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Review Article

Lifestyle Intervention – The Quintessential tool to prevent & reverse Type- 2 Diabetes

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ABSTRACT

Type-2 diabetes is a major non-communicable disease with increasing prevalence at a global level. Type-2 diabetes results when the body does not make enough insulin or the body cannot use the insulin it produces. The rate of type 2 diabetes is increasing alarmingly around the world and it has become one of the major causes of vision loss and blindness, kidney failure requiring dialysis, heart attacks, strokes, amputations, infections and even early death. Over 80% of people with prediabetes (that is, high blood sugar with the high risk for developing full-blown diabetes) don't know it. One in four people who have full-blown diabetes don't know they have it! Research suggests that a healthy lifestyle can prevent diabetes from occurring in the first place and even reverse its progress.

INTRODUCTION

Diabetes mellitus or type-2 diabetes is one of the major non-communicable and fastest growing public health problems in the world, is a condition difficult to treat and expensive to manage. It has been estimated that the number of diabetes sufferers in the world will double from the current

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value of about 190 million to 325 million during the next 25 years [1]. Individuals with type-2 diabetes are at a high risk of developing a range of debilitating complications such as cardiovascular disease, peripheral vascular disease, nephropathy, changes to the retina and blindness that can lead to disability and premature death. It also imposes important medical and economic burdens. Genetic susceptibility and environmental influences seem to be the most important factors responsible for the development of this condition. However, a drastic increase in physical inactivity, obesity, and type-2 diabetes has been recently observed. The fact indicates that obesity and physical inactivity may constitute the main reasons for the increasing burden of diabetes in the developed world [2].

The beneficial effect of the dietary pattern on diabetes mellitus and glucose metabolism in general and traditional food pattern was associated with a significant reduction in the risk of developing type-2 diabetes. The dietary pattern emphasizes a consumption of fat primarily from foods high in unsaturated fatty acids, and encourages daily consumption of fruits, vegetables, low fat dairy products and whole grains, low consumption of fish, poultry, tree nuts, legumes, very less consumption of red meat [3]. The composition of diet is one of the best known dietary patterns for its beneficial effects on human health that may act beneficially against the development of type-2 diabetes, including reduced oxidative stress and insulin resistance. High consumption of vegetables, fruits, legumes, nuts, fish, cereals and omega-3 leads to a high ratio of monounsaturated fatty acids to saturated fatty acids, a low intake of trans fatty acids, and high ingestion of dietary fiber, antioxidants, polyphenols. The diets are characterized by a low degree of energy density overall; such diet prevent weight gain and exert a protective effect on the development of type-2 diabetes, a condition that is partially mediated through weight maintenance. Greater adherence to the diet in combination with light physical activity was associated with lower odds of having diabetes after adjustment for various factors [4]

Regular physical activity/scientific exercises helps the body cells take up glucose and thus lower blood glucose levels. Regular physical activity also helps with weight loss as well as controlling blood cholesterol and blood pressure. You need to let your doctor and dietitian know about the kinds of physical activities you do regularly. Your doctor and dietitian will help you balance your physical activity with your medication and diabetic meal plan. If you are not physically active now, your doctor may recommend that you increase your physical activity levels. Important benefits of a regular aerobic exercise program in diabetes management include decreased need for insulin, decreased risk of obesity, and decreased risk for heart disease. Exercise decreases total cholesterol, improves the ratio of low-density lipoprotein (LDL) to high-density lipoprotein cholesterol (HDL), and reduces blood triglycerides. It also decreases the blood pressure and lower stress levels. Walking is one of the easiest and healthiest ways to exercise. This is one activity that anyone can do for a lifetime without special equipment and with little risk of injury. Talk to your doctor about exercise plan and supervised activity is best because of the risk of an insulin imbalance. Use the buddy system when you exercise [5].

Even though the chronic disease risk factors and prevention measure are well known, it can be difficult for people to adopt health lifestyle changes. Part of the challenge of understanding and adopting healthier habits could be related to how difficult it is for people to comprehend and remember health information. Studies show that our ability to comprehend information declines when we're in a doctor's office or health clinic/ One study showed that up to 80% forget what their doctor tells them as soon as they leave the office.

And according to the institute of medicine, nearly half of all adults in the U.S have difficulty understanding and using health information. People of all literacy levels have difficulty understanding and using health information [6].

DISCUSSION

The Key lifestyle intervention strategies to prevent T2D

A. Weight Reduction: Based on the evidence coming from observational studies on T2D risk factors and the remarkable beneficial effects of weight reduction on glucose metabolism [6], weight reduction has been considered as a cornerstone in the prevention of T2D; with larger weight reductions associated with a lower risk of T2D.

B. Optimal Diet: Some prospective cohort studies have demonstrated that adherence to plant-based dietary patterns, such as Mediterranean DASH (Dietary Approaches to Stop Hypertension) or vegetarian dietary patterns, are associated with a lower risk of T2D incidence. In two prospective studies, a Mediterranean-type or healthy dietary pattern has also been inversely related to gestational diabetes.

C. Physical Activity/Scientific exercises: In FDPS (Finnish Diabetes Prevention Study), the impact of physical activity was examined as a secondary analysis taking into account the effect of diet and weight reduction. Based on different criteria used to evaluate physical activity, it was concluded that being physically active may reduce T2D risk by approximately 50% [7].

Evidences to prove the efficacy of lifestyle in the prevention and reversal of diabetes:

Overwhelming evidence shows that lifestyle changes namely, improvements in physical activity and diet, leading to weight loss reduce diabetes risk significantly. Randomized controlled trials have shown that lifestyle interventions focused on physical activity, healthy diets, and weight loss can reduce diabetes risk by 58% in people with IGT(impaired glucose tolerance). Evidence also shows that lifestyle changes may help mitigate the effects of genes on diabetes risk. For instance, in the US Diabetes Prevention Program (DPP), the association between susceptible genotypes and progression to diabetes was attenuated in individuals receiving a lifestyle intervention. Similarly, a study among Swedish adults showed that the genetic predisposition to diabetes may be offset by physically active lifestyles. Weight loss is the main driver of diabetes prevention in populations with high mean BMI, such as Americans. In the US DPP for instance, weight loss was the strongest predictor of reduced diabetes incidence; a 5-kg weight loss explained an incidence reduction of 58%. More specifically, for every kilogram participants lost, a 16% reduction in diabetes risk was observed. Similarly, only participants who lost 8-17% of their weight in the Finish Diabetes Prevention Study (DPS) achieved significant improvements in insulin sensitivity. Changes in fat distribution have also been linked to improved insulin sensitivity, particularly changes in visceral fat mass and liver fat content. Based on this, a weight loss of 7% of total body weight has been recommended for the primary prevention of diabetes [8].

The extent to which lifestyle changes can prevent or delay the onset of diabetes is associated with the degree of β-cell dysfunction and hyperglycemic nature. For example, in persons with mild β-cell dysfunction, who exhibit IGT as a result of peripheral insulin resistance, lifestyle changes can improve insulin sensitivity and ultimately restore normoglycemia. Conversely, in patients with moderate β-cell dysfunction, who present with isolated IFG, lifestyle changes may not restore normoglycemia but may help regulate glucose levels. In other words, lifestyle changes may have a small effect on the progression to diabetes in individuals with isolated IFG

concentrations but they are highly beneficial among those with IGT.76 Recent systematic reviews published on the prevention of T2D in high-risk groups uniformly conclude that the onset of T2D can be delayed or prevented with lifestyle changes. Furthermore, these systematic reviews conclude that lifestyle changes may result in the sustained reduction of T2D. On the other hand, a recent Cochrane review concluded that the evidence took into account only the combined effect of physical activity and dietary changes, and the evidence on the effect of diet or physical activity alone is insufficient [9].

In the Finnish Diabetes Prevention Study (FDPS), 522 individuals with IGT were randomized into a control or lifestyle intervention group (healthy diet and physical activity promotion). The diagnosis of T2D was based on repeated OGTT. After 3.2 years of follow-up, there was a significant decrease in the incidence of T2D, and the trial was prematurely stopped based on the decision of the independent advisory committee. The risk reduction was 58% in the intervention group compared to the control group. Weight loss was larger in the intervention group: the difference in weight reduction between the groups was 3.5 and 2.6 kg at 1 and 3 years, respectively. The intervention group also showed an increase in physical activity and the number of sedentary people was smaller in the intervention (17%) than in the control group (29%) [10].

Dietary recommendations to prevent & reverse diabetes:

Decrease intake of added sugars and processed foods-

It starts from avoiding refined grains like white flour and white rice. This also includes avoiding sugary drinks, not only sodas but also juices. The best drinks are water, seltzer, and tea or coffee without sugar.

Swap out refined grains for whole grains-

Whole grains are actually real grains that haven't been stripped of nutrients in processing. Foods made from 100% whole grain (like whole wheat) are okay, but intact whole grains (like farro, quinoa, corn, oatmeal, and brown rice) are even better.

Increase fiber intake-

High-fiber foods include most vegetables and fruits. Legumes are also high in fiber and healthy plant protein. Legumes include lentils, beans, chickpeas, peas, edamame, and soy. People who eat a lot of high-fiber foods tend to eat fewer calories, weigh less, and have a lower risk of diabetes.

Increase fruits and vegetables intake-

At least half of our food intake every day should be non-starchy fruits and vegetables, the more colorful the better. Cruciferous vegetables like broccoli, cauliflower, and Brussels sprouts, and high-fiber fruits like berries of all kinds, are especially healthy.

All fruits and vegetables are associated with living a significantly longer and healthier life! Eat less meat, and avoid processed red meat-

Many studies have shown us that certain meats are incredibly risky for us-

People who eat processed red meat are far more likely to develop diabetes: one serving a day (which is two slices of bacon, two slices of deli meat, or one hot dog) is associated with over a 50% higher risk of developing type 2 diabetes. Eating even a small portion of red meat daily (red meat includes beef, lamb, and pork), like a palm-sized piece of steak, is associated with a 20% increased risk of type 2 diabetes. This may be because of the iron in red meats, and the chemicals in processed meats. As a matter of fact, the less meat you eat, the lower your risk of diabetes. People who don't eat red meat at all, but do eat chicken, eggs, dairy, and fish, can significantly lower their risk of developing type 2 diabetes, by about 30%; those who eat only fish, 50%; those who eat only eggs

and dairy, 60%; those who are vegan, 80% [11].

Eat healthier fats-

Fat is not necessarily bad for you. What kind of fat you're eating really does matter. Saturated fats, particularly from meats, are associated with an increased risk of diabetes and heart disease. Plant oils, such as extra-virgin olive oil and canola oil, carry less risk. Omega-3 fats, like in walnuts, flax seeds, and some fish, are actually quite good for you. Favor foods with a low glycemic index- The glycemic index identifies foods that increase blood sugar rapidly. This handy tool allows you to favor foods that have much less effect on blood sugar. High-glycemic-index foods include sugar itself, white potatoes, most wheat flour products, and most cold cereals, e.g., pumpernickel, rye, multigrain, or sourdough bread, old-fashioned oatmeal, bran cereals, grape-nuts, most fruits, sweet potatoes, pasta, rice, barley, couscous, beans, peas, lentils, most vegetables [12]

Reduce salt ("sodium") in diet-

High blood pressure may also be present with your diabetes. Limiting how much salt you eat can help keep your blood pressure low. Decrease the amount of salt you add during cooking and reduce salt in recipes, before adding salt at the table, taste first, try seasoning your food with (salt-free) herbs, spices, and garlic. Lemon juice brings out the natural saltiness of foods.

Avoid processed foods that are high in salt (sodium chloride) such as canned or packaged foods and condiments such as mustard, watch for "Na" (sodium) on food labels. Chips, pretzels, and other such snacks are very high in salt, and check with your physician before using salt substitutes [13].

Exercise recommendations to prevent & reverse diabetes:

Regular Scientific Exercise promotes blood sugar management and burns calories, which contributes to weight loss and this also increases insulin sensitivity, which helps blood sugar to enter the cells from the bloodstream [14].

Physical activity or scientific exercises involves any bodily movement produced by skeletal muscles that requires energy expenditure and includes leisure time physical activity, transportation (eg, walking or cycling), occupational (ie, work), household chores, play, games, and sports or planned exercise. A range of physical activities and intensities are associated with 20% to 30% diabetes risk reduction, especially among high-risk individuals. For instance, ≥2.5 h/wk of moderate-intensity brisk walking is associated with a diabetes risk reduction of 27%, independent of BMI [15].

Furthermore, moderate- to vigorous-intensity physical activity has been linked to enhanced β-cell function and glucose regulation, independent of obesity. Structured exercise training has been found to reduce HbA1c by 67% among diabetes patients and to improve β-cell function and insulin sensitivity among high-risk patients. These effects are comparable or superior to those achieved with common antidiabetic drugs. Overall, international guidelines recommend that adults 18 years and older engage in 150 minutes of moderate-intensity or 75 minutes of vigorous-intensity aerobic physical activity (or a combination of these) per week, accumulated in bouts lasting at least 10 minutes with muscle-strengthening activities involving major muscle groups performed on 2 or more days a week [16].

CONCLUSION

In conclusion, effective lifestyle modifications including counseling on weight loss, adoption of a healthy dietary pattern like the Mediterranean diet, together with regular physical activity/scientific exercises are the cornerstone in the prevention of type-2 diabetes. Therefore, emphasis must be given to promoting a healthier lifestyle and finding solutions in order to increase adherence and compliance to the lifestyle modifications,

especially for high-risk individuals. We have a high certainty of evidence that T2D is preventable by changing lifestyle, i.e., weight reduction by diet change according to the current recommendations in terms of quality of fat, fiber intake, increased use of whole grain products, fruit, and vegetables, and increasing physical activity. The risk reduction of T2D is strongly related to the degree of long-term weight loss and adherence to lifestyle changes, and this preventive effect has been demonstrated to sustain for many years after active intervention. Evidence clearly supports the efficacy and effectiveness of such interventions across clinical and community settings, delivery formats, and implementers.

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