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THE ROLE OF YOGA IN DIABETES MANAGEMENT: AN EXAMINATION OF PHYSIOLOGICAL AND PSYCHOLOGICAL BENEFITS

Şule Çalışır Kundakçı

ORCID ID: 0000-0002-8820-8046
Address: (Lecturer) Istanbul Beykent University Faculty of Health Sciences, Department of Nursing, Beylikdüzü Campus, 34520, Beylikdüzü-Istanbul, Türkiye.
E-mail: sulecalisir@gmail.com

Abstract

Diabetes is a prevalent chronic disease that imposes a substantial burden on both individuals and society. Chronic conditions like diabetes significantly reduce quality of life, restrict daily activities, and contribute to premature mortality. When poorly managed, diabetes can result in dysfunction across multiple body systems. To address its complex symptoms, many patients seek complementary and alternative therapies alongside conventional treatments. The aim of complementary and alternative therapies is to create a healing environment, enhance self-awareness, and activate the body's self-healing capacity. Diabetic patients frequently use complementary and alternative therapies to regulate blood sugar levels and prevent complications. Common complementary and alternative therapies practices in diabetes management include yoga, acupuncture, reflexology, aromatherapy, and herbal therapies. These methods are primarily employed to promote overall well-being, stabilize blood glucose, and reduce the risk of diabetes-related complications. This article was compiled to be both informative and useful for future research on the effects of yoga in diabetes management.

Keywords: *Diabetes, Yoga therapy, Human Health, Complementary therapies, Blood glucose level, HbA1c*

INTRODUCTION

Diabetes mellitus is one of the most prevalent chronic diseases globally, and its frequency continues to rise. It significantly impacts the quality of life due to its chronic nature and the complications it induces. Diabetes is characterized by elevated blood sugar levels, resulting from either reduced insulin production or insulin resistance. Patients with diabetes often need to monitor their blood glucose levels frequently and may require insulin administration several times daily. One of the major consequences of diabetes is the development of microvascular complications (such as nephropathy, neuropathy, and retinopathy) and macrovascular complications (such as ischemic heart disease, hypertension, cerebrovascular disease, and peripheral vascular disease). These complications lead to severe health problems and reduce life expectancy (ADA, 2021; IDF, 2024).

In chronic diseases such as diabetes, lifestyle modifications are essential to prolong life and improve the quality of life. Managing diabetes requires patients to adopt long-term treatment plans and make significant changes in their daily routines. However, it is widely acknowledged that diabetes poses challenges in maintaining long-term adherence to treatment, and patients often struggle to turn the education and guidance they receive into consistent, habitual behaviors. Additionally, diabetes comes with both acute and chronic complications, making the journey even more demanding (TSEM, 2022; Kaynak ve Polat, 2017). The emotional and physical toll of living with diabetes often leads patients to seek out alternatives beyond conventional medical treatments. As a result, complementary and alternative therapies (CAM) have become popular options. These therapies include practices like yoga, acupuncture, and herbal treatments, which are commonly explored by patients looking for holistic approaches to managing their condition and alleviating symptoms. CAM practices offer patients an avenue to address not only the physiological but also the psychological burdens of living with a chronic illness like diabetes. The integration of these therapies alongside traditional medical treatment can help enhance overall well-being and support more comprehensive disease management (Çalışır Kundakçı, 2023; Küçükgüçlü et al., 2012; Thind et al., 2018).

Integrative and complementary practices have become a reality in healthcare. In this approach, yoga is a treatment method that appears as a simple and easily applicable alternative. Yoga, a spiritual practice rooted in Hinduism, encompasses various techniques aimed at enhancing self-awareness and connection to life. Different forms of yoga integrate physical

postures, breath control, and meditation, promoting health, relaxation, and well-being. Often incorporated into holistic treatment plans, yoga is particularly valued for its role in reducing stress and improving physical strength. Yoga therapy, in this context, serves as a complementary approach to managing stress and enhancing overall vitality, making it a widely recognized tool in modern wellness practices (Grossman et al., 2018; Köyüstü et al., 2021; Talhaoğlu, 2021; Thind et al., 2018). The literature demonstrates that the application of yoga in individuals with diabetes leads to significant improvements in clinical markers, including alterations in hemoglobin levels, enhanced peripheral blood circulation, and beneficial effects on reducing general fatigue and improving mood [7,8,9]. In light of this information, the article will comprehensively examine the efficacy and therapeutic benefits of yoga for diabetic patients, highlighting its role in improving both physiological and psychological outcomes.

YOGA IN DIABETES MANAGEMENT

Yoga is a traditional Indian practice that encompasses physical postures, breathing exercises, behavioral modifications, and dietary regulation through mental discipline [8]. It has been shown to effectively regulate physiological parameters such as blood pressure, heart rate, and respiratory rate, while also offering significant psychological benefits, including stress reduction and improved mental well-being. Due to these attributes, yoga has gained recognition as a therapeutic intervention in clinical settings. In recent years, its role in managing various chronic conditions such as hypertension, asthma, obesity, neuromuscular disorders, and psychiatric illnesses has been increasingly studied (Şahin et al., 2019; Torgutalp, 2018; Ovayolu &Ovayolu, 2019). Additionally, yoga has proven effective in controlling the symptoms and complications associated with diabetes mellitus (Mooventhan, 2017; Thind et al., 2018).

Diabetes is one of the fastest-growing global health concerns (Cole &Florez, 2020). Its complications, including cardiovascular diseases, diabetic kidney disease, and diabetic retinopathy, are significant contributors to morbidity (Chung et., 2021). Beyond these complications, diabetes can also detrimentally impact individuals' quality of life (Cole &Florez, 2020; Chung et., 2021). Defined as a state of hyperglycemia resulting from insulin deficiency or resistance, diabetes affects millions worldwide. Notably, type 2 diabetes accounts for more than two-thirds of the diabetic population and is increasingly common, particularly among young adults, posing a global public health challenge (Şahin et al., 2019; Kumar et al., 2016). Typical symptoms of diabetes include polyuria, polydipsia, fatigue, and dry mouth (Şahin et al., 2019).

Many diabetic patients turn to complementary and alternative treatment methods to manage diabetes and its complications (İlhan et al., 2016). A key driver for the use of complementary and alternative therapies (CAM] is the potential side effects of conventional medical treatments (Şahin et al., 2019). Diabetic individuals frequently employ techniques such as multivitamins, herbal medicines, dietary regulation, spiritual healing, and relaxation techniques (Özçelik et al., 2015). Among these, yoga stands out as a popular approach. Yoga involves muscle stretching, breathing exercises, behavioral modification, and dietary control through mental discipline. It is recognized for its ability to regulate physiological parameters such as blood pressure, heart rate, and respiratory rate, while providing psychological relaxation (Uzun & Demir, 2024). Originating from India, yoga is used for symptom management in various chronic conditions. Research on yoga's role in diabetes management has shown that it can effectively control symptoms and complications associated with type 2 diabetes. Studies indicate that yoga may lower HbA1c levels and help manage high blood sugar (Kumar et al, 2016; Thind et al., 2018). Moreover, additional research suggests that yoga can reduce fasting blood sugar, blood lipid levels, and HbA1c values while enhancing the quality of life for type 2 diabetes patients (Popli et al., 2014; Jyotsna et al., 2014). However, findings in the literature regarding the efficacy of yoga in managing type 2 diabetes are not entirely consistent. For example, Kumar et al. (2016) found no significant effect of yoga on blood sugar levels in individuals with diabetes. In contrast, a meta-analysis by Cui et al. (2017) reported that yoga effectively reduced fasting blood sugar and HbA1c levels in type 2 diabetes patients.

The impact of yoga on diabetes management is evident in both physiological improvements and aspects such as mental relaxation and stress management. The existing literature presents varying findings across these domains (Kumar et al., 2016; Uzun & Demir, 2024; Shetty et al., 2024). Therefore, the effects of yoga on diabetes will be discussed under two distinct categories: physiological outcomes and psychological well-being.

PHYSIOLOGICAL EFFECTS OF YOGA IN DIABETES MANAGEMENT

Yoga, increasingly recognized for its therapeutic potential in the management of diabetes, particularly type 2 diabetes, offers a multifaceted approach through its influence on key physiological functions. The practice of yoga, which integrates physical postures (asanas), controlled breathing techniques (pranayama), and meditative practices, has been shown to contribute significantly to the enhancement of metabolic and cardiovascular health. These physiological benefits are particularly pertinent in the context of type 2 diabetes, where challenges such as insulin resistance and dysregulated glucose metabolism predominate (Grossman et al., 2018; Thind et al., 2018; Torgutalp, 2018; Köyüstü & Kırık, 2021).

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This section provides a critical examination of the ways in which yoga practice modulates key physiological parameters that are integral to the effective management of diabetes.

One of the key physiological benefits of yoga in the management of diabetes is its ability to improve insulin sensitivity. Studies have shown that regular yoga practice can increase the body's ability to respond to insulin, thereby improving glucose uptake by cells and lowering blood sugar levels (Ghosh & Jamadar, 2022; Köyüstü & Kırık, 2021; Shetty et al., 2024). This is particularly important for individuals with type 2 diabetes, where insulin resistance is a central concern. The mechanism by which yoga improves insulin sensitivity may be related to its effects on the autonomic nervous system and the reduction of stress hormones such as cortisol. Increased cortisol levels are associated with increased insulin resistance, and yoga's role in lowering cortisol may thus enhance insulin function (Corey et al., 2014; Çetinoğlu % Pehlivan, 2024; Köyüstü & Kırık, 2021). Yoga has been shown to have a positive effect on glycemic control, as well as improving insulin sensitivity. Studies show that people who do yoga regularly generally have lower fasting blood sugar and hemoglobin A1c (HbA1c), a marker of long-term blood sugar control (Ghosh et el., 2022; Shetty et al., 2024; Thind et al., 2018). Improved glycemic control is vital for preventing complications of diabetes, including cardiovascular disease, neuropathy, and retinopathy. The exact mechanisms by which yoga affects blood sugar levels are still being studied, but it is believed that a combination of improved muscle mass, improved circulation, and better hormone regulation contribute to this effect (Köyüstü & Kırık, 2021; Kumar et al., 2016). (Figure 1).

Diabetes management benefits from yoga's positive effect on cardiovascular health as one of its key physiological advantages. Diabetes significantly increases the risk of cardiovascular disease, making heart health a major concern in diabetes care. Yoga has been shown to lower blood pressure, lower cholesterol levels, and improve heart rate variability, all of which are beneficial for cardiovascular health. These improvements may be due to the combination of physical activity and relaxation that yoga provides. Yoga may help reduce the cardiovascular risk associated with diabetes by lowering blood pressure and improving lipid profiles, thereby improving overall health outcomes (Cramer et al., 2014; Sharma et al., 2024).

Yoga may also help with weight management, a critical component of diabetes management. Obesity is a major risk factor for the development and progression of type 2 diabetes. While yoga is not as intense as other forms of exercise, it can still contribute to weight loss and improved body composition. Certain forms of yoga, such as power yoga or vinyasa, involve sustained movement, which can increase calorie expenditure. Additionally, yoga helps build lean muscle mass, which can improve basal metabolic rate and increase fat metabolism. This can lead to reduced insulin resistance and better glucose control (Bernstein et al., 2014; Gadham et al., 2015; Tundwala et al., 2012).

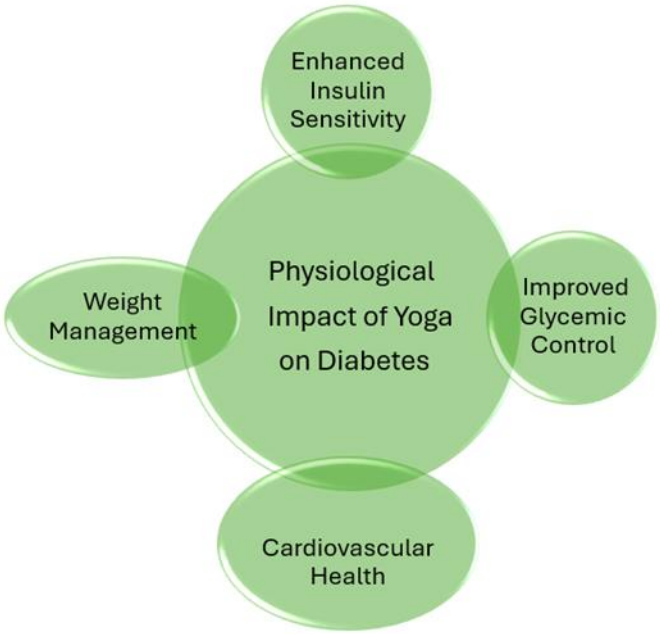

Figure 1. Physiological Effects of Yoga in Diabetes Management

Yoga's effects on the endocrine system also play an important role in diabetes management. Certain yoga poses are believed to stimulate the pancreas, the organ responsible for insulin production. Improved pancreatic function may increase insulin secretion in individuals with type 2 diabetes, potentially reducing the need for exogenous insulin or other glucose-lowering medications. While more research is needed to fully understand this mechanism, some studies suggest

that yoga may have a direct impact on pancreatic health (Kumar et al., 2016; Singh et al., 2015). The physiological effects of yoga are multifaceted and offer promising benefits for individuals with diabetes. By improving insulin sensitivity, improving glycemic control, supporting cardiovascular health, aiding in weight management, and potentially stimulating pancreatic function, yoga serves as a valuable complementary therapy for diabetes management. While yoga should not replace treatments, incorporating it into a holistic diabetes care plan can lead to better health outcomes and improved quality of life for those living with the condition (Kumar et al., 2016; Sanogo et al., 2023; Vizcaino & Stover, 2016).

THE PSYCHOLOGICAL BENEFITS OF YOGA IN DIABETES MANAGEMENT

In diabetes management, psychological health is as crucial as physical exercise and nutrition. Yoga plays a significant role in diabetes management by positively affecting both physical and psychological health. The psychological benefits of yoga can enhance the quality of life for individuals with diabetes and assist them in coping with the disease (Ismail et al., 2024; Talhaoğlu, 2021). (Figure 2).

Yoga is considered an effective tool for stress management (Chong et al., 2011). Individuals with diabetes often encounter daily stress and anxiety associated with their condition. Yoga's meditation and breathing exercises help to reduce the body's stress responses (Thangasami et al., 2015). Research indicates that yoga practice lowers cortisol levels, which contributes to stress reduction. Lower stress levels are a significant factor in diabetes management, as elevated stress can adversely affect blood glucose levels (Corey et al., 2014; Chong et al., 2011).

Individuals can gain a better understanding of themselves and their emotional states through the practice of yoga. The practice of yoga enhances self-awareness and allows individuals to observe and manage their emotional conditions. Particularly for individuals with diabetes, who may struggle with emotional challenges related to their condition, yoga provides a tool for addressing these difficulties and strengthening emotional regulation. Through yoga, individuals can better comprehend their physical and mental states, enabling them to manage stress and anxiety more effectively (Gunn et al., 2022; Sandham et al., 2023).

Figure 2. Psychological benefits of yoga in diabetes

Yoga practices are often conducted in group settings, which can foster social support and a sense of community among participants. Individuals with diabetes may experience feelings of social isolation due to their condition (Özdemir & Taşçı, 2013). Yoga groups and communities can help reduce this isolation and strengthen social connections. Social support can positively impact psychological well-being and assist individuals in coping with their illness (Özdemir et al., 2019; Karakurt et al., 2013). Practicing yoga can enhance individuals' self-confidence and bolster their personal motivation (Fasczewski et al., 2020). Consistent engagement in yoga improves physical capacity and endurance. As individuals with diabetes experience increased physical and emotional empowerment, they are more likely to achieve greater success in managing their condition (Çapoğlu et al., 2019; Sreedevi et al., 2017). These psychological effects of yoga should be considered as part of diabetes coping strategies and utilized to support the overall well-being of individuals with diabetes.

CONCLUSION

In summary, yoga plays a vital role in the holistic management of diabetes, offering both physiological and psychological benefits (Kumar et al., 2016; Sanogo et al., 2023). On the physiological front, regular yoga practice has been shown to improve cardiovascular health, enhance insulin sensitivity, and help regulate blood glucose levels, all of which are essential components in diabetes management (Cui et al., 2017; Corey et al., 2014; Cramer et al., 2014; Shetty et al., 2024). Beyond the physical benefits, yoga's influence on mental health is equally significant. By reducing stress, enhancing emotional regulation, and fostering self-awareness, yoga helps individuals with diabetes better cope with the emotional challenges posed by the condition. Furthermore, the sense of community and social support found in group yoga practices can reduce feelings of isolation that many people with diabetes experience, thus improving their overall quality of life (Chong et al., 2011; Gunn et al., 2022).

The combined physiological and psychological effects of yoga make it a valuable tool in a comprehensive approach to diabetes care. As both the mind and body are deeply interconnected, the stress-reducing and empowering nature of yoga can significantly improve both metabolic and emotional health. Incorporating yoga into diabetes treatment plans can help individuals manage their disease more effectively and enhance their overall well-being. Therefore, yoga should be considered not just as an alternative therapy but as a complementary practice that supports conventional diabetes management strategies.

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