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Indian Journal of Clinical Anatomy and Physiology

Journal homepage: https://www.ijcap.org/

Original Research Article

Role of yoga in type 2 diabetes mellitus

Mehak Mahajan[1,*], Youshita Mahajan[2]

[1]*Dept. of Physiology, Government Medical College, Jammu, India*
[2]*Dept. of ENT, Government Medical College, Jammu, India*

ARTICLE INFO

Article history:
Received 27-01-2023
Accepted 10-03-2023
Available online 19-04-2023

Keywords:
FBG
PPBG
T2DM
HbA1c

ABSTRACT

Background: Type 2 Diabetes Mellitus (T2DM) has become most common problem worldwide. Yoga provides best means of self-improvement and gaining full potential of one's body, mind & soul. It has been proved that pranayama and certain Asana's help in lowering blood glucose, balancing blood pressure and calms nervous system. The asanas improve the sensitivity of β-cells to glucose, improves insulin secretion, and improves glucose uptake. Hence, Yogic asanas are important for preventing and curing many ailments. The effect of yogic practices in diabetics has to be investigated well.
Aim & Objectives: To assess the effect of yoga on blood glucose levels and anthropometric parameters before and after doing yoga in T2DMpatients.
Materials and Methods: A total of 100 T2DM diabetic patients in age group 30-60 years were taken. Effect of Yoga on fasting Blood glucose (FBG), Post prandial blood glucose (PPBG), HbA1c levels and serum insulin were assessed. Anthropometric parameters like BMI and waist hip ratio were also assessed.
Results: There was significant decrease in FBG, PPBG and HbA1c levels with p value<0.001 after doing yoga. There was also significant improvement in serum insulin levels and decrease in BMI & waist hip ratio.
Conclusion: A significant improvement in the blood glucose levels occurred in subjects who practiced Yoga. There was also lowering of the drug requirement.

1. Introduction

The word yoga means union and aims to balance body, mind, and soul. It is proved that pranayama and certain asanas are important for preventing and curing many diseases. Yoga is also used to achieve good health and cure many diseases. Yoga and pranayama is beneficial on different systems of body. It increases life span and brings balance of psychic and somatic aspect of body.[1–4] The physiological effects of yoga involve no weight gain, less blood glucose levels, low cholesterol levels and low blood pressure along with improvement in immunity and better psychological effects.[5,6]

Type 2 diabetes mellitus is a lifestyle disease caused by insulin resistance with less or absent insulin causing increased blood glucose levels. According to International Diabetes Federation diabetes atlas in 2017, there were roughly 425 million people with diabetes, which will increase to 629 million by 2045.[7] Sedentary lifestyle and unhealthy dietary habits are major risk factors for lifestyle diseases, like diabetes mellitus. Mental stress also increases the risk and severity of diabetes. Less physical activity increases the risk of diabetes by 3 times and risk of coronary artery disease by 2.4 times.[8]

Yoga is a hope for many diabetic patients to be free from disease and medicines. Yoga involves physical,

* *Corresponding author*.
E-mail address: mahajanmhk1992@gmail.com (M. Mahajan).

https://doi.org/10.18231/j.ijcap.2023.003

physiological, psychological and endocrinal changes which were reported following yoga.[9–11]

Studies have suggested that yoga decreases stress, improves metabolic function, regulates autonomic nervous system and alters hypothalamic-pituitary adrenal axis that releases neural mediators of increased blood sugar.[12]

Hence, the present study was done to assess the role of yoga on blood glucose levels and anthropometric parameters in T2DM patients.

2. Aim & Objectives

To assess the effect of yogic exercises on blood glucose levels i.e., FBG, PPBG, HbA1c and serum insulin levels and to assess effect of yogic exercises on anthropometric parameters i.e., height, weight, BMI and waist-hip ratio in T2DM patients.

3. Materials and Methods

The study population included 100 Type 2 male diabetic patients in age group 30-60 years. Male subjects were taken because they did yoga regularly whereas female subjects didn't do yoga regularly. Hence, follow up was better in male subjects.

3.1. Inclusion criteria

Type 2 diabetic patients.

3.2. Exclusion criteria

Patients with complications like nephropathy, retinopathy and neuropathy. People with liver, pulmonary diseases, thyroid disorder, alcoholics, kidney disease and who were non cooperative.

Patients were explained about the aim of the studies and their consent was taken. They were advised to take healthy diet which included balanced diet and to avoid junk food and processed sugary drinks while patients were also told to continue the same drugs. They were told to perform pranayama and different asanas i.e., Surya Namaskar, Dhanurasana (Bow pose), Paschimottanasana (Seated-forward Bend), Viparita Karani (Legs up the wall), Bhujangasana, Shavasana for a duration of 3 months. After 3 months of yoga, various levels of FBG, PPBG, HbA1c & serum insulin were analysed.

Fasting Blood Glucose was measured by taking blood sample empty stomach by GOD-POD (glucose oxidase peroxidase) method.

Post Prandial Blood Glucose was measured by taking blood sample after meal by GOD-POD method.[13]

HbA1c levels were measured by boronate affinity chromatographic method[14] and serum insulin was measured by ELISA. All these methods were standardized.

They performed Yoga, which included pranayama for 30 min and Yogic Asanas for other 30 min every day. Patients performed Yoga in the Yoga centre under the guidance of yoga instructor.

Height, weight, BMI and waist hip ratio was assessed before and after doing yoga. Body weight was measured without shoes and with light clothing using a mechanical weighing scale**.** Standing height was measured barefooted with light clothing using a stadiometer. From these parameters, BMI was calculated as per formula: -

$$BMI = \frac{Weight\ (kg)}{Height\ (m\ sq.)}$$

The study was done after taking ethical committee approval& registered vide no: C-312.

3.3. Statistical analysis

Data was presented with the help of appropriate tables. Statistical analysis was done by using SPSS Microsoft version 22. P value<0.01was considered as significant.

4. Results

The present study was done in 100 T2DM male subjects. They were subjected to Pranayama and different asanas for a duration of 3 months. There was significant decrease seen in FBG, PPBG & HbA1c levels and serum insulin levels as shown in Table 1 with p value <0.001.

There was significant decrease in weight, waist hip ratio and BMI with p value < 0.01 as shown in Table 2.

The Table 1 shows the Mean ± SD of FBG is 152.10 ± 62.00 & 94.84 ± 31.40, PPBG is250.20 ± 81.60 & 150.02 ± 44.90, HbA1c is 10.56 ± 3.42 & 9.02 ± 3.50, and serum insulin level is 13.9 ± 4.9&9.04 ± 4.3of 100 male T2DM patients before and after doing yoga respectively. The difference between them is significant at p value < 0.001.

The Table 2 shows the Mean ± SD of Height is168 ± 2.1, the Mean ± SD of Weight is 62.90 ± 2.4 & 61.00 ± 2.2, BMI is 28.91 ± 0.9 & 27.00 ± 0.9 and WHR is 0.90± 0.1 & 0.88 ± 0.1 of 100 male T2DM patients before and after doing yoga respectively. The difference between them is significant at p value < 0.01 except height that remains the same.

5. Discussion

Fasting blood glucose and post prandial blood glucose levels decreased after yoga in the present study which showed positive effect of yoga in the control of Type 2 Diabetes Mellitus. A significant decrease in these levels has been observed in a study where T2DM patients undergoing yoga who were on hypoglycaemic drugs as compared to those who were only on medication.[15,16] Similarly, a significant decrease in FBG and PPBG levels was also observed in another study.[17] The beneficial effect of yoga is due to increased insulin sensitivity at target tissues which

Table 1: Shows the effect of yoga on various parameters in diabetic patients

Parameters	Before Yoga	After Yoga	p value
Fasting blood glucose(mg/dl)	152.10 ± 62.00	94.84 ± 31.40	<0.001
Post Prandial blood glucose (mg/dl)	250.20 ± 81.60	150.02 ± 44.90	<0.001
HbA1c (%)	10.56 ± 3.42	9.02 ± 3.50	<0.001
Serum insulin (m IU/ml)	13.9 ± 4.9	9.04 ± 4.3	<0.001

Table 2: Shows the effect of yoga on anthropometric parameters in diabetic patients

Parameters	Before Yoga	After Yoga	p value
Height	168 ± 2.1	168 ± 2.1	
Weight (kg)	62.90 ± 2.4	61.00 ±2.2	<0.01
BMI (kg/msq.)	28.91 ± 0.9	27.00 ± 0.9	<0.01
Waist Hip Ratio	0.90± 0.1	0.88±0.1	<0.01

decreases insulin resistance and improves the peripheral utilization of glucose.[18] It is also proved that yoga can regenerate the beta cells of pancreas.[19] Yoga has good effect on body and decreases stress.[20] Thus, for control of T2DM, yoga can be considered as feasible and non-invasive adjuvant therapy. Yoga not only decreases the dosage of oral hypoglycaemic drugs/insulin but also delays the progression of disease and prevents the complications.[21]

A significant decrease in the BMI and waist hip ratio was seen in type 2 DM after yoga. Yoga causes redistribution of fat by causing shift from central obesity to peripheral obesity due to improvement in insulin resistance.[22] Another study also showed decrease in weight and even distribution of fat in diabetic patients.[20] Chaya et al, showed decrease in waist circumference, weight and BMI in T2DM patients.[23] All these findings are in accordance with our study that has showed significant decrease in weight, BMI, waist circumference, waist hip ratio and improvement in insulin resistance after yoga.

6. Conclusion

The present study showed a significant decrease in fasting and post prandial blood glucose levels in T2DM male patients who practiced Yoga. There was also reduced drug requirement. Yogic practices involving pranayama and different asanas i.e., Surya Namaskar, Dhanurasana (Bow pose), Paschimottanasana (Seated-forward Bend), Viparita Karani (Legs up the wall), Bhujangasana and Shavasana for 3 months decreased body weight, BMI, waist hip ratio and thus improved insulin sensitivity and resistance.

Further, inclusion of adults with T1DM is essential. The psychological burden in T1DM is significantly greater in adults than T2DM using insulin therapy than those not using insulin. Hence, exploring yoga benefits by diabetic type and treatment is required for future research.

7. Source of Funding

None.

8. Conflict of Interest

None.

Acknowledgments

I want to express love and gratitude to my parents Prof (Dr) RK Gupta and Mrs Anju Gupta and special thanks to my elder sister Dr Youshita Mahajan and brother Ishaan Mahajan who inspired me and cooperated with me to work on this topic at all levels. Their affection, love, firm support and perennial encouragement was of immense importance.

I will always remain deeply indebted to my subjects for bearing with me and enriching my experience with each interaction. Above all, I would like to offer my humble gratitude to the Almighty for all the blessing he has showered upon me and will continue to do so throughout my life.

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Author biography

Mehak Mahajan, Registrar

Youshita Mahajan, Research Scholar https://orcid.org/0000-0001-8158-4834

Cite this article: Mahajan M, Mahajan Y. Role of yoga in type 2 diabetes mellitus. *Indian J Clin Anat Physiol* 2023;10(1):6-9.