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STUDY ON THE IMPORTANCE OF YOGA IN THE MANAGEMENT OF DIABETES

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ABSTRACT

Exercise can increase glucose uptake in both type 1 and type 2 diabetics by increasing insulin sensitivity and decreasing body fat. Yoga is an ancient practice aiming to bring balance and health to the physical, mental, emotional, and spiritual elements of the individual. Since yoga takes up very little room, requires no equipment, and has no known negative side effects, it may be a tempting alternative to typical aerobic exercises and strength training programs. Yoga focuses primarily on relaxing of the mind and body. It offers a person a less demanding and more enjoyable exercise experience. Yoga can make someone feel better by boosting their mood and physical health. Numerous studies have demonstrated that yoga has positive effects on lipid profiles, cardiovascular health, and glycemic control in the management of diabetes. Additionally, it can reduce tension. Yoga is an excellent alternative to exercise treatment. For many years, along with nutrition and medicine, exercise has been seen as a crucial component of diabetes control. Growing data demonstrates how yoga improves both physical and mental health by reducing activity of the sympathetic nervous system and the hypothalamic-pituitary-adrenal (HPA) axis (SNS). This article compares the effects of yoga and exercise on diabetes patients, providing a thorough evaluation of the research literature in that area.

Keywords*: *Exercise, Diabetes, Therapy, Yoga

1. INTRODUCTION

A chronic, progressive metabolic illness known as diabetes mellitus (DM) causes hyperglycemia primarily as a result of an absolute (Type 1 DM) or relative (Type 2 DM) insulin hormone shortage. Over the past 20 years, diabetes has become a much bigger problem. By 2035, there will be 592 million more individuals with diabetes than there were in 2014 (8.3 percent prevalence). The region with the highest prevalence of diabetes—11 percent, or 37 million people—is North America and the Caribbean, followed by the Middle East and North Africa, which has a prevalence of 9.2 percent and 35 million diabetics. 138 million people in the Western Pacific region have diabetes, making it the region with the highest prevalence (8.6 percent), which is comparable to the global prevalence. According to the International Diabetes Federation (IDF), China, India, the United States, Russia, and Brazil now have the greatest percentage of diabetic patients worldwide. In every nation, the number of patients with type 2 diabetes is rising. People with diabetes make up 77% of the population in low- and middle-income nations. There

are 179 million undiagnosed diabetics worldwide. In 2014, 4.9 million people died from diabetes. A workable method to stop the disease's escalating epidemic is primary diabetes prevention through a change in lifestyle. Government and non-government organizations should educate the general population about the disease, as well as the advantages of changing one's lifestyle.

Factors responsible for rising incidence

Numerous genetic-environmental combinations may lead to diabetes. The rising rates of urbanization, the migration of people from rural to urban regions, and the adoption of sedentary lifestyles and bad eating practices are mostly to blame for the rising incidence of diabetes.

Obesity:

Type 2 diabetes frequently coexists with obesity, which numerous studies have proved to be a strong indicator of the development of type 2 diabetes. Because of the mix of genetic and environmental variables, including metabolic traits, inactivity, and a high-calorie diet, obesity has risen sharply in many communities in recent years. Type 2 diabetes is becoming more common as a result of this rise in obesity. In contrast to people with lower BMI, who see an increase in incidence as they become older, those with greater Body Mass Index (BMI) have considerably higher incidence rates of type 2 diabetes at younger ages. A youngster who gains BMI more quickly than their peers is at higher risk of developing diabetes mellitus (DM) or metabolic syndrome in the future.

Obesity, particularly abdominal obesity, is thought to be a significant contributor to Type 2 DM in both adults and children. Both increased insulin resistance and lower insulin secretion are independently correlated with increased visceral fat. In obese teenagers, visceral fat content is adversely related to insulin sensitivity and directly correlated with baseline and glucose-stimulated hyperinsulinemia. According to a number of research, waist circumference or the ratio of the waist to the hips may be more accurate predictors of the likelihood of getting diabetes than BMI. The distribution of fat is crucial in determining the risk of type 2 DM in patients, even though BMI is important in predicting the risk.

Lack of physical activity:

The majority of the working population has shifted their lifestyle over the past few decades from physically demanding activities like agriculture to less strenuous ones like office work. Children are discouraged from engaging in regular physical activity by TV and electronic games. When compared to people who engage in vigorous physical exercise, it was found that people who lead sedentary lifestyles had a prevalence of diabetes that is almost three times greater (23.2 percent vs. 8.1 percent). It was also discovered that individuals with light physical activity were more likely to have metabolic syndrome and hypertension. The risk of getting coronary artery disease was 2.4 times higher in people who engaged in light physical activity than in people who engaged in heavy physical activity.

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Diet:

The type and quantity of dietary fat affects insulin sensitivity and glucose tolerance. By a number of processes, including reduced glucose transport, decreased glycogen synthase, buildup of triglycerides in skeletal muscles, and decreased insulin binding to its receptors, a high fat diet may worsen glucose tolerance. By changing membrane fluidity and insulin signaling, the fatty acid composition of the diet influences both the composition of tissue phospholipids and insulin action.

Stress:

A multitude of stressors can result in stress, which is described as a "stimulus event of sufficient severity to induce disequilibrium in the homeostasis of physiological systems." Stress-related neuroendocrine changes might cause pathophysiological abnormalities by translating the signals. As a result of the production of cortisol and catechol amines, the hypothalamic-pituitary-adrenal (HPA) axis and sympathetic nervous system (SNS) are activated in response to a stressor, causing a cascade of physiological, behavioral, and psychological repercussions (epinephrine and norepinephrine). The HPA axis and SNS repeatedly firing causes the system to become dysregulated, which results in illnesses like autoimmune disorders, obesity, diabetes, substance misuse, depression, and cardiovascular disease. Diabetes development is also influenced by stress. By raising the levels of hormones such glucagon, cortisol, growth hormone, catecholamines, Corticotrophin Releasing Hormone (CRH), prolactin, leptin, and neuropeptide Y, stress-related changes cause hyperglycemia. According to Bjorntop's theory, the sympathetic nervous system's activation after stress might result in a series of hormonal changes that eventually cause obesity and, in turn, diabetes. The onset of metabolic syndrome and visceral obesity may be influenced by psychosocial stress. Both men and women with central obesity who are premenopausal have been demonstrated to have higher levels of HPA activity. The differential modulation of HPA that occurs in central and peripheral gynecoid and android obesity also affects metabolically significant tissues including the liver and visceral fat. Visceral obesity and the prevalence of type 2 diabetes mellitus were both associated with chronic psychological stress. The frequency of newly diagnosed diabetes was positively correlated with the number of stressful situations.

Life style intervention:

The cornerstones of managing diabetes are diet, medications (insulin, OAD, and other injectables), education, and exercise. However, management's most underappreciated component is exercise. A proper fitness regimen would have a dramatic positive impact if it were combined with the treatment.

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2. Role of exercise in DM

A body movement that originates from the contraction of skeletal muscles and increases energy expenditure over resting metabolic rate is referred to as physical activity. Exercise, sometimes known as "exercise training," is a particular kind of physical activity carried out with the goal of improving certain aspects of physical fitness. The etiology of diabetes and the subsequent morbidity and death can be started and accelerated by physical inactivity. On the other hand, consistent physical activity can halt or even stop the advancement from one stage to another. Numerous studies have demonstrated that engaging in moderate physical activity significantly lowers the chance of developing diabetes.

Benefits of yoga

The Sanskrit term "Yuj," which means the union of the body, breath, and mind, is where the word "yoga" originates. Yoga is a practice that has been around for ages and was created to help people with their physical, mental, emotional, and spiritual well-being. Yoga's main focus is on improving overall health through the integration of its three main elements, which are often held poses or sequences of poses, breathing techniques, and meditation.

3. Yoga practices

Yoga therapy includes graded sets of exercises, some of which are very basic, so that everyone can practice on their own even after the first lesson, regardless of whether they have ever practiced yoga. It starts with simple stretches and breathing exercises before progressing to a variety of traditional asanas and pranayama techniques.

The asanas have a variety of effects, including:

- Relaxation, strengthening and balancing of muscles
- Mobilization of joints
- Improvement of posture
- Action on pressure points
- Improvement of breathing
- Calming of nervous system
- Promotion of homoeostasis in cardiovascular, digestive, endocrine and other systems.

By holding the muscles in gently stretched positions, asanas relax the muscles. Through body awareness, visualizations, and other methods, mental relaxation techniques encourage relaxation at all levels (muscles, autonomic system, and mind).

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By bringing the mind and body into harmony, pranayama. Conscious and unconscious neural pathways that connect the mind and body regulate breathing. Enhancing breathing patterns can improve health and aid in the treatment of many chronic conditions. Yoga is now viewed as a complementary therapy for treating many stress-related illnesses, such as diabetes, coronary artery disease (CAD), and others.

Beneficial Effects of Yoga

Stretching the abdomen when practicing yoga increases the consumption and metabolism of glucose in peripheral tissues, the liver, and adipose tissues through an enzymatic mechanism, rejuvenating/regenerating pancreatic cells. Muscle development, increased blood flow to the muscles, and muscle relaxation all contribute to increased insulin receptor expression, which increases glucose uptake and lowers blood sugar. The rise in hepatic lipase and lipoprotein lipase at the cellular level, which influences the metabolism of lipoprotein and consequently increases the uptake of triglycerides by adipose tissues, may be the cause of the improvement in cholesterol levels after yoga. Yoga poses can enhance both the pancreas's -cells' sensitivity to the glucose signal as well as their ability to secrete insulin. In order to bring about new balance in the body, pranayama modifies a variety of inflatory and deflatory lung reflexes and interacts with a central neurological element.

Fasting blood sugar (FBS), serum total cholesterol, low density lipoproteins (LDL), very low density lipoproteins (VLDL), the ratio of total cholesterol to HDL-C, total triglycerides, and the ratio of total cholesterol to HDL-C were all significantly lower on the final day of the course than they were on the first day of the 8-day course after practicing yoga, according to an interventional study involving 98 subjects. HDL-C was also significantly higher.

In a trial, a yoga professional taught 44 Type 2 DM patients yoga (n = 22) and pranayama for three continuous months, one hour each day in the morning. When compared to the control group (n = 22), the test group's FBS, postprandial blood sugar (PPBS), glycosylated hemoglobin (HbA1c), triglycerides, and LDL all significantly decreased. The yoga group's need for insulin was also noticeably cut down.

In a research, a professional yoga teacher gave a 40-day yoga regimen to 20 individuals with type 2 diabetes mellitus. The exercises included the sun salutation Surya namaskar, the triangle pose Trikonasana, the mountain pose Tadasana, the lotus pose Padmasana, the breathing exercise Bhastrika Pranayama, the posterior stretch Pashimottanasana, the half spinal twist Ardhmatsyendrasana, the joint-freezing series Pawanmuktasana, the cobra pose Bhujangasana, the thunderbolt pose (corpse pose). After 40 days of doing the asanas, the study subjects had significantly lower fasting glucose levels, a smaller waist-to-hip ratio, and improved insulin levels.

In a research with 16 postmenopausal women who had more than 36% body fat, there were two groups: the yoga group and the control group. In obese postmenopausal women who participated in yoga,

adiponectin levels, serum lipid levels, and risk factors for metabolic syndrome all improved.

In a retrospective study comprising 15,550 adults between the ages of 53 and 57, it was discovered that regular yoga practice for at least four years was linked to reduced weight increase, particularly in overweight individuals. An intensive yoga training lasting one week decreased BMI, waist and hip circumference, total cholesterol, and improved stability and posture.

Numerous studies have demonstrated that yoga immediately reduces the SNS-HPA axis's sensitivity to stress. According to studies, yoga lowers blood glucose, plasma renin, norepinephrine, and epinephrine levels as well as salivary cortisol levels.

Only type 2 diabetic patients have been the subject of the majority of studies on yogic practice. About 25 studies with yoga interventions lasting from 8 days to 12 months assessed the associated risk indices. These include lower blood sugar and glycosylated hemoglobin levels, as well as improved glucose tolerance test results (GTT). Even before glycemic management, a rise in insulin receptors, a decrease in fasting insulin level, and an increase in the percentage of receptor binding all point to lower insulin resistance and enhanced sensitivity. There have been reports of improvements in mood, self-efficacy, and quality of life, as well as weight loss, a decline in waist-hip ratio and body mass index. Yoga has been proven to increase cognitive abilities and nerve conduction in diabetics, which may be helpful in managing diabetic complications. In a research, individuals with diabetes who received conventional care together with the comprehensive yogic breathing program fared better than those who received only standard care.

Yoga dramatically lowers systolic and diastolic blood pressure as well as heart rate. According to studies, yoga boosts levels of immunoglobulin A and natural killer cells, reversing the immune system's detrimental effects of stress. Yoga has been shown to reduce inflammatory cytokines like interleukin-6 and lymphocyte-1B as well as inflammatory markers like high sensitivity C-reactive protein. Adiponectin has anti-inflammatory properties, whereas leptin plays a pro-inflammatory role. Yoga practitioners had higher adiponectin levels. One such intervention that stops the onset and progression of metabolic decline and co-morbidity could be yoga (Figure 1)

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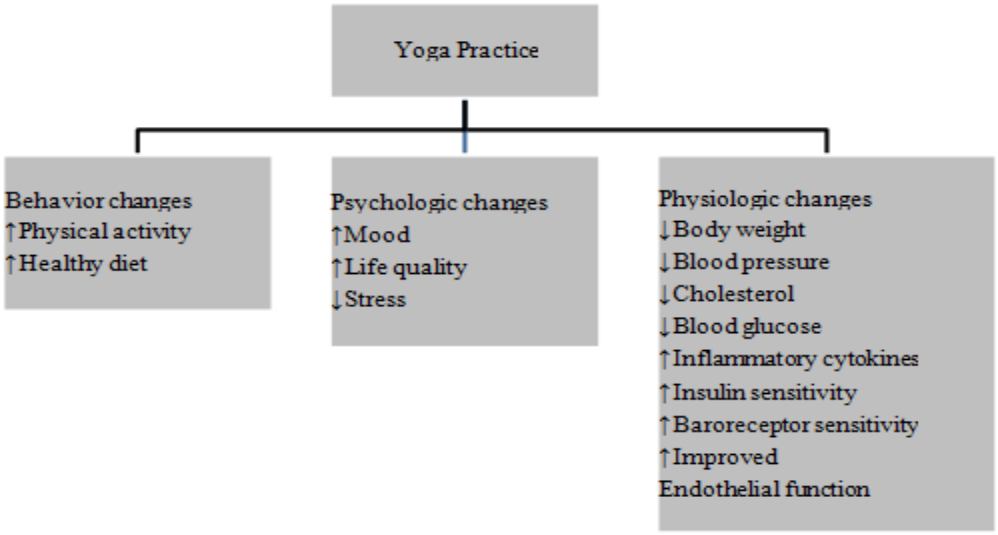

Fig 1 Effect of Yoga Practices

4. Risk of exercise in type 2 DM:

In high risk populations, regular exercise can stop or delay the onset of type 2 diabetes. When starting an exercise program, patients need a cardiovascular evaluation due to the high prevalence of occult coronary disease. Retinal hemorrhage and a temporary exacerbation of diabetic proteinuria are also possible side effects of high-intensity exercise.

Patients can sustain injuries when exercising or walking if they have comorbidities including diabetic foot, diabetic neuropathy, denervation, or loss of proprioception. Any pre-exercise evaluation should include a thorough analysis of the lower extremities' blood flow and neurologic condition. The selection of appropriate footwear must be done with care. Patients with advanced disease may need to restrict activities to lower-impact kinds of exercise, such as walking or jogging. Finally, it should be highlighted that some individuals may be at risk for developing post-exercise orthostatic hypotension due to autonomic dysfunction, especially in the early stages of an exercise program when autonomic impairment is not yet noticeable at rest.

In rare situations, diabetic microvascular problems may become worse. According to the available data, moderately intensive exercise neither causes nor worsens retinopathy and may even have a preventive impact. Certain forms of activity, however, may put the patient at risk for retinal hemorrhage if they already have an established proliferative illness. Concern exists over the potential impact of exercise on the development of diabetic nephropathy. Many patients who do not have proteinuria at rest will start to have protein in their urine 12 to 24 hours after a single intense exercise session. The increase in systolic blood pressure that takes place during the activity is roughly inversely related to the level of proteinuria.

5. CONCLUSION

Yoga is a practice that has been around for ages and was created to help people with their physical, mental, emotional, and spiritual well-being. A thorough yoga treatment program can be incorporated into a successful complementary or integrative therapy program and has the potential to increase the positive effects of standard medical management of DM. Yoga practice can help a person live a healthier life by reducing stress and improving certain biochemical indices.

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