10.5005/jp-journals-10052-0046

REVIEW ARTICLE

Lifestyle Interventions in Type 2 Diabetes Mellitus

[1]Veeresh Chaitrika, [2]Mohamed Sameer, [3]Vivek Khatri, [4]Nupur Khetan

ABSTRACT

Lifestyle-related risk factors play an important role in the development of type 2 diabetes mellitus. This is evident from increasing incidence of various secondary complications in diabetics. Some of these risk factors like dietary choices, smoking, alcohol consumption, being overweight, and sedentary lifestyle are modifiable. Studies have shown that these factors, if effectively controlled, can lead to reduction in the risk of developing further complications. Thus, the aim of the present review is to highlight the lifestyle interventions for type 2 diabetes.

Keywords: Diabetes mellitus, Lifestyle interventions, Prevention of type 2 diabetes mellitus.

How to cite this article: Chaitrika V, Sameer M, Khatri V, Khetan N. Lifestyle Interventions in Type 2 Diabetes Mellitus. Int J Prev Clin Dent Res 2016;3(3):213-215.

Source of support: Nil

Conflict of interest: None

INTRODUCTION

Diabetes mellitus is a complex multisystemic disorder characterized by a relative or absolute insufficiency of insulin secretion and/or concomitant resistance to the metabolic action of insulin on target tissues.[1] It is a condition characterized by hyperglycemia. However, type 1 (insulin-dependent) and type 2 (non-insulin-dependent) variants of the disease have very different etiologies and patterns of distribution. Type 1 diabetes mellitus is due to the primary failure of the pancreatic β cells to produce the hormone insulin, while type 2 diabetes mellitus is caused by a failure of the insulin-signaling mechanism in the target cells of the body, so that they are unable to utilize circulating insulin.

[1,2]Consultant, [3,4]Postgraduate Student (2nd Year)

[1]Endodontist and Cosmetic Dentist, Apollo Hospital, Chennai Tamil Nadu, India

[2]Oral and Maxillofacial Surgeon and Implantologist, Vasan Dental Hospital, Chennai, Tamil Nadu, India

[3]Department of Periodontology and Oral Implantology, I.T.S Dental College, Ghaziabad, Uttar Pradesh, India

[4]Department of Prosthodontics, I.T.S Dental College, Ghaziabad Uttar Pradesh, India

Corresponding Author: Veeresh Chaitrika, Consultant Endodontist and Cosmetic Dentist, Apollo Hospital, Chennai Tamil Nadu, India, Phone: +919677212928, e-mail: amie_ozma@hotmail.com

Type 2 diabetes accounts for the vast majority of diabetic cases in the population.[2] Data indicate that in 2011, 366 million people worldwide were affected by diabetes and the number is continuing to climb steeply. By 2030, predictions suggest that the number of people with diabetes will reach 552 million. Currently, India is in the second position in the chart, after the People's Republic of China.[3]

The impact of diabetes is felt in both developed and developing countries, and this metabolic disease is a burden on both patients and society because of the high morbidity and mortality associated with its complications in renal, retinal, nervous, and vascular system.[1]

The risk of a person with diabetes mellitus acquiring end-stage renal disease is 25 times that of a person without diabetes. The relative risk of diabetic patients having a limb amputated because of diabetic complications is over 40 times that of normal. The relative risk of an individual with diabetes becoming blind is 20 times greater, and the risk of myocardial infarction is 10 times more likely in diabetic patients.[4] So considering these factors, the authors aimed to review the different lifestyle precautions to reduce the complications of type 2 diabetes mellitus.

LIFESTYLE INTERVENTIONS

Lifestyle interventions have been shown to be effective in preventing the onset of type 2 diabetes mellitus as well as serving as a cornerstone to effective diabetes self-management. This section comprises a review on risk factors related to dietary and other lifestyle factors. These factors have been shown to have an increased or a decreased risk for the development of type 2 diabetes and can be modified by lifestyle changes.

Obesity: It is a frequent concomitant of type 2 diabetes and a powerful predictor of its development. Indeed, as BMI increases, the risk of developing type 2 diabetes increases in a "dose dependent" manner.[5] The prevalence of type 2 diabetes is 3–7 times higher in obese than in normal-weight adults, and those with a BMI < 35 kg/m^2 are 20 times more likely to develop diabetes than those with a BMI between 18.5 and 24.9 kg/m^2.

Obesity also complicates the management of type 2 diabetes by increasing insulin resistance and blood glucose concentrations. It is an independent risk factor for dyslipidemia, hypertension, and cardiovascular disease and, thus, increases the risk of cardiovascular

complications and cardiovascular mortality in patients with type 2 diabetes.[6,7]

Benefits of weight loss: It is important for type 2 diabetes as it improves glycemic control. Moderate weight loss (5% of body weight) can improve insulin action, decrease fasting blood glucose concentrations, and reduce the need for diabetes medications[8].

Several studies indicate that waist circumference or waist-to-hip ratio may be a better indicator of the risk of developing diabetes than BMI. Such data suggest that the distribution of body fat is an important determinant of risk as these measures reflect abdominal or visceral obesity. In Japanese-American men, e.g., the intra-abdominal fat, as measured from CAT scans, was the best anthropometric predictor of diabetes incidence.[9]

Physical activity: Physical activity is an important component of any weight management program. Although energy restriction by dieting is largely responsible for initial weight loss, regular physical activity helps to maintain weight loss and prevent weight regain.[10]

A greater reduction in cardiovascular disease risk would be anticipated by increasing either the duration or the intensity of physical activity. Data from most weight loss studies suggest that 60 to 75 minutes of moderate-intensity activity (e.g., walking) or 35 minutes of vigorous activity (e.g., jogging) daily is needed to maintain long-term weight loss.[11]

Hu et al[12] indicated in their study that decreased physical activity (i.e., watching TV for 2 hours/day) increases the risk of diabetes by as much as 14%, while brisk walking at least 1 hour/day decreases the risk of diabetes by 34%.

Dietary control: World health organization (WHO) has recognized the importance of dietary control in diabetes mellitus and has given its recommendation regarding the distribution of nutrients in diabetic patients.[13]

Table 1: Recommended distribution of nutrients for diabetic subjects

Nutrients	*Percentage*
Carbohydrates	45
Total fat	35
Monounsaturated fatty acids	20
Polyunsaturated fatty acids	<8
Saturated and transfatty acids	<7
Protein	15–20
Cholesterol	<20 mg/day

The following are the dietary guidelines given by the American Diabetes Association and the American Heart Association (Tabels 1 and 2):[14,15]

- Consume a variety of fruits, vegetables, grains, low-fat or nonfat dairy products, fish, legumes, poultry, and lean meats.
- Limit foods high in saturated fat, transfatty acids, and cholesterol; substitute unsaturated fat from vegetables, fish, legumes, and nuts.
- Emphasize a diet rich in fruits, vegetables, and low-fat dairy products.
- Limit salt to 6 grams/day (2,400 mg sodium) by choosing foods low in salt and limiting the amount of salt added to food.
- Limit alcohol intake to no more than two drinks per day (men) and one drink per day (women) in those who choose to drink alcohol.

Alcohol intake: Several studies have suggested that moderate alcohol intake is associated with a reduced incidence of type 2 diabetes. There was a strong inverse relation between alcohol consumption and body weight, which could explain much of the apparent protective effect of

Table 2: Summary of recommendations on diet and prevention of type 2 diabetes

Risk factors	*Recommendations*
Overweight/obesity	▪ Prevention/early treatment of overweight and obesity, particularly in high-risk groups. ▪ Avoid adult weight gain of >5 kg. ▪ The optimum BMI for individuals is at the lower end of the normal range. ▪ An optimum mean BMI for a population is in the range 21–23 kg/m^2
Physical inactivity	▪ Increase physical activity (moderate or greater level of intensity) to at least 1 hr every day for most days of the week. ▪ Vigorous activity is required to reduce the risk of developing type 2 diabetes
Fat intake	▪ Saturated fat intake should not exceed 7% of total energy intake in high-risk groups. ▪ Total fat intake should not exceed 30% of total energy intake
Nonstarch polysaccharide (NSP)	▪ Adequate intakes of NSPs can be achieved through whole grain cereals, legumes, vegetables, and fruit
Further research required on diet and type 2 diabetes	▪ Effects of maternal diet on infant birth weight and subsequent growth and development. ▪ Long-term effects of early stunting glycemic index of different foods (and in combination) ▪ n-3 Fatty acids as protective factors in decreasing risk of type 2 diabetes. ▪ Transfatty acids as possible risk factors for developing type 2 diabetes. ▪ Benefits of exclusive breastfeeding in reducing risk of type 2 diabetes

alcohol consumption. Among 20,000 male physicians, those consuming more than two to four drinks per week had a lower incidence of type 2 diabetes in the subsequent 12 years compared with nondrinkers, relationships that persisted after adjustment of BMI and other diabetes risk factors.[16]

Ahmed et al also studied the relationship between alcohol consumption and glycemic control and concluded that the relationship is inversely proportional; thus, diabetic complications can be minimized by restricting alcohol consumption.[17]

Smoking: Smoking is also highly associated with the increased risk of diabetes mellitus. In their study, Willey et al[18] found that frequent smokers (≥20 cigarettes/day) were at increased risk of developing diabetes mellitus (relative risk = 1.61) compared to occasional smokers (relative risk = 1.29). The risk was further decreased to 1.23 for ex-smokers compared with active smokers.

CONCLUSION

Diabetes mellitus is one of the most prevalent problems facing our modern civilization, resulting in numerous complications, which can be effectively controlled by simple means, such as lifestyle modifications. Pharmacological interventions are not always necessary to control diabetes, but emphasis should also be given to nonpharmacological management. Evidence has clearly shown that lifestyle variables are highly associated in determining the relative risk of diabetes mellitus. Hence, by controlling these factors, one can effectively halt the progression of this highly penetrating disease. This can be achieved through the involvement of a multidisciplinary team, particularly a health provider who can counsel the patient regarding the risk factors associated with diabetes; public health policies can be designed to achieve the desired results, and self-confidence should also be developed among the patients to improve medication adherence.

REFERENCES

1. Radhika. S, Ranganathan K. Salivary glucose levels and oral candidal carriage in type II diabetics. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2010;109:706-711.
2. Michael WJ Dodds, Chih-Ko Yeh, Dorthea A. Johnson. Salivary alterations in type 2 (non-insulin-dependent) diabetes mellitus and hypertension. Community Dent Oral Epidemiol 2000; 28: 373-381.
3. Abikshyeet. P, Ramesh. V, Oza. N. Glucose estimation in the salivary secretion of diabetes mellitus patients. Diabetes, Metab Syndr Obes 2012:5 149-154.
4. Anthony T. Vernillo. Diabetes mellitus: relevance to dental treatment. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2001;91:263-270.
5. Mokdad AH, Ford ES, Bowman BA, Dietz WH, Vinicor F, Bales VS, Marks JS. Prevalence of obesity, diabetes, and obesity-related health risk factors, 2001. JAMA 289:76-79, 2003.
6. JL, Laird N, Dietz WH, Rimm E, Colditz GA: Impact of overweight on the risk of developing common chronic diseases during a 10-year period. Arch Intern Med 161: 1581-1586, 2001.
7. Hu FB, Manson JE, Stampfer MJ, Colditz G, Liu S, Solomon CG, and Willett WC: Diet, lifestyle, and the risk of type 2 diabetes mellitus in women. N Engl J Med 345: 790-797, 2001.
8. Torgerson JS, Hauptman J, Boldrin MN, Sjostrom L: XENical in the Prevention of Diabetes in Obese Subjects (XENDOS) study: a randomized study of orlistat as an adjunct to lifestyle changes for the prevention of type 2 diabetes in obese patients. Diabetes Care 27:155-161, 2004.
9. Despres JP. Health consequences of visceral obesity. Annals of Medicine 2001;33: 534-541.
10. Wing RR. Exercise and weight control. In Handbook of Exercise in Diabetes. Ruderman N, Devlin JT, Schneider SH, Eds. Alexandria, VA, American Diabetes Association, 2002, p. 355-364.
11. Wing RR, Hill JO: Successful weight loss maintenance. Annu Rev Nutr 21:323-341, 2001.
12. Hu FB, Li TY, Colditz GA, Willett WC, Manson JE. Television watching and other sedentary behaviors in relation to risk of obesity and type 2 diabetes mellitus in women. JAMA 2003 Apr;289(14):1785-1791.
13. World Health Organization: Guidelines for the prevention, management and care of diabetes mellitus. EMRO Technical publication series 32, Geneva 2006.
14. Franz MJ, Bantle JP, Beebe CA, Brunzell JD, Chiasson JL, Garg A, Holzmeister LA, Hoogwerf B, Mayer-Davis E, Mooradian AD, Purnell JQ, Wheeler M: Evidence-based nutrition principles and recommendations for the treatment and prevention of diabetes and related complications. Diabetes Care 26 (Suppl) 1:S51-S61, 2003.
15. Krauss RM, Eckel RH, Howard B, Appel LJ, Daniels SR, Deckelbaum RJ, Erdman JW Jr, Kris-Etherton P, Goldberg IJ, Kotchen TA, et al. AHA Dietary Guidelines: revision 2000: a statement for health care professionals from the Nutrition Committee of the American Heart Association. Circulation 102:2284-2299, 2000.
16. Ajani UA, Hennekens CH, Spelsberg A, Manson JE. Alcohol consumption and risk of type 2 diabetes mellitus among US male physicians. Archives of Internal Medicine 2000; 160: 1025-30.
17. Ahmed AT, Karter AJ, Warton EM, Doan JU, Weisner CM. The relationship between alcohol consumption and glycemic control among patients with diabetes: the Kaiser Permanente Northern California Diabetes Registry. J Gen Intern Med 2008 Mar;23 (3):275-282.
18. Willi C, Bodenmann P, Ghali WA, Faris PD, Cornuz J. Active smoking and the risk of type 2 diabetes: a systematic review and meta-analysis. JAMA 2007 Dec;298(22):2654-2664.