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Emphasis of Yoga in the Management of Diabetes

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Abstract – The aim of the present study was to investigate the effect of Yoga exercises- Asanas and Pranayama on diabetic person. Yoga Asanas and Pranayama were conducted on respondents before starting the Asanas and Pranayama blood pressure, blood sugar, and hemoglobin were measured. After it was observed that Asanas and Pranayama have reduced adults 'blood sugar level, blood pressure and hemoglobin. These changes were observed due to Yoga exercises and it was found at normal level. These observations suggested that Yoga Asanas and Pranayama have a beneficial effect on controlling diabetic symptoms. It was assumed that there would be significant effect of Yoga- Asanas and pranayama on blood pressure, blood glucose and hemoglobin. As a result of one month of Pranayama and Asanas practice when compared to post-test condition. The results of the study reveal that there is significant reduction in post-test condition. Yogic exercises showed a positive and significant impact on diabetic adults. In the case of systolic blood pressure, diastolic blood pressure it was found that the reduction level was significant in post-test condition. Similar study is necessary to observe the efficacy Asanas and Pranayama on different age level and gender.

Keywords: Yoga, Management, Diabetes, Exercises, ASANAS, Pranayama, Blood Pressure, Blood Sugar, Hemoglobin, etc.

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INTRODUCTION:-

Diabetes mellitus (DM) is a chronic progressive metabolic disorder characterized by hyperglycemia mainly due to absolute (Type 1 DM) or relative (Type 2 DM) deficiency of insulin hormone. The problem of diabetes has grown enormously in the last two decades. In 2014, around 387 million people had diabetes with a prevalence of 8.3%; by 2035 this will rise to 592 million. North America and the Caribbean is the region with the highest prevalence of 11% having 37 million people with diabetes followed by the Middle East and North Africa with a prevalence of 9.2% having 35 million people with diabetes. Western Pacific is the region with higher number of people living with diabetes (138 million); however its prevalence is 8.6%, close to the prevalence of the World. The International Diabetes Federation (IDF) currently states that the top 5 countries with highest amount of diabetic patients are china, India, United States, Russia and Brazil. The number of people with type 2 diabetes is increasing in every country. 77% of people with diabetes live in low- and middle-income countries. 179 million people with diabetes are undiagnosed. Diabetes caused 4.9 million deaths in 2014. Primary prevention of diabetes by life style modification is a feasible solution to arrest the rising epidemic of the disease (Kleinfield, 2006). Government and non-government organizations should create awareness about the disease among public and also teach them way to self-care and benefits of lifestyle modification (Jayosinghe, 2004).

REVIEW OF LITERATURE:

Diabetes may result due to a lot of genetic-environmental interactions. The growing incidence of diabetes is mainly attributable due to the increasing rates of urbanization, migration from rural to urban areas and adoption of sedentary life style and unhealthy diet habits.

Obesity: Obesity frequently accompanies type 2 diabetes and many studies have shown it to be a powerful predictor of development of type 2 diabetes. Obesity has increased rapidly in many populations in recent years because of an interaction between genetic and environmental factors such as metabolic characteristics, physical inactivity and high calorie composition of the diet. This increase in obesity has been accompanied by an increasing prevalence of type 2 diabetes (Sareen and Kumah, 2006). Those with higher Body Mass Index (BMI) have much higher incidence rates of type 2 diabetes at earlier ages than those with lower BMI among whom the incidence rise in the older age groups. A child gaining BMI faster than their peers is shown to be at increased risk of DM or metabolic syndrome later in life. Obesity,

especially abdominal obesity is considered as a strong risk factor for Type 2 DM both in adults and children. Increased visceral fat is independently related to both increased insulin resistance and decreased insulin secretion. Amount of visceral fat in obese adolescents is directly correlated with basal and glucose stimulated hyperinsulinemia and inversely relate with insulin sensitivity. Several studies indicate that waist circumference or waist-to-hip ratio may be a better indicator of the risk of developing diabetes than BMI. Even though BMI is important in predicting the risk, distribution of fat plays a major role in assessing the risk of type 2 DM in patients (Sharma, et. al., 2005).

Lack of physical activity: During the last few decades, most of the working population had changed their lifestyle from active working occupations like agriculture to a less demanding works like office jobs. TV, video games too makes the children refrain from regular physical activity. It was observed that the prevalence of diabetes was almost 3 times higher in individuals with sedentary life style compared to those having heavy physical activity (23.2% vs. 8.1%). It was also noted that prevalence of metabolic syndrome and hypertension were also higher among people with light physical activity (Rajesh, et. al., 2006). Individuals with light grade physical activity had 2.4 times higher chance of developing coronary artery disease compared to heavy physical activity group.

Diet: The amount and quality of dietary fat modifies the glucose tolerance and insulin sensitivity. A high fat content in the diet may result in worsening of glucose tolerance by several mechanisms including decreased binding of insulin to its receptors, impaired glucose transport, and decreased glycogen synthase and accumulation of triglycerides in skeletal muscles (Ernst, 2006). The fatty acid composition of the diet affects the tissue phospholipid composition and also insulin action by altering membrane fluidity and insulin signaling.

Stress: Stress is defined as a 'stimulus event of sufficient severity to produce disequilibrium in the homeostasis of physiological systems' resulting from a variety of stressors. The neuroendocrine changes accompanying stress can translate the signals into pathophysiological alterations. The hypothalamic-pituitary-adrenal (HPA) axis and sympathetic nervous system (SNS) are triggered as a response to a stressor leading to a cascade of physiologic, behavioral, and psychological effects, primarily as a result of the release of cortisol and catechol amines (epinephrine and norepinephrine). Due to repeated firing of the HPA axis and SNS, the system gets de-regulated, leading to diseases such as autoimmune disorders, obesity, diabetes, substance abuse, depression, and cardiovascular disease (Pozzilli, et. al., 2006). Stress also plays a role in diabetogenesis. Changes related to stress precipitates hyperglycemia by increasing levels of hormones like glucagon, cortisol, growth hormone, catechol amines, Corticotrophin Releasing Hormone (CRH), prolactin, leptin, neuropeptide Y. Bjorn top postulated that activation of sympathetic nervous system following stress can lead to a series of hormonal changes leading to obesity and hence diabetes (Visweswaraiah and Telles, 2004). Psychosocial stress may trigger the onset of visceral obesity and metabolic syndrome. HPA has been shown to be more active in pre-menopausal centrally obese women and in centrally obese men. Central android obesity and peripheral gynoecia obesity is associated with differential regulation of HPA and also targets metabolically important tissues such as liver and visceral fat. Chronic psychological stress was correlated with prevalence of type 2 diabetes mellitus and with visceral adiposity. The numbers of stressful events were positively associated with the prevalence of newly diagnosed diabetes (Granath, et. al., 2006).

Life style intervention: Diet, medicines (insulin /OAD/other injectable), education and exercise are the mainstay in the management of diabetes. However, exercise is the most neglected part of management. If a proper exercise program accompanies the treatment, it would lead to drastic beneficial effects.

BENEFITS OF YOGA:

The word Yoga is derived from the Sanskrit word 'Yuj' meaning union of the body, breath and mind. Yoga is an ancient discipline designed to bring balance and health to the physical, mental, emotional, and spiritual dimensions of the individual (Ramdev, 2005). Yoga's primary emphasis is upon gaining general well-being by the way of integration often incorporating three major components: held or sequences of physical postures, breathing exercises and meditation.

Yoga practices: Yoga therapy consists of graded sets of exercises, including very simple ones, so that all can practice on their own, even after the first lesson, whether or not they have done yoga before. Commencing with gentle stretching and breathing exercises, it varies up to a range of classical asanas and pranayama practices (Table 1). 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.

Asanas relax muscles through holding them in gently stretched positions. Mental relaxation techniques promote relaxation at all levels (muscles, autonomic system and mind), through body awareness, visualizations, etc. Pranayama harmonizes and links the mind and body. Breathing is controlled by both conscious and unconscious neural pathways, bridging the mind and body. Improving the breathing pattern promotes health and can help in the management of many chronic ailments. Yoga is now regarded as a complementary for self-management of many stress related disorders like diabetes, Coronary Artery Disease (CAD) etc.

S.NO	NAME OF ASANA	DURATION	
1	Bhastrika Pranayama	3 - 5 mins per day	
2	Suryanamskar	3 - 7 turns	
3	Kapal- Bhati	5 - 10mins per day	
4	Tadasana (Mountain pose)	¼ minute to one minute	
5	Trikonasana (Triangle pose)	¼ minute to one minute	
6	Anulom Viloma (breathing exercise)	5 - 10 mins per day	
7	Bhramari(breathing exercise)	5 times a day	
8	Paschimottanasan (seated forward bend)	¼ minute to one minute	
9	Bhujangasana (cobra pose)	3 - 7 turns	
10	Shavasana (corpse pose)	3 - 7 turn of each	
11	Vajrasana (thunderbolt pose)	¼ minute to one minute	
12	Pawanmuktasana (wind relieving pose)	¼ minute to one minute	
13	Padmasana(lotus position)	5 - 15 minutes per day	
14	Sarvangasana(supported shoulder stand pose)	Few seconds	
15	Matsyasana(fish pose)	Few seconds	
16	Sukhasana(crossed leg pleasant pose)	¼ minute to one minute	

Table 1: Name and duration of various pranayama and yoga asana included in yogic exercises for type 2 diabetes on the basis of available literature

BENEFICIAL EFFECTS OF YOGA:

Abdominal stretching during yoga exercise causes rejuvenation/ regeneration of cells of pancreas increasing the utilization and metabolism of glucose in peripheral tissues, liver, and adipose tissues through enzymatic process. Improved blood supply to the muscles and muscular relaxation along with its development enhances insulin receptor expression causing increased glucose uptake and thus reducing blood sugar. The improvement in the lipid levels after yoga could be due to increased hepatic lipase and lipoprotein lipase at cellular level, which affects the metabolism of lipoprotein and thus increase uptake of triglycerides by adipose tissues. Yoga postures can lead to improvement in the sensitivity of the β-Cells of pancreas to glucose signal and also the improvement in insulin secretion. Pranayama modified various inflatory and deflatory lung reflexes and interact with central neural element to bring new homeostasis in the body. In an interventional research, involving 98 subjects, fasting blood sugar (FBS), serum total cholesterol, low density lipoproteins (LDL), very low density lipoproteins (VLDL), and the ratio of total cholesterol to HDL-C, and total triglycerides were significantly lower, and HDL-C significantly higher, on the last day of the course compared with the first day of the 8-days course after performing yoga. In a study, 44 Type 2 DM patients were taught yoga (n = 22) and pranayama for three continuous months, 1 hour every day in the morning, by a yoga expert. They had significant decrease in FBS, Postprandial blood sugar (PPBS), glycosylated hemoglobin (HbA1c), triglycerides and LDL of test group with P<0.001, compared with control group (n = 22). The requirement of insulin in the yoga group was also significantly reduced. In a study, 20 patients with type 2 diabetes mellitus were subjected to 40 days yoga routine by an expert yoga teacher. The postures performed were: Surya Namaskar (sun salutation), Trikonasana (triangle pose), and Tad asana (mountain pose), Padma Sana (lotus pose), Bhastrika Pranayama (breathing exercise), Pashimottanasana (posterior stretch), Ardhmatsyendrasana (half spinal twist), Pavanamuktasana (joint freeing series), Bhujangasana (cobra pose), Vajrayana (thunderbolt pose), Dhanurasana (bow pose), and Shavasana (corpse pose). At the end of 40 days of performing the asanas, the study participants had a significant decrease in fasting glucose levels, waist-hip ratio and beneficial changes in insulin levels. In a study involving 16 postmenopausal women with more than 36% body fat were divided into yoga group and control group. Yoga group showed improved adiponectin level, serum lipids, and metabolic syndrome risk factors in obese postmenopausal women. In a retrospective study involving 15,550 adults aged 53-57 years, it was found that regular yoga practice for 4 years or more was associated with attenuated weight gain, especially among people

who were overweight. A week of intensive yoga course reduced the BMI as well as waist and hip circumference, decreased total cholesterol, improved posture, and stability. Numerous studies have shown yoga to have an immediate effect down regulating the response of SNS -HPA axis to stress. Studies show that yoga decreases levels of salivary cortisol, blood glucose as well as plasma renin levels, and 24-hour urine norepinephrine and epinephrine levels. Most of the works related to yogic practice have been carried out only in type 2 diabetic patients. The associated risk indices have been evaluated in about 25 studies with yogic intervention ranging from 8 days to 12 months. These include decreased blood glucose levels and glycosylated hemoglobin level and also showed improvement in the glucose tolerance test (GTT). A decrease in fasting insulin level, rise in insulin receptors, increased percentage of receptor binding (even before glycemic control) suggests decreased insulin resistance and improved sensitivity. There have been reports of weight loss, decrease in body mass index and waist-hip ratio, stress reduction, improvement in mood, self-efficacy and quality of life. Yoga has shown improvement in nerve conduction and cognitive functions in diabetics, a feature, which may prove to be beneficial in management of diabetic complications. In a study, Cardiac autonomic functions improved in patients with diabetes on standard treatment that followed the comprehensive yogic breathing program compared to patients who were on standard therapy alone. Yoga significantly decreases heart rate, systolic and diastolic blood pressure. Studies suggest that yoga reverses the negative impact of stress on the immune system by increasing levels of immunoglobulin A as well as natural killer cells. Yoga has been found to decrease markers of inflammation such as high sensitivity C-reactive protein as well as inflammatory cytokines such as interleukin-6 and lymphocyte-1B. Leptin plays a pro-inflammatory role while adiponectin has anti-inflammatory properties. Adiponectin levels were higher among practitioners of yoga. Yoga could be one such intervention that prevents the occurrence and progression of metabolic deterioration and co-morbidity.

CONCLUSION:

It was assumed that there would be significant effect of Yoga- Asanas and pranayama on blood pressure, blood glucose and hemoglobin. As a result of one month of Pranayama and Asanas practice when compared to post-test condition. The results of the study reveal that there is significant reduction in post-test condition. Yogic exercises showed a positive and significant impact on diabetic adults. In the case of systolic blood pressure, diastolic blood pressure it was found that the reduction level was significant in post-test condition. Similar study is necessary to observe the efficacy Asanas and Pranayama on different age level and gender. Another suggestion may also be that these variables should be included with other variables and different time intervals with an organized manner. From the statistical analysis of the results obtained in the present study and their comparison with other published reports, it may be concluded that yoga helps in decreasing blood sugar level and keep the diabetes in control. There is a significant effect of Yogic intervention on serum glucose level on Diabetics.

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