International Journal of Web of Multidisciplinary Studies
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
website: https://ijwos.com
Volume 3 Issue 6 , June 2026
E-ISSN : 3049-2424
DOI: https://doi.org/10.71366/ijwos03062654249

Therapeutic Impact of Selected Yogic Interventions on Serum Glucose and Triglyceride Levels in Diabetic Patients

Shweta Tiwari[1], Dr. Charu Mechandiratta[2]
[1] Research Scholar, School of Naturopathy& Yogic Sciences, APEX University Jaipur, India
[2] H.O.D, School of Naturopathy& Yogic Sciences, APEX University Jaipur, India.

Article Info

Article History:

Published: 15 June 2026

Publication Issue:
Volume 3, Issue 6
June-2026

Page Number:
154-165

Corresponding Author:
Shweta Tiwari

Abstract:

Yogic interventions, as part of integrative medicine, have a long-standing tradition in health promotion and disease prevention. The practice of yoga in diabetes management are attributed to its multifaceted impact on neuroendocrine, autonomic, and metabolic functions. Specifically, yoga is posited to enhance insulin sensitivity, modulate the hypothalamic-pituitary-adrenal (HPA) axis, reduce oxidative stress, and improve lipid metabolism. Methods: The present study assessed the effects of 90 days yoga-based intervention compared to a passive control group in a sample of patients with diabetes mellitus. A total of 100 diabetic people with an age group of 25 to 50 years were randomly assigned to the experimental group (n = 50) and control group (n= 50). The experimental group was assigned selected yogic practices for ninety days. The control group received no intervention. The serum glucose and triglycerides were measured 90 days before and after the intervention. Results: The effect of selected yogic practices resulted in a significant reduction in Serum glucose levels ($p < 0.0001$) and triglyceride levels ($p < 0.0001$). Conclusion: A 90-days yoga-based intervention has a positive impact in regulating the serum glucose and triglycerides among the patients of diabetes mellitus.

Keywords: Yoga, Diabetes Mellitus, serum glucose, triglycerides, diabetic patients

1. INTRODUCTION

The global burden of diabetes mellitus, particularly type 2 diabetes, has increased dramatically over the past decades, representing a critical challenge to public health systems worldwide. Central to the management of diabetes is the regulation of serum glucose and triglyceride levels, both of which are major risk factors not only for microvascular complications but also for cardiovascular morbidity and mortality. The International Diabetes Federation estimates that diabetes affects more than 10% of the world's population. Type 2 diabetes mellitus (T2DM) accounted for the majority of diabetes cases. By 2045, the total number of T2DM patients will increase by 46% (Sun et al., 2022). Effective management of diabetes necessitates stringent control of blood glucose and lipid profiles. In developing countries, low-cost strategies to identify at-risk individuals and inexpensive lifestyle interventions like yoga are optimal. With sedentary lifestyles rising and treatment effectiveness declining, specific yogic practices appear to be a beneficial and economical adjunct for managing the blood glucose levels. Recent interventional research primarily explores Asana (physical posture), Pranayama (breathing exercise), and Dhyana (meditation), all of which are components of Hatha Yoga, a yoga tradition (Riley D., 2004).

Hatha Yoga has four main texts: Hatha Yoga Pradipika, Gheranda Samhita, Shiva Samhita, and Hatharatnavali. Gheranda Samhita and Hatha Yoga Pradipika focus on body-mind refinement systems. Many clinical trials reported the effectiveness of yogic interventions on physiological and psychological outcomes from these practices, which also emphasize internal cleansing called Shatkarma. These are effective techniques that bring the mind and body into harmony, which revitalizes and rejuvenates the body with positive physiological outcomes (Patra S., 2017). Among the kriyas, varisaradhauti (Shankhaprakshalana) from antar dhauti in Gherand Samhita (Saraswati, 2012) cleans the alimentary canal, followed by a specific module. Laghu shankha prakshalana is a shorter variant of Shankha Prakshalana that promotes healthy digestive system functioning. Tadasana, Tiryaka Tadasana, Katichakrasana,

Tiryaka Bhujangasana, and Udarakarshanasana are the five commonly practiced asanas, each of which can be repeated eight times. It helps to raise insulin production, regulate blood glucose levels, and is meant for cleansing the colon (Raveendran et al., 2018). It appears to be the earliest and most effective technique for achieving serenity and maintaining mental tranquillity.

Karna Randhra Dhauti (Saraswati, 2012) is the process of cleansing the ear orifices with the index or ring finger. The outer ear is similar in structure to a conch shell. A tube or canal from the outer ear connects to the internal portions of the ear, which then connect to the brain. It emphasizes the meditative experience of internal and external sound (nada) to induce deep psychophysiological relaxation and resonance. It is commonly referred to as ear-cleaning, is the process of cleaning the two openings in the ears with the index and ring fingers. The mysterious sounds are experienced after consistent practice (Bernard, 1958).

The upper hollowed area of the head, known as Kapalrandhra, is readily visible on a new-born. Form a cup-like form with the palm by joining the right hand's fingers and thumb and taking water in the cup-shaped hand by bending forward and patting the upper region of the head three or four times to damp the kapalrandhra. Repeating this technique four to five times is kapal randhra (Saraswati, 2012). This region is linked to the cerebral cortex, which controls many higher processes such as speech and decision-making. often associate this practice with the purification of the mind, enhancing focus and concentration, and balancing the flow of prana (life force energy) within the body (Saraswati, 2012).

Patanjali's Yoga Sutras (PYS) is one of the classical yoga texts in which the meaning of Om is clearly stated. PYS only mentions Pranava (OM) only clearly. This implies that Pranav is essentially Ishwara or Om, where Ishwara is the term for God. Repeatedly reciting OM with focusing on its powerful significance is addressed as a way to cultivate self-awareness and lessen several disruptions to clarity (Omanand, 2013). Harne and Hiwale (2018) found that chanting Aum improved participants' psychological and physiological characteristics, reducing symptoms of anxiety, depression, and stress while also lowering heart rate and blood pressure. The researchers concluded that Aum chanting provided a comprehensive strategy to treating psychosomatic diseases by addressing both mental and physical health.

Patanjali's Yoga Sutras (PYS) explains a simple technique for maintaining mental stability through breath control, with a particular emphasis on exhaling (pracchardana) retaining (vidharana) the breath. This includes specialized pranayama practices, such as controlled exhalation and breath-holding (kumbhaka), which lead to mental tranquillity, quieting the fluctuating mind, and overcoming obstacles to focus (Omanand, 2013). A study demonstrated how pranayama practices, such as prolonged breathing and breath retention, enhanced insulin sensitivity and assisted diabetes patients in lowering their blood sugar levels. Furthermore, it improved lipid profiles, including LDL cholesterol, triglycerides, and total cholesterol (Jain et al., 2004).

Mechanisms Linking Yogic Practices to Glucose and Triglyceride Regulation

Autonomic Modulation and Neuroendocrine Effects:

Yoga has a documented impact on autonomic function, promoting a shift towards parasympathetic dominance, which correlates with reduced heart rate, blood pressure, and stress hormone levels linked to diabetes pathology (Albers et al., 2011). Specifically, practices such as pranayama and meditation decrease cortisol production and sympathetic nervous system activity, potentially enhancing insulin sensitivity and glucose uptake. The communication between the central nervous system and peripheral metabolic organs involves neuroendocrine pathways, including the HPA axis and sympathetic-adrenal-medullary axis. Chronic stress, often experienced by diabetics, worsens hyperglycemia and dyslipidemia via elevated glucocorticoid and catecholamine levels. Therefore, by alleviating stress responses, yoga may indirectly help improve glycemic and lipid levels.

Molecular and Metabolomic Pathways:

Integrative systems biology approaches have identified specific molecular pathways through which lifestyle interventions, including yoga, may influence metabolic phenotypes. Yoga-induced alterations in metabolic flux, antioxidant capacity, and inflammatory signalling may modulate these and other metabolites, thereby exerting downstream effects on lipid metabolism. The efficacy of yoga may be modulated by individual genetic backgrounds, suggesting a role for personalized intervention strategies (Yazdani et al., 2018).

Literature Review

Yoga and Ayurveda, Indian medical systems, emphasize the need of refinement of body and mind as part of treatment based on disease concepts. According to the Ayurveda, In Charaka (prameha nidana and chikitsa) the derailment of glucose metabolism is caused by a number of etiological factors, including krodha (anger), shoka (grief), bhaya (fear), udvega (anxiety), and chinta (worry) for the vatika prameha (madhumeha is among the vatika prameha) (Agniveśa, 2011). Yoga has become increasingly popular worldwide, and its application as a therapy is expanding rapidly (Jeter et al., 2015). Several yogic practices have been employed in the management of Diabetes-associated illnesses which have a deeper impact on the body, mind, internal organs, endocrine glands, and other aspects of the body-mind complex. Researchers examined the effects of LSP on intestinal health and safety in 60 healthy participants who were randomly assigned to two groups of 30. While the control group received no intervention, the study group underwent the LSP process once a week for four weeks. The trial arm showed a substantial decrease in Constipation Scores (as determined by Cleveland Clinic CS) from 8.73±0.69 to 3.63±0.49 at $p < 0.001$, whereas the control group showed no statistically significant difference. Over the course of the 4-week trial, no negative occurrence or effect was discovered. LSP is safe and effective for constipation patients, it can be concluded (Kiran et al., 2019). A person can recover from illnesses like Madhumeha that are brought on by vitiated Kapha and Pitta by practicing Varisara Dhauti weekly once. According to recent studies, practicing Shatkarma (Varisara, Vahnisara, Vaman, Neti, and Kapalbhati) significantly decreased their blood sugar and cholesterol levels (Pokhriyal et al., 2013). Yoga tends to decrease blood pressure in hypertension individuals by improving autonomic stability and reducing stress. Research indicates that yoga-based relaxation approaches can reduce sympathetic arousal (Vempati et a., 2002). Yoga improves stress responses by enhancing autonomic stability, parasympathetic tone, and reducing sympathetic arousal, leading to increased performance. It facilitates controlled physiological reactions to stressful conditions, preventing uncontrollable HPA axis overtones during chronic stress (Leonard B E., 2006). A study showed a decrease in weight following an 8-week yoga program, which led to better body composition and total cholesterol levels in obese teenage boys (Seo et al., 2012). A systematic review and meta-analysis of patients with cardiovascular disease found that consistent yoga practice reduced TC, TG, LDL, and increased HDL cholesterol while also decreasing VLDL (Kalra et al., 2022). In comparison to the control group, a meta-analysis of type-2 diabetes patients showed a significant drop in TC, TG, and LDL cholesterol and a significant increase in HDL cholesterol (Dutta et al., 2021). Enhancements in lipid profile may result from two factors. The first is its impact on the autonomic nervous system, while the second involves its influence on metabolism. Yoga affects the equilibrium between the sympathetic and parasympathetic nervous systems, leading to a shift towards greater parasympathetic dominance (Anand B.K., 1991). Recent research revealed significant improvements in lipid profile metrics after a 12-week program of yoga and meditation. There were notable decreases in total cholesterol, triglycerides, and LDL-C levels, whereas HDL-C levels experienced a significant rise. These results align with previous studies that support the cardiovascular advantages of consistent yoga practice (Salunkhe et al., 2025). In a randomized controlled trial (RCT) with 23 adults, the yoga group received twice-weekly yoga sessions for three months, while the education group received health information every two weeks. The study found that the yoga group improved their weight, blood pressure, and insulin levels compared to the education group (Yang et al., 2011). A study was undertaken to investigate the effect of yoga on type 2 diabetes. For 40 days, the yoga group practiced mandukasanasana and Om Chanting. FBG, PPBG, and HbA1C were the biochemical markers measured. It can be concluded that mandukasan combined with OM chanting has been effective as an addition to medical therapy for reducing biochemical markers. Yoga treatment benefits diabetics by reducing medicine doses, increasing physical and mental alertness, and preventing diabetes-related problems (Menariya et al., 2021). In a study, the integration of the two relaxation techniques—'Om' chanting and Yoga nidra—demonstrated a statistically meaningful decrease in SBP, DBP, PP, MAP, and RPP. Likewise, an enhancement in the lipid profile parameters like Triglycerides, HDL, LDL, VLDL, Total Cholesterol was noted in the intervention group (Anjana et al., 2022). A meta-analysis conducted

by Snowling et al (2006) revealed a notable decrease in FBG (15.16mg/dl), PPBG (28.66mg/dl), HbA1c (0.39%), and BMI (0.71 kg/m2) in the yoga intervention group when compared to the control group that engaged in physical exercise in the pooled analysis. There are several positive effects of breath holding meditation on human body. Following six weeks of meditation practice, in a study found improvements in serum lipid levels (decreases in TC, TG, LDL-C, VLDL, and increases in HDL-C) and FBG (decreases) (Singh et al, 2024). A study found that treating diabetes-related dyslipidemia is effective. Yoga, which combines meditation and stress management, can enhance lipid profiles, lower BMI, and reduce macro-vascular problems in diabetes. Yoga can reduce sympathetic hormones and cortisol levels. Pranayama decreases sympathetic tone, increases parasympathetic activity, and relieves stress (Shantakumari et al., 2013). Several researchers found that the Asanas and Pranayama group improved cholesterol levels and antioxidant status. A review found that yoga improved body weight, blood pressure, blood glucose, and cholesterol levels (Yang, 2007). According to the study's findings, people with type 2 diabetes who are also undergoing pharmaceutical treatment may benefit from yoga treatment in terms of their blood glucose and lipid profile indices. For the short run (i.e., 10–24 weeks), yoga can be considered an effective supplemental treatment for type 2 diabetes (Chen et al., 2022). According to a study by Valarmathy et al.(2017), yoga is more advantageous than brisk walking for the lipid profiles of noninsulin-dependent diabetic men, with HDL rising and LDL falling. According to Shetty et al. (2020), a 10-day yoga intervention that included Sheethalikarana Vyayama, Asana, Pranayama, Kriya, meditation, and deep relaxation techniques significantly improved cholesterol markers.

2. Methods and Materials:

2.1. Study design

This prospective randomized controlled study has included patients diagnosed with Diabetes Mellitus Type 2. The study was carried out at a Yoga Institute and research facility in Bengaluru, South India. Serum Glucose and Triglyceride levels were assessed at baseline and after 90 days of Yogic intervention.

2.2 Subjects

Hundred patients of diabetes mellitus were selected from Bengaluru on the basis of Purposive Sampling and divided into two groups of 50 subjects each. The inclusion criteria: 25-50 years age group of selected patients of hundred Diabetes Mellitus and not having any other medical condition, and willingness to participate voluntarily. The exclusion criteria: participants having any other disease except Diabetes Mellitus, alcoholic, smokers or with any critical medical conditions shall be completely excluded. Written informed consent was obtained from the participants after explaining them the detailed procedure.

2.3. Randomization

To find participants for the study, 215 patients with diabetes mellitus were checked first. From these, 152 were eligible to take part. After more checks, hundred participants who agreed to join were divided into two groups, experimental group (n = 50) and control group (n = 50) on the basis of simple random sampling method. The experimental group (Group 1) underwent with yogic intervention for 90 days. The control group (Group 2) did not receive any intervention. No patients in the any of the groups has left the study before it ended.

2.4 Yogic Intervention

2.4.1 Varisara Dhauti: Laghoo Shanka Prakshalana (LSP)

The experimental group underwent LSP once a week for 12 weeks. The control group did not receive any intervention. The experimental group (Group 1) underwent the following procedure for LSP (Saraswati, 2012), early morning on an empty stomach. The participant was made to drink two glasses of lukewarm saline water as quickly as possible.

They were instructed five Asanas sixteen times each in the following sequence: (1) Tadasana (Palm Tree Pose), (2) Tiryaka Tadasana (Swaying Palm Tree pose), (3) Kati Chakrasana (Waist Rotating Pose), (4) Tiryaka Bhujangasana (Twisting Cobra Pose), and (5) Udarakarshanasana (Abdominal stretch pose). This completed the first round of practice. After the completion of the first round, once again participants were asked to drink two more glasses of saline lukewarm water and again repeat the five Asanas sixteen times each. Participants completed the process by the maximum six to eight glass waters. The individual was permitted to go to the toilet when the pressure built up. There was no rest during the asana and between the rounds. Total rest was provided to the individuals after the completion of the procedure by making them lie down on yoga mat for 5 min. After completing LSP, individual ate khichadi (cooked rice and lentil) with ghee. There was no any intervention for the control group participants and they were instructed to carry out their normal routine activities.

2.4.2 Kapalrandhra Dhauti:

The patients were instructed to form a cup-like form with the palm by joining the right hand's fingers and thumb and taking water in the cup-shaped hand by bending forward and patting the upper hallow central region of the head three or four times to damp (Saraswati, 2012) for 10 minutes daily.

2.4.3 Karnarandhra Dhauti:

After practicing kapalrandhra dhauti, the participants were instructed to use either index finger or ring finger for performing this practice. They were instructed to wet their finger, so that it adheres to the skin at the mouth of the ear canal. Then, were instructed to slowly insert their finger with slight pressure and try to reach the inside of the ear by rotating the finger in a circular movement. Properly practicing this technique creates a vacuum-like effect, causing suction to gently remove dirt and wax from the inside. ln the beginning of your practice, some mystical sounds will be heard. They were instructed to hear these inner sounds more subtly (Saraswati, 2012). This was performed 5 minutes daily.

2.4.4 Om Chanting:

The patients were trained in “Om Chanting” by the experienced yoga expert. The patients were trained to chant “Om” as it is (Omanand, 2013) continuously for 10 minutes daily.

2.4.5 Bahya Kumbhak Pranayama:

Patients were instructed to exhale gently through the nose, emptying the lungs completely, while contracting the abdomen lightly to release all the air as per their own capacity. After complete exhalation they were instructed to hold the breath outside as much as long as possible with ease and let the breath flow back into the body naturally, without effort (Omanand, 2013). This was done 10 minutes daily.

Assessments

The diabetics had complete drug compliance throughout the study period. The experimental group (Group 2) underwent the yogic intervention with complete procedure early in the morning on an empty stomach. The experimental subjects were taking varisara dhauti 1½ hour session for weekly once and daily 35 min of other practices at a yoga centre. None of the subject engaged in any other out-of-routine physical activity. The blood sampling was done between 8.00 am to 10.00 am from a forearm vein of all the patients with fasting for more than eight hours. The entire participants were assessed before the intervention, as to take pre- and post-data were taken after 24 hr of last intervention.

Statistical analysis

The statistical analysis of data within the group was performed using independent samples *t*-test. $p < 0.01$ & $p < 0.01$ was considered as statistically significant. T-test were applied. Results were presented as mean ± SD; P value <0.01 defined statistically significant difference.

3. Results

Hundred patients of diabetes mellitus were selected from Bengaluru on the basis of purposive sampling and divided into two groups of fifty subjects each. The duration of experimentation was 90 days.

The mean serum glucose level (Fasting) of the patients of experimental group was found to be 171.2 (±62.12) mg/dl and 120.56 (±24.66) mg/dl on day 1 and day 90 respectively (Table 1.1). It is obvious that the mean value is lower on day 90 than that on day 1. The values of day 1 and day 90 all varied at 0.01 significance level.

1.1 Serum glucose level (Fasting) of Experimental Group Patients (Mean Value)

Days	Mean serum glucose level (mg/dl)	S. D	t- value	Level of significance
Day 1	171.22	62.12	5.35	Significant at < 0.01
Day 90	120.56	24.66		

The mean serum glucose level (Fasting) of the patients of control group was found to be 172.04(±23.63) mg/dl and 171.14 (±24.57) mg/dl on day 1 and day 90 respectively (Table 1.2). It is obvious that the mean values on day 1and day 90 did not differ significantly.

1.2 Serum glucose level (Fasting) of Control group Patients (Mean Value)

Days	Mean serum glucose level (mg/dl))	S. D	t- value	Level of significance
Day 1	172.04	23.63	0.18	Non-Significant
Day 90	171.14	24.57		

The mean serum glucose level (Post Prandial) of the patients of experimental group was found to be 275.28 (±79.28) mg/dl and 193.78 (±59.74) mg/dl on day 1 and day 90 respectively (Table 1.3). It is obvious that the mean value is lower on day 90 than that on day 1. The values of day 1 and day 90 all varied at 0.01 significance level.

1.3 Serum glucose level (Post Prandial) of Experimental group Patients (Mean Value)

Days	Mean serum glucose level (mg/dl)	S. D	t- value	Level of significance
Day 1	275.28	79.28	5.80	Significant at < 0.01
Day 90	193.78	59.74		

The mean serum glucose level (Post Prandial) of the patients of control group was found to be 275.6(±41.51) mg/dl and 273.3 (±42.42) mg/dl on day 1 and day 90 respectively (Table 1.4). It is obvious that the mean values on day 1and day 90 did not differ significantly.

1.4 Serum glucose level (Post Prandial) of Control Group Patients (Mean Value)

Days	Mean serum glucose level (mg/dl)	S.D	t- value	Level of significance
Day 1	275.6	41.51	0.26	Non-Significant
Day 90	273.3	42.42		

The mean triglyceride level in the patients of experimental group was found to be 268.86 (±54.40) and 228.06 (±49.86) on day 1and day 90 respectively (Table 2.1). It is obvious that the mean value is lower on day 90 than that on day 1. The values of day 1 and day 90 varied at 0.01 significance level.

2.2.1 Triglyceride levels of Experimental Group Patients (Mean Value)

Days	Mean triglyceride value	S.D	t- value	Level of significance
Day 1	268.86	54.40	3.91	Significant at < 0.01
Day 90	228.06	49.83		

The mean triglyceride level in the patients of control group was found to be 269.14 (±44.43) and 267.64 (±43.10) on day 1and day 90 respectively (Table 2.2). It is obvious that the mean values on day 1 and day 90 did not differ significantly.

2.2.2 Triglyceride levels of Control Group Patients (Mean Value)

Days	Mean triglyceride value	S.D	t- value	Level of significance

Day 1	269.14	44.43	0.38	Non-Significant
Day 90	267.64	43.10		

4. Discussion:

The present study assessed the effect of 90-days yogic intervention on serum glucose and triglyceride levels in diabetic patients. This study examined the changes in serum glucose and triglyceride levels after the practice of yogic intervention. The findings showed that there was a significant decrease in serum glucose and triglyceride levels ($p <$ 0.001) in the experimental group, but no changes in the control group. No adverse effects of yogic intervention have been noticed and documented, suggesting that it is safe to practice daily for diabetic patients.

The result validates the notion that yoga improves the body's ability to integrate signals from the neuro-endocrinal system and the vital organs. The enhanced connectivity of the mind, nerves, and muscles leads to deliver more relaxation to the body and mind and faster adaptations to internal changes. Though recent medical research on yoga therapy has revealed the efficacy of Shatkarmas, pranayama, and mediations in the treatment of many lifestyle disorders, larger cohort studies, follow-up studies with larger sample sizes, and clinical trials are required to establish the therapeutic benefits of these yoga practices (Woodyard, 2011). Numerous scientific research has demonstrated yoga's ability to promote health and prevent and manage psychosomatic diseases. Yogic practices have a solid scientific foundation and consistently alter the body. Yogic lifestyle changes yield impressive results and can significantly aid in both primary prevention and management of lifestyle diseases (Madanmohan et al.,2012). The findings revealed that a 90-days yoga intervention greatly improved the serum blood sugar and triglycerides of diabetic patients demonstrates that yoga is a holistic intervention that not only improves physical health and well-being, but also brings significant positive changes in physiological parameters. Yoga has been shown to elicit physiological and biochemical changes in volunteers (Rugmini et al., 1976). According to a systemic review in the Physiology Section, yoga may reduce stress, improve metabolic profile, regulate autonomic nervous system, and alter the hypothalamopituitary adrenal axis, which are neural mediators of high blood glucose levels (Mahajan A., 2014).

Shatkarmas, including danta moola dhauti, serve to clean the teeth, gums, tongue, skull, and ears, enhancing the functions of sensory organs and preventing dental issues, speech problems, and other health conditions. These practices promote internal cleanliness, increase energy levels, and enhance the efficacy of asanas and pranayama, thereby improving overall health (Kumar et al., 2021). Yogi practices are essential in managing diabetes-related complications, significantly affecting the body, mind, and endocrine system. Gastrointestinal disorders, including constipation and diarrhea, are common among diabetic patients, with studies showing that 20-44% experience such symptoms (Maleki et al., 1998). Shankhaprakhsālana, a yogic technique for gastrointestinal cleansing, can be modified into a less strenuous form called Laghu Shankha Prakshālana (LSP), which effectively reduces body mass index (BMI), enhances glycemic control, and increases antioxidants like glutathione and vitamin C in individuals with type 2 diabetes (Gadhem et al., 2015). Following LSP, practitioners rest for 45-60 minutes, allowing the digestive system to rejuvenate while consuming a meal of Khichadi with ghee, which alleviates diarrhea by delaying gastric emptying and slowing peristalsis (Shankaradevanand, 2007). This process revitalizes the digestive organs, facilitating a reset of the system, as the bile acid pool is depleted, preventing fat absorption temporarily (Sharma et al., 2012). Ultimately, LSP promotes increased excretion and secretion, contributing to lower serum glucose levels and enhancing insulin sensitivity through improved communication between tissue and cellular systems (Tiwari and Roy, 2010). Notably, the significant reduction in fasting and post-prandial glucose levels after LSP indicates the potential of yoga in the management and prevention of type 2 diabetes, while asanas may also mitigate immune suppression caused by stress (Straub, 2007).

Karnarandhra Dhauti is a practice aimed at cleansing the ear passage to harmonize sensory pathways and modulate neural circuits. It utilizes mystical sounds, or nada, to enhance meditation and induce relaxation. In diabetic patients,

focused listening promotes relaxation and altered consciousness, potentially increasing ear blood flow to prevent diseases. This process relaxes internal organs through the parasympathetic vagus nerve, contributing to balance within the autonomic nervous system. "*Nityam abhyaasa yogena naadaantaram prakaashayet*", with daily practice nada is heard. Nada yoga is an independent branch of yoga that focuses on hearing internal sound in a state of dharana, concentration, and dhyana, meditation. It explains that the hearing sense can perceive both external and subtle sounds, allowing individuals to access deeper consciousness as they advance in sadhana. This practice includes listening to bodily sounds like breath, blood circulation, and heartbeat, ultimately achieving a state where subtle sounds become audible. (Saraswati, 2012). Ezzelarab et al. (2015) describe the cochlea's role in decomposing incoming sound waves into frequency components, with hair cells selectively responding to specific frequencies, reflecting a biological dispersion relation. The auditory pathway's anatomical and electrophysiological characteristics limit the phase space of neural responses to certain perceptible and meaningful patterns. Furthermore, stress-reducing practices, such as yoga, have demonstrated the potential to improve lipid profiles in certain populations, possibly through reduced activation of the hypothalamic-pituitary-adrenal (HPA) axis and its metabolic consequences. Therefore, if Karna Randhra Dhauti positively impacts stress and autonomic nervous system (ANS) balance, it may lead to secondary enhancements in cholesterol regulation.

Kapalrandhra Dhauti is a technique for cleansing the cranial region involves gently massaging or stimulating the area at the crown of the head (the fontanelle) with the intention of purifying subtle energy pathways and promoting mental clarity (Saraswati, 2012). This stimulation is believed to facilitate the flow of prana (vital energy) to the brain and support the cleansing of mental impurities. While empirical research on Kapalrandhra Dhauti is sparse, its inclusion in traditional texts underscores the holistic approach of yoga, which addresses not only muscular and skeletal health but also subtle physiological and energetic systems (Kumar et al., 2025). The cranial region, particularly areas influenced by Kapalrandhra Dhauti, is richly innervated by branches of the trigeminal and vagus nerves. Stimulation of these regions through gentle massage and cleansing may enhance parasympathetic activity, attenuate sympathetic overdrive, and reduce HPA axis activation. Chronic sympathetic activation and elevated cortisol levels are known to impair insulin sensitivity and promote hepatic glucose output, contributing to hyperglycemia (Kuschinski et al., 2023).

The ultimate sound of nature is "Om". The effects of OM chanting on the human body have been the subject of extensive research. Om Meditation Studies Using EEG Methods reduces the complexity of EEG signals conclude that OM sound creates Nitric oxide, a chemical that our bodies require to assist its 50 trillion cells connect with one another by passing messages throughout the body. Nitric oxide (NO) regulates and mediates several activities in the neurological, immunological, and cardiovascular systems. These include vascular smooth muscle relaxation, which causes arterial vasodilation and increases blood flow (Harne, 2014). This supports another research that mind–body practices such as Om chanting reduce perceived stress, lower circulating catecholamines, and modulate the hypothalamic-pituitary-adrenal (HPA) axis. These neuroendocrine shifts favor a metabolic profile characterized by lower blood sugar and triglyceride levels (Ahmadli et al., 2024).

Pranayama (yogic breathing) is directly linked to autonomic function, which regulates heart rate, blood pressure, and metabolism. It increases higher-level brain processes and improves neuronal function in the brain and peripheral nervous system. It improves learning, memory, cognition, and higher mental functioning. Slow breathing promotes longevity. According to the results of the investigations, the Asanas and Pranayama group improved the antioxidant status by altering the lipid levels. According to a review, yoga improved blood pressure, blood glucose, cholesterol, and body weight (Yang, 2011). After practicing yoga and pranayama for three months, women's total cholesterol significantly decreased, according to a study and various studies carried out in Western nations have shown that physical activity increases HDL cholesterol and decreases triglycerides (Szapary et al., 2003). After 30 days of Pranayama practice, the HDL-cholesterol level significantly increased in men (0.104 mmol/L) suggesting that yogasanas and pranayama stimulate mobilization of fat deposits (Prasad et al., 2004).

Strengths and Limitations of the Study:

The study's main benefit was the intervention's lack of physical exercises (such asanas), which makes it easier for middle-aged patients to practice the current intervention. And further benefit is that none of the participants reported

any unpleasant events. Despite the strong theoretical rationale and supportive indirect evidence, direct empirical studies on the effects of karna dhauti and kapalrandhra dhauti on serum glucose and triglycerides are needed. The multifactorial regulation of these biomarkers and the modest effect sizes observed in related interventions suggest that any benefit from holistic yogic approach is likely to be context-dependent and synergistic with other lifestyle modifications.

Future Directions:

Despite compelling theoretical and indirect empirical support, direct, high-quality evidence linking yogic interventions to reductions in serum glucose and triglyceride level is limited. Most existing studies focus on general yogic or meditative interventions, with heterogeneous methodologies and small sample sizes. Rigorous randomized controlled trials (RCTs) incorporating longitudinal biomarker assessment, joint modeling, and mechanistic endpoints are needed. Furthermore, the neurophysiological effects of various kumbhaka pranayama, kapalradhra and karnarandhra remain underexplored, particularly with respect to direct measures of vagal tone (e.g., heart rate variability), baroreflex sensitivity, and inflammatory markers. Similarly, the specific neural and metabolic pathways by which yoga influences lipid metabolism require elucidation

5. Conclusion:

The results of the present study demonstrated that the 90-days yogic intervention is effective in reducing the serum glucose and triglyceride levels in patients with Type-2 Diabetes mellitus. This yogic intervention been proven to be useful in the reduction of high serum glucose and triglyceride level among diabetic patients. With no adverse events reported throughout the experiment, these specialized yogic relaxation practices could be employed as an adjunct to standard management of Diabetes mellitus.

References

1. Acharya Agnivesha, Charaka Samhita, edited by Vaidya Yadavaji Trikamji, Chaukhambha Subharati Prakashan, Varanasi reprint 2011, Nidana Sthana 4/36; page no. 215.
2. Ahmadli, N., Sarsil, M. A., & Ergen, O. (2024). Hearing Your Blood Sugar: Non-Invasive Glucose Measurement Through Simple Vocal Signals, Transforming any Speech into a Sensor with Machine Learning. *arXiv preprint arXiv:2408.08109*.
3. Albers, D. J., Hripcsak, G., & Schmidt, M. (2011). Population physiology: leveraging population scale (EHR) data to understand human endocrine dynamics. *arXiv preprint arXiv:1110.3317*.
4. Anand, B. K. (1991). Yoga and medical sciences. *Indian J Physiol Pharmacol*, *35*(2), 84-87.
5. Anjana, K., Archana, R., & Mukkadan, J. K. (2022). Effect of om chanting and yoga nidra on blood pressure and lipid profile in hypertension–A randomized controlled trial. *Journal of Ayurveda and Integrative Medicine*, *13*(4), 100657.
6. Bernard, T. (1944). *Haṭha Yoga: the report of a personal experience*. Columbia University Press.
7. Chen, S., Deng, S., Liu, Y., & Yin, T. (2022). Effects of yoga on blood glucose and lipid profile of type 2 diabetes patients without complications: a systematic review and meta-analysis. *Frontiers in Sports and Active Living*, *4*, 900815.
8. Dutta, D., Bhattacharya, S., Sharma, M., Khandelwal, D., Surana, V., & Kalra, S. (2021). Effect of yoga on glycemia and lipid parameters in type-2 diabetes: a meta-analysis. *Journal of Diabetes & Metabolic Disorders*, *20*(1), 349-367.
9. Ezzelarab, N., Diab, A. M., & Tawfik, A. N. (2016). Equation of State in Non-Zero Magnetic Field. In *Journal of Physics: Conference Series* (Vol. 668, No. 1, p. 012102). IOP Publishing
10. Gadham, J., Sajja, S., & Rooha, V. (2015). Effect of yoga on obesity, hypertension and lipid profile. *Int J Res Med Sci*, *3*(5), 1061-1065.
11. Harne, B. P. (2014). Higuchi fractal dimension analysis of EEG signal before and after OM chanting to observe overall effect on brain. *International Journal of Electrical and Computer Engineering*, *4*(4), 585.

12. Harne, B. P., & Hiwale, A. S. (2018). EEG spectral analysis on OM mantra meditation: A pilot study. *Applied psychophysiology and biofeedback*, *43*(2), 123-129.
13. Jain, A., Mistry, H. A., & Pathak, N. (2022). Effects of Yogasana and Pranayama on lipid profile in patients of type 2 diabetes mellitus–A prospective study. *National Journal of Physiology, Pharmacy and Pharmacology*, *12*(6), 793-795.
14. Jeter, P. E., Slutsky, J., Singh, N., & Khalsa, S. B. S. (2015). Yoga as a therapeutic intervention: a bibliometric analysis of published research studies from 1967 to 2013. *The journal of alternative and complementary medicine*, *21*(10), 586-592.
15. Kalra, S., Miraj, M., Ajmera, P., Shaik, R. A., Seyam, M. K., Shawky, G.M., Alasiry, S.M., Mohamed, E.H., Alasiri, H.M., Alzhrani, M & Ahmad, F. (2022). Effects of yogic interventions on patients diagnosed with cardiac diseases. a systematic review and meta-analysis. *Frontiers in Cardiovascular Medicine*, *9*, 942740.
16. Kiran, S., Sapkota, S., Shetty, P., & Honnegowda, T. M. (2019). Effect of yogic colon cleansing (laghu sankhaprakshalana kriya) on bowel health in normal individuals. *Yoga Mimamsa*, *51*(1), 26-30.
17. Kumar, S., & Joshi, N. (2021). An Ayurvedic Perspective of Hrid Dhauti in Shatkarmas and its Impact upon Human Physiology. Dev Sanskriti Interdisciplinary International Journal, 17, 36-42
18. Kumar, V., Sahu, H., Gupta, H. P., & Srivastava, B. (2025). Technology-assisted Personalized Yoga for Better Health--Challenges and Outlook. *arXiv preprint arXiv:2508.18283*.
19. Kuschinski, N., Christe, J. A., & Monroy, A. (2023). Bayesian statistical models to explore the use glucometer measurements of capillary blood sugar for OGTT Tests. *arXiv preprint arXiv:2303.06441*.
20. Leonard, B. E. (2007). HPA and immune axes in stress: involvement of the serotonergic system. *Neuroimmunomodulation*, *13*(5-6), 268-276.
21. Madanmohan, A. B. B., Dayanidy, G., Sanjay, Z., & Basavaraddi, I. V. (2012). Effect of yoga therapy on reaction time, biochemical parameters and wellness score of peri and post-menopausal diabetic patients. *Int J Yoga*, *5*(1), 10-15.
22. Mahajan, A. (2014). Role of yoga in hormonal homeostasis. *International Journal of Clinical and Experimental Physiology*, *1*(3), 173-173.
23. Maleki, D., Camilleri, M., Burton, D. D., Rath-Harvey, D. M., Oenning, L., Pemberton, J. H., & Low, P. A. (1998). Pilot study of pathophysiology of constipation among community diabetics. *Digestive diseases and sciences*, *43*(11), 2373-2378.
24. Menariya, R., Singh, H., Tank, P., & Menaria, J. (2021). Prophylactic Role of Mandukasan and OM Chanting Patients Who Survives with Diabetes. *Journal of Drug Delivery & Therapeutics*, *11*(5).
25. Omanand Maharaj. (2013). *Patanjal Yog Pradeep* (Code 47). Gita Press, Gorakhpur.
26. Patra, S. K. (2017). Physiological effect of kriyas: Cleansing techniques. *Journal of Applied Consciousness Studies*, *5*(1), 3-5.
27. Pokhriyal, K. P., & Kumar, K. (2013). Effect of Shatkarma practices on serum glucose and serum cholesterol level of the Human subjects: an Observation. *International Journal of Yoga and Allied Sciences*, *2*(1), 10-13.
28. Prasad, K. V. V., Raju, P. S., Reddy, M. V., Annapurna, N., & Murthy, K. J. R. (2004). Effect of Pranayama and yoga on bone metabolism in normal healthy volunteers. JEP, 7, 57-62.
29. Raveendran, A. V., Deshpandae, A., & Joshi, S. R. (2018). Therapeutic role of yoga in type 2 diabetes. *Endocrinology and Metabolism*, *33*(3), 307.
30. Riley D. (2004). Hatha yoga and the treatment of illness. *Alternative therapies in health and medicine*, *10*(2), 20–21.
31. Rugmini, P. S., & Sinha, R. N. (1976). The effect of yoga therapy in diabetes mellitus. Seminar on yoga. *Man, and Science, Delhi India*, 175-189.
32. Salunkhe, A., Hebbar, R., & Girgla, K. K. (2025). A study of Effect of Yoga and Meditation on Lipid Profile. *Journal of Heart Valve Disease*, *30*, 40-43.
33. Saraswati, N., Swami (2012). Gheranda Samhita Commentary on the Yoga Teachings of Maharshi Gheranda . Yoga Publishing Trust, India. ISBN-13: 978-9381620199
34. Seo, D.Y., Lee, S., Figueroa, A., Kim, H.K., Baek, Y.H., Kwak, Y.S., Kim, N., Choi, T.H., Rhee, B.D., Ko, K.S. and Park, B.J., (2012). Yoga training improves metabolic parameters in obese boys. The Korean Journal of Physiology & Pharmacology, 16(3), 175-180
35. Shankardevananda, S. (2007). Yoga Publications Trust. *Yogic Management of Asthma and Diabetes*. Bihar School of Yoga.

36. Shantakumari, N., & Sequeira, S. (2013). Effects of a yoga intervention on lipid profiles of diabetes patients with dyslipidemia. *Indian heart journal*, *65*(2), 127-131.
37. Sharma, P., & Sharma, A. (2012). To study the effect of asanas & pranayamas on diabetes mellitus (type 2). *ACADEMICIA: An International Multidisciplinary Research Journal*, *2*(3), 135-142.
38. Shetty, K. G., Gupta, S. K., HC, S., & Shetty, S. (2020). Combined effect of yoga and naturopathy treatments on lipid profile among type 2 diabetes mellitus-a randomised trial. *Eur J Biomed Pharm Sci*, *7*, 368-72.
39. Singh, S., Saxena, . J., Rastogi, . D., Kumar, . A., Gupta, . A., Singh, . J., Kanawjia, . P. & Saha, . S. (2024) Effect of short-term breathing meditation on serum lipid profile and fasting blood glucose level among young healthy adults. *National Journal of Physiology, Pharmacy and Pharmacology*, 14 (1), 144-148.
40. Snowling, N. J., & Hopkins, W. G. (2006). Effects of different modes of exercise training on glucose control and risk factors for complications in type 2 diabetic patients: a meta-analysis. *Diabetes care*, *29*(11), 2518-2527.
41. Straub, R. (2007). *Health Psychology: A Biopsychosocial Approach*. Worth Publishers, 85-87.
42. Sun, H., Saeedi, P., Karuranga, S., Pinkepank, M., Ogurtsova, K., Duncan, B. B., ... & Magliano, D. J. (2022). IDF Diabetes Atlas: Global, regional and country-level diabetes prevalence estimates for 2021 and projections for 2045. *Diabetes research and clinical practice*, *183*, 109119.
43. Szapary, P. O., Bloedon, L. T., & Foster, G. D. (2003). Physical activity and its effects on lipids. *Current Cardiology Reports*, *5*(6), 488-493.
44. Tiwari, S. P., & Roy, D. (2010). Effect of certain yogic practices on blood sugar and anxiety levels of diabetes mellitus patients. *Journal of Progressive Science*, *1*(1), 47-51.
45. Valarmathy, M., & Saroja, S. (2017). Effect of Yoga and Brisk walking on Lipid profiles on non-insulin dependent diabetic patients. *Group*, *47*(52.25), 43-56.
46. Vempati, R. P., & Telles, S. (2002). Yoga-based guided relaxation reduces sympathetic activity judged from baseline levels. *Psychological reports*, *90*(2), 487-494.
47. Woodyard, C. (2011). Exploring the therapeutic effects of yoga and its ability to increase quality of life. *International journal of yoga*, *4*(2), 49-54.
48. Yang, K. (2007). A review of yoga programs for four leading risk factors of chronic diseases. *Evidence-Based Complementary and Alternative Medicine*, *4*(4), 487-491.
49. Yang, K., Bernardo, L. M., Sereika, S. M., Conroy, M. B., Balk, J., & Burke, L. E. (2011). Utilization of 3-month yoga program for adults at high risk for type 2 diabetes: a pilot study. *Evidence-Based Complementary and Alternative Medicine*, *2011*(1), 257891.
50. Yazdani, A., Yazdani, A., Lorenzi, P. L., & Samiei, A. (2018). Integrated systems approach identifies pathways from the genome to triglycerides through a metabolomic causal network. *arXiv preprint arXiv:1809.05024*.