



Yogic Practices to Manage Diabetes Mellitus

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Abstract

Human race has become machines in this technology era. They think fast, act fast, live fast, eat fast and also end their life very fast. This machine life will soon lead to fatality. Even though there are many reasons for this machine life, the human race has to survive. This machine life leads to increase in Diabetes Mellitus all over the world. World Health Organization(WHO) states that the number of people with diabetes has risen from 108 million in 1980 to 422 million in 2014. The global prevalence of diabetes among adults over 18 years of age has risen from 4.7% in 1980 to 8.5% in 2014. Diabetes prevalence has been rising more rapidly in middle- and low-income countries. The prevalence of diabetes in the age group of 20 to 79 years stood at nearly 9% of the population in India. The greatest number of people with diabetes is between 40 to 59 years of age. One of the best remedial activity to manage this fatal life style is yoga.

Keywords: Yogic Practices, Diabetics, Obesity.

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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 [1]. 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. 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 [2]. Primary prevention of diabetes by life style modification is a feasible solution to arrest the rising epidemic of the disease. 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.

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 [3,4].

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Obesity

Obesity frequently accompanies type 2 diabetes and many studies have shown it to be a powerful predictor of development of type 2 diabetes [5,6]. 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 [5]. This increase in obesity has been accompanied by an increasing prevalence of type 2 diabetes. 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 directly.

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 also 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%) [7].

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. 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. Bjorntop postulated that activation of sympathetic nervous system following stress can lead to a series of hormonal changes leading to obesity and hence diabetes.

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. 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 [8].

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. Role of exercise in DM Physical activity refers to a behavior, specifically a body movement that occurs from skeletal muscle contraction and results in increased energy expenditure above resting metabolic rate. Exercise, or “exercise training,” is a specific type of physical activity that is performed with the intention of enhancing components of physical fitness [9]. Physical inactivity can initiate and accelerate the pathogenesis of diabetes and subsequent morbidity and mortality. Conversely, regular physical activity can retard the progression from one stage to another, and it may even reverse the process. Numerous studies have shown that moderate physical activity has decreased the risk of diabetes considerably [10]. Types of exercise training include [11]

1. aerobic exercise
2. endurance type exercise
3. passive exercise
4. resistance exercise

Effect of aerobic exercise in type 2 DM Aerobic exercise is the exercise which improves oxygen consumption and increases the functioning of the cardiovascular and respiratory systems [12]. Aerobic exercises comprise of swimming, cycling, and treadmill, walking, rowing, running and jumping rope [13]. Moderate aerobic exercise leads to maintenance of the blood pressure in diabetic neuropathy patients [14]. Aerobic exercise improves the physiological parameters like fasting blood-glucose level, glycemic control and lipid profile. It reduces the arterial stiffness and can restore the endothelial function, and reduces the risk for developing cardiovascular complications in type 2 DM [15-17] and is a valuable therapeutic strategy for type 2 DM.

Effect of resistance exercise in type 2 DM Resistance exercise helps to develop proper glucose control and less insulin resistance among type 2 DM. Resistance exercises are exercises that have to be performed against resistance. Example: Weight lifting. Unlike aerobic exercise, resistance exercises are relied on the Equipment. Resistance training has been reported to enhance insulin sensitivity, daily energy expenditure and quality of life [18]. Resistance training increases muscle strength, lean muscle mass, and bone mineral density, which could enhance functional status and glycemic control and assist in the prevention of sarcopenia and osteoporosis [19,20].

Passive exercise needs to include another person or outside force, or produced by voluntary effort of another segment of the patient’s own body [21]. There is paucity of studies on these types of exercise in treating type 2 DM.

Benefits of Yoga

The word Yoga is derived from the Sanskrit word ‘Yuj’ meaning union of the body, breath and mind [22]. Yoga is an ancient discipline designed to bring balance and health to the physical, mental, emotional, and spiritual dimensions of the individual. 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 [23]. Yoga practices Yoga therapy [24,25] 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.

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 homeostasis 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.

Asanas for managing Diabetes mellitus (DM)

Asana	Explanation	Picture
Balasana	Forward bending asana	
Paschimottanasana	Forward bending asana	
Halasana	Backward bending asana	
ArdhaMatsyendrasana	Spine Twisting Asana	
Padahasthasana	Standing and Forward bending asana	
Mayurasana	Hand stand asana	
JanuSirasasana	Forward bending asana	
Dhanurasana	Bow posture	
UtthitaParsvakonasana	Extended Stretching asana	
Makarasana	Lying Asana	

Yoga is now regarded as a complementary for self-management of many stress related disorders like diabetes, Coronary Artery Disease (CAD) etc. 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 [26-28]. 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 [29]. 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 [30,31]. 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 [32]. Pranayama modified various inflatory and deflatory lung reflexes and interact with central neural element to bring new homeostasis in the body [32].

Conclusion

Yoga is an ancient discipline designed to bring balance and health to the physical, mental, emotional, and spiritual dimensions of the individual. A comprehensive yoga therapy program has the potential to enhance the beneficial effects of standard medical management of DM and can be used in an effective complementary or integrative therapy program. The improvement in various biochemical indices and stress

reduction by practicing yoga can enable a person with a better healthy living.

References

1. Monro, Robin (1997) "Yoga therapy". *Journal of Bodywork and Movement Therapies* 1: 215-218.
2. Balaji PA, Varne SR, Ali SS (2012) "Physiological effects of yogic practices and transcendental meditation in health and disease". *N Am J Med Sci* 4: 442-448.
3. Boulé NG, Kenny GP, Haddad E, Wells GA, Sigal RJ (2003) Meta-analysis of the effect of structured exercise training on cardiorespiratory fitness in Type 2 diabetes mellitus. *Diabetologia* 46: 1071-1081.
4. Chandratreya S (2012) "Diabetes and Yoga".
5. Colditz GA, Willett WC, Stampfer MJ, Manson JE, Hennekens CH, et al. (1990) "Weight as a risk factor for clinical diabetes in women". *Am J Epidemiol* 132: 501-513.
6. Cuff DJ, Meneilly GS, Martin A, Ignaszewski A, Tildesley HD, et al. (2003) "Effective exercise modality to reduce insulin resistance in women with type 2 diabetes". *Diabetes Care* 26: 2977-2982.
7. Dang KK, Sahay BK (1999) "Yoga and Meditation, Medicine update". In: Singh MM, editor. *The Association of Physicians of India. Vol. 9*. New Delhi: APICON, The Association of Physicians of India conference 502-512.
8. Delmonte MM (1985) "Biochemical indices associated with meditation practice: a literature review". *NeurosciBiobehav Rev* 9: 557-561.
9. HH Sri Sri Ravi Shankar (2011) "PatanjaliYog Sutras-A" commentary (1st edtn), India: Sri Sri Publication Trust.
10. <http://www.idf.org/diabetesatlas/update-2014>.
11. Hunter GR, McCarthy JP, Bamman MM (2004) Effects of resistance training on older adults. *Sports Med* 34: 329-348.
12. Hurley BF, Roth SM (2000) "Strength training in the elderly: effects on risk factors for age-related diseases". *Sports Med* 30: 249-268.
13. Jerath RJ, Edry VA, Barnes VA, Jerath V (2006) "Physiology of long pranayamic breathing: Neural respiratory elements may provide a mechanism that explains how slow breathing shifts the autonomic nervous system". *Med Hypotheses* 67: 566-71.
14. LaMonte MJ, Blair SN, Church TS (2005) "Physical activity and diabetes prevention". *J ApplPhysiol* (1985) 99: 1205-1213.
15. Ligtenberg PC, Hoekstra JB, Bol E, Zonderland ML, Erkelens DW (1997) "Effects of physical training on metabolic control in elderly type 2 diabetes mellitus patients". *ClinSci (Lond)* 93: 127-135.
16. Manjunatha S, Vempati RP, Ghosh D, Bijlani RL (2005) "An investigation into the acute and long-term effects of selected yogic postures on fasting and postprandial glycemia and insulinemia in healthy young subjects". *Indian J PhysiolPharmacol* 49: 319-324.
17. Mogensen CE, Ruderman N, Devlin JT, Schneider SH, Kriska A et al. (2002) Nephropathy: early. In: "Handbook of Exercise in Diabetes". (2nd edtn) American Diabetes Association, 433-449.
18. Mohan V, Shanthirani CS, Deepa R (2003) "Glucose intolerance (diabetes and IGT) in a selected South Indian population with special reference to family history, obesity and lifestyle factors-the Chennai Urban Population Study (CUPS 14)". *J Assoc Physicians India* 51: 771-7.
19. Nayak NN, Shankar K (2004) "Yoga: a therapeutic approach". *Phys Med RehabilClin N Am* 15: 783-798, vi.
20. Poehlman ET, Dvorak RV, DeNino WF, Brochu M, Ades PA (2000) "Effects of resistance training and endurance training on insulin sensitivity in nonobese, young women: a controlled randomized trial". *J ClinEndocrinolMetab* 85: 2463-2468.
21. Ramachandran A, Ma RC, Snehalatha C (2010) "Diabetes in Asia". *Lancet* 375: 408-418.
22. Ramachandran A, Snehalatha C, Samith Shetty A, Nanditha A (2013) "Primary prevention of Type 2 diabetes in South Asians--challenges and the way forward". *Diabet Med* 30: 26-34.
23. Sahay BK, Murthy KJR (1988) "Long term follow up studies on effect of yoga in diabetes". *Diab Res ClinPract* 5: S655.
24. Segal KR, Edano A, Abalos A, Albu J, Blando L, et al. (1991) "Effect of exercise training on insulin sensitivity and glucose metabolism in lean, obese, and diabetic men". *J ApplPhysiol* (1985) 71: 2402-2411.
25. Sigal RJ, Kenny GP, Boulé NG, Wells GA, Prud'homme D, et al. (2007) "Effects of aerobic training, resistance training, or both on glycemic control in type 2 diabetes: a randomized trial". *Ann Intern Med* 147: 357-366
26. Sridhar GR, Madhu K (2002) "Psychosocial aspects of diabetes". In

- Ahuja MMS, Tripathy BB, Moses SGP et al. (eds). RSSDI Textbook of Diabetes. Research Society for the Study of Diabetes in India, Hyderabad, 737-755.
27. Steyn NP, Mann J, Bennett PH, Temple N, Zimmet P, et al. (2004) "Diet, nutrition and the prevention of type 2 diabetes". *Public Health Nutr* 7: 147-165.
 28. Thent ZC, Das S, Henry LJ (2013) "Role of exercise in the management of diabetes mellitus: the global scenario". *PLoS One* 8: e80436.
 29. Tulpule TH, Shah HM, Shah SJ, Haveliwala HK (1971) "Yogic exercises in the management of ischaemic heart disease". *Indian Heart J* 23: 259-264.
 30. US Department of Health and Human Services (1996) "Physical Activity and Health: A Report of the Surgeon General". Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion.
 31. Yokoyama H, Emoto M, Fujiwara S, Motoyama K, Morioka T, et al. (2004) Short-term aerobic exercise improves arterial stiffness in type 2 diabetes. *Diabetes Res ClinPract* 65: 85-93.
 32. Zargar AH, Wani AA, Laway BA, Masoodi SR, Wani AI, et al. (2008) "Prevalence of diabetes mellitus and other abnormalities of glucose tolerance in young adults aged 20-40 years in North India (Kashmir Valley)". *Diabetes Res ClinPract* 82: 276-281.