text=Diabetes%20is%20a%20chronic%20(long,your%20pancreas%20to%20release%20insulin.)
- [4] International Diabetes Federation. Facts & Figures. <https://idf.org/about-diabetes/facts-figures/>
- [5] NHS inform. Type 2 diabetes. <https://www.nhsinform.scot/illnesses-and-conditions /diabetes/type-2-diabetes>
- [6] World Health Organization. (2023). Diabetes. <https://www.who.int/news-room/fact-sheets/detail/diabetes>
- [7] Caporuscio, J. (2019). Medical news today. How to manage diabetes? <https://www.medicalnewstoday.com/articles/325592#takeaway>
- [8] Benjamin, E. M. (2002). Self-monitoring of blood glucose: The basics. *Clinical Diabetes*, 20 (1): 45–47. <https://doi.org/10.2337/diaclin.20.1.45>
- [9] Cleveland Clinic. Blood sugar monitoring. <https://my.clevelandclinic.org/health/ treatments/17956-blood-sugar-monitoring#:~:text=Monitoring%20your%20blood%20sugar%20is,can%20affect%20your%20blood%20sugar.>
- [10] Mayo Clinic. (2022). Blood sugar testing: Why, when and how? <https://www. Mayo clinic.org/diseases-conditions/diabetes/in-depth/blood-sugar/art-20046628>
- [11] National Institute of Diabetes and Digestive and Kidney Diseases. Continuous glucose monitoring. <https://www.niddk.nih.gov/health-information/diabetes/overview/managing-diabetes/continuous-glucose-monitoring#:~:text=Continuous%20glucose%20monitoring%20automatically%20tracks,or%20days%20to%20see%20trends.>
- [12] Wilding, J. P. (2014). The importance of weight management in type 2 diabetes mellitus. *International Journal of Clinical Practice*, 68(6), 682-691. <https://doi.org/10.1111/ijcp.12384>

- [13] Institute of Medicine (US) Subcommittee on Military Weight Management. (2004). *Weight Management: State of the Science and Opportunities for Military Programs*. <https://www.ncbi.nlm.nih.gov/books/NBK221839/>. National Academies Press. United States.
- [14] Franz, M. J. (2017). Weight management: Obesity to diabetes. *Diabetes Spectrum: A Publication of the American Diabetes Association*, 30(3), 149-153. <https://doi.org/10.2337/ds17-0011>
- [15] Asaad, G., Soria-Contreras, D. C., Bell, R. C., & Chan, C. B. (2016). Effectiveness of a Lifestyle Intervention in Patients with Type 2 Diabetes: The Physical Activity and Nutrition for Diabetes in Alberta (PANDA) Trial. *Healthcare*, 4(4). <https://doi.org/10.3390/healthcare4040073>
- [16] Evert, A. B., Dennison, M., Gardner, C. D., Garvey, W. T., Karen Lau, K. H., MacLeod, J., Mitri, J., Pereira, R. F., Rawlings, K., Robinson, S., Saslow, L., Uelmen, S., & Urbanski, P. B. (2019). Nutrition Therapy for Adults with Diabetes or Prediabetes: A Consensus Report. *Diabetes Care*, 42(5), 731-754. <https://doi.org/10.2337/dci19-0014>
- [17] Shrivastava, S. R., Shrivastava, P. S., & Ramasamy, J. (2013). Role of self-care in management of diabetes mellitus. *Journal of Diabetes and Metabolic Disorders*, 12(1), 14 <https://doi.org/10.1186/2251-6581-12-14>
- [18] Gray, A., Threlkeld, R. J. (updated 2019, October 13). Nutritional recommendations for individuals with diabetes. In: Feingold, K. R., Anawalt, B., Blackman, M. R., et al. (Eds.). *Endotext* [Internet]. South Dartmouth (MA) MD. Textilecom, 2000. <https://www.ncbi.nlm.nih.gov/books/NBK279012/>.
- [19] Schroeder, E. B. (Updated 2022, July 28). Management of Type 2 Diabetes: Selecting Amongst Available Pharmacological Agents. In: Feingold, K. R., Anawalt, B., Blackman, M. R., et al. (Eds.). *Endotext* [Internet]. South Dartmouth (MA) MD. Textilecom, 2000. <https://www.ncbi.nlm.nih.gov/books/NBK425702/>.
- [20] American Diabetes Association. Diabetes food hub. What is the diabetes plate method? <https://www.diabetesfoodhub.org/articles/create-your-plate-simplify-meal-planning-with-the-plate-method.html#:~:text=The%20Diabetes%20Plate%20Method%20is,calculating%2C%20weighing%2C%20or%20measuring.>
- [21] Colberg, S. R., Sigal, R. J., Fernhall, B., Regensteiner, J. G., Blissmer, B. J., Rubin, R. R., Chasan-Taber, L., Albright, A. L., & Braun, B. (2010). Exercise and Type 2 Diabetes: The American College of Sports Medicine and the American Diabetes Association: Joint position statement. *Diabetes Care*, 33(12), e147-e167. <https://doi.org/10.2337/dc10-9990>
- [22] American Diabetes Association. Weekly exercise targets. The magic number: 150. <https://diabetes.org/healthy-living/fitness/weekly-exercise-targets>
- [23] Watts, E. (2022). Exercising later in the day may reduce insulin resistance, control blood sugar. *Medical news today*. <https://www.medicalnewstoday.com/articles/type-2-diabetes-exercise-timing-to-reduce-insulin-resistance>
- [24] Cronkleton. (2019). How long should you hold a stretch? *Healthline*. <https://www.healthline.com/health/how-long-to-hold-a-stretch>
- [25] Benatti, F. B., & Ried-Larsen, M. (2015). The effects of breaking up prolonged sitting time: A review of experimental studies. *Medicine and Science in Sports and Exercise*, 47(10), 2053–2061. <https://doi.org/10.1249/MSS.0000000000000654>
- [26] Inform.Educ. (updated 2022 October 20). Medication for type 2 diabetes. Cologne, Germany: Institute for Quality and Efficiency in Health Care (IQWiG). *Health.org* 2006. <https://www.ncbi.nlm.nih.gov/books/NBK279506/>
- [27] Jimmy, B., & Jose, J. (2011). Patient medication adherence: Measures in daily practice. *Oman Medical Journal*, 26(3), 155-159. <https://doi.org/10.5001/omj.2011.38>
- [28] Thomas, R., & Chalkidou, K. (2016). Cost-effectiveness analysis. Health system efficiency: How to make measurement matter for policy and management [Internet]. In: Cylus, J., Papanicolas, I., Smith, P.C. (Eds.). Copenhagen (Denmark): European Observatory on Health Systems and Policies; 2016. (Health Policy Series, No. 46.) <https://www.ncbi.nlm.nih.gov/books/NBK436886/>
- [29] Huang, Z., Lum, E., Jimenez, G., Semwal, M., Sloot, P., & Car, J. (2019). Medication management support in diabetes: A systematic assessment of diabetes self-management apps. *BMC Medicine*, 17(1), 127. <https://doi.org/10.1186/s12916-019-1362-1>

- [30] MedlinePlus [Internet]. (updated 2020 Jun 24). Diabetic foot exam. <https://medlineplus.gov/lab-tests/diabetic-foot-exam/> National Library of Medicine United States.
- [31] Griffith, M. L. (2021). What to know about diabetes and dehydration. <https://www.healthline.com/health/diabetes/diabetes-and-dehydration#water-goals>
- [32] Mayo Clinic. Diabetes management: How lifestyle, daily routine affect blood sugar? <https://www.mayoclinic.org/diseases-conditions/diabetes/in-depth/diabetes-management/art-20047963>

Author's short Biography

 <p>10565 - 22</p>	<p>Dr. Johnsy Rani is currently serving as a Professor cum Associate Dean in the School of Nursing at Joy University, Tirunelveli, Tamilnadu. She has her Doctoral degree in Community Health Nursing from Apollo College of Nursing, Chennai under The Tamilnadu Dr. MGR Medical University, Chennai in the year 2019. She is presently a Postdoctoral Researcher at Srinivas University, Mangalore, Karnataka. She is a Research co-guide under Meenakshi Academy of Higher Education and Research, Chennai, Srinivas University, Mangalore, and Shri Jagdishprasad Jhabarmal Tiberwala University, Rajasthan.</p> <p>She has a teaching experience of more than 14 years. She has achieved the Best Teacher Award thrice. She is a Life Member of the Christian Medical Association of India (CMAI), the Clinical Nursing Research Society (CNRS), and the Trained Nurses Association of India (TNAI). She has been a trainer in International projects funded by SAWSO, Norway, and NORAD. She has published many research articles in reputed national and international journals and book chapter under Jaypee Publications. She has done many invited presentations. She is the editor of the International Journal of Community Health Nursing and the International Journal of Nursing Science Practice and Research.</p> <p>She has international work experience as Assistant Professor in Male', Maldives where she has been involved in Program, curriculum, module, and content development. She has worked as Nodal Officer for the Mentorship program under Mission Niramaya, Uttar Pradesh, and worked for the Quality ranking of nursing colleges by QCI under Mission Niramaya, Uttar Pradesh.</p>
---	--