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CASE SERIES

Effect of *Uddiyana Bandha* in Patients with Type 2 Diabetes Mellitus: A Case Series

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ABSTRACT

Background: Type 2 diabetes mellitus (T2DM) is a non-communicable and chronic metabolic disorder with increasing prevalence in India. Pharmacological management of T2DM has many adverse effects; hence, we need to conduct research in complementary and alternative medicine. *Uddiyana bandha* is a yogic technique utilized as a complementary practice for various conditions, but its evidence on the impact of T2DM is limited.

Objective: This case series aims to assess the effect of *U. bandha* on fasting blood glucose and blood pressure in patients with T2DM.

Methods: Three T2DM patients were admitted to our inpatient hospital for a holistic approach combining Yoga and Naturopathy treatment. During their stay, they participated in 5 min of *U. bandha* intervention under supervision. We have evaluated fasting blood glucose (FBG) and blood pressure (BP) before, immediately after, after 30 min, and after 45 min of the intervention. Meanwhile, the next day, the same 3 patients were assessed for fasting blood glucose level and blood pressure in *Shavasana* to detect potential effects used as a control group.

Results: Preliminary findings indicate that *U. bandha* may initially raise fasting blood glucose and blood pressure but reduce them after 45 min compared to controls. However, further research is needed to validate these findings and establish a causal relationship.

Conclusion: *U. bandha* is a promising intervention as a complementary therapy for T2DM, but more extensive investigations are required to elucidate its mechanisms and clinical significance.

1. INTRODUCTION

Type 2 diabetes mellitus (T2DM) is a metabolic disease characterized by elevated blood glucose levels resulting from two main factors: Inadequate insulin secretion and insulin resistance.[1] The prevalence of T2DM is rapidly increasing in India.[2] Recent research evidence and global estimates of diabetes prevalence half a billion people are living with diabetes worldwide, and the number is projected to increase by 25% in 2030 and 51% in 2045.[3] T2DM is associated with increased mortality, microvascular, and macrovascular complications. Pharmacological management of T2DM, though effective in controlling hyperglycemia, is often associated with adverse effects such as hypoglycemia, fluid retention, cardiovascular disease, weight gain, and hypersensitivity.[4] Exploring complementary and alternative medicine therapies for T2DM management is much needed to reduce the risk factor and associated complications, better management, and prepare future T2DM protocols.[5-7] In yoga, *Bandha* is one of the yogic techniques to lock the flow of energy (prana) and redirect it into particular parts of the body. There are four types of *Bandhas*

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Jalandhara bandha, Uddhiyana bandha, Moola bandha, and *Maha bandha*.[8] *U. bandha* has been used in the realm of complementary medicine for managing elevated serum blood glucose levels and anxiety.[9] Therefore, the objective of this case series report is to investigate the potential effect of *U. bandha* on fasting blood glucose and blood pressure in patients with T2DM.

2. CASE DETAILS

2.1. Case 1

A 47-year-old female was admitted to our inpatient ward and was diagnosed with T2DM in 2015. She has been taking homeopathic medication since then to improve insulin sensitivity. She attained menopause at the age of 45. She reported irregular bowel movement, disturbed sleep, and poor thirst and was classified as overweight (BMI - Body mass index was 27.3 kg/m^2). Physical examination revealed varicose veins noted over bilateral legs.

2.2. Case 2

A 52-year-old male was admitted to our inpatient ward for Yoga and Naturopathic approach to manage T2DM. He was diagnosed with T2DM in 2019, and he had been taking metformin after meals (1-0-1) for insulin sensitivity. He reported disturbed sleep, increased thirst, increased appetite, and his BMI was 25.1 kg/m^2. A physical examination showed no significant findings.

2.3. Case 3

A 56-year-old male was admitted to our inpatient department for Yoga and Naturopathic management for T2DM. He was diagnosed with T2DM in 2014, and he was under metformin after meals (1-0-1). He reported irregular bowel movements, poor thirst, and increased appetite and was classified as overweight (BMI 29.4 kg/m^2). Physical examination revealed a whitish-coated tongue and a small abrasion noted over the right elbow due to a recent accidental fall from a bike.

2.4. Intervention Details

A detailed information regarding the intervention procedure was explained to the patients. Followed by verbal and written consent were obtained before the beginning of therapeutic intervention from the patient. Participants were taught *U. bandha* before the day of intervention under the guidance of a Yoga and Naturopathic physician. On the day of the intervention, the patient was on an empty stomach, the patient was asked to stand erect, and then, practice *U. bandha* as follows: Patients were asked to stand erect with the feet shoulder-width apart, then inhale deeply through the nostrils, bend forward from the waist, and exhale the air through the mouth. Patients were also asked to empty his lungs as much as possible and hold his breath outside. The subject was asked to place the palms of their hands on the thighs just above the knees; fingers should be pointed downward, and arms should be straight. In this position, there is an automatic contraction of the abdominal region. Patients were asked to bend the head forward and take a false inhalation, then expand the chest. This movement automatically draws the abdomen upward and inward toward the spine to form the *U. bandha.* Hold this position as long as you are comfortable and then ask to release the abdominal lock. This is one round, and the patients were asked to continue this procedure for 5 min without interruption.[9] Immediately after the intervention, fasting blood sugar level and blood pressure were assessed, at different timelines 8.00 am, 8.30 am, and 8.45 am. The next day same time (8 o'clock) fasting blood sugar level and blood pressure were assessed, at different timelines 8.00 am, 8.30 am, and 8.45 am to compare the results with *U. bandha* practice. To evaluate the effect of *U. bandha* with the control group, the next day, the same patient, same timing, fasting blood sugar, and blood pressure were assessed at different timelines in *Shavasana* (dead men pose or corpse pose) practice.

2.5. Outcome Measurements

Fasting blood sugar and blood pressure were monitored before and immediately after, 30 min, and 45 min after the intervention.

Fasting blood sugar was measured using a control D glucometer strip and blood pressure was measured using an Omron digital blood pressure monitor, the handcuff part will be tied above the cubital fossa in the left hand, and the monitor will be switched on, the blood pressure will be obtained.

3. RESULTS

All the cases showed notable changes in fasting blood sugar levels and blood pressure after the intervention [Table 1]. The day 1 results suggest that, after 45 min, the practice of *U. bandha* was found to significantly lower blood pressure and fasting blood glucose levels in patients with type 2 diabetes, and day 2 results suggest that, after 45 min of Shavasana practice was found to a slight decrease in fasting blood sugar levels for all 3 patients, and cases 1 and 2 show a slight increase in systolic blood pressure. Compared to day 1 and day 2 both groups had decreased fasting blood glucose levels but significant changes were noted on day 1. Considering blood pressure, day 1 had a decrease in blood pressure compared to day 2 [Table 2].

4. DISCUSSION

The current case series aimed to assess the role of *U. bandha* practice on blood glucose and blood pressure changes in patients with T2DM. To the best of our knowledge, this case series is the first of its kind. The findings from this case series indicate that *U. bandha* has a potential effect on reducing fasting blood sugar levels and blood pressure after 45 min of practice. The practice of *U. bandha* creates abdominal contraction which increases intra-abdominal pressure and pressure within the vena cava, resulting in greater filling of the right atrium of the heart, and increased stroke volume causing a rise in blood pressure.[10] The contraction of the abdomen also influences the pancreatic duct and duodenum, which is responsible for controlling the flow of pancreatic secretions through the ampulla of Vater into the second part of the duodenum.[11] Immediately after the intervention, the sensitivity of insulin might start to increase under the influence of *U. bandha*. This increasing insulin sensitivity could be a possible mechanism for the sudden increase in fasting blood glucose levels and decrease after 45 min of practice. Immediately after the intervention, sudden rush of secretion into the duodenum. We hypothesize that it might be a possible mechanism for sudden increases in blood pressure and fasting blood sugar immediately after practicing the *U. bandha*. The practice of *U. bandha* increases blood supply to the superior mesenteric artery and enhances blood supply to the gastrointestinal organ causing vasodilatation which reduces venous return to the heart and results in decreased blood pressure. It might be the reason for falling blood pressure after 30 and 45 min of *U. bandha*. The strength of this study lies in being the first to document the impact of *U. bandha* on fasting blood sugar and blood pressure in patients with T2DM. However, the study has limitations, including the absence of monitoring postprandial blood glucose levels and the relatively small sample size.

5. CONCLUSION

This case series provides valuable insights into the potential benefits of *U. bandha* in managing fasting blood sugar and blood pressure in patients with T2DM. Further research with larger sample sizes and control groups is warranted to strengthen the evidence for incorporating *U. bandha* as a complementary therapy for T2DM management. This study contributes to the growing body of research on alternative treatments for T2DM and may pave the way for incorporating *U. bandha* into diabetes management protocols.

5.1. Declaration of patient consent

The authors confirm that they have received informed consent from the patients. The patients have agreed to the publication of their images and clinical information in the journal. They are aware that their names and initials will not be disclosed, and reasonable efforts will be made to protect their identities; however, complete anonymity cannot be assured.

6. AUTHORS' CONTRIBUTIONS

All the authors contributed equally in design and execution of the article.

7. FUNDING

Nil.

8. ETHICAL APPROVALS

This manuscript does not require ethical approval as it is a case series study.

9. CONFLICTS OF INTEREST

Nil.

10. DATA AVAILABILITY

This is an original manuscript and all data are available for only review purposes from principal investigators.

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Table 1: Day 1 measurements of fasting blood sugar and blood pressure.

Variables	T-0 BP (mmHg)	T–0 FBS (mg/dL)	T-1 BP (mmHg)	T–1 FBS (mg/dL)	T-2 BP (mmHg)	T–2 FBS (mg/dL)	T-3 BP (mmHg)	T–3 FBS (mg/dL)
Case 1	115/78	135	110/80	148	110/81	116	108/80	108
Case 2	117/69	197	112/79	204	107/60	188	105/56	181
Case 3	142/90	178	150/91	183	136/88	170	135/75	156

T-0: Before the intervention, T-1: Immediately after the intervention, T-2: 30 min after the intervention, T-3: 45 min after the intervention, BP: Blood pressure, FBS: Fasting blood sugar.

Table 2: Day 2-measurements of fasting blood sugar and blood pressure

Variables	T-0 BP (mmHg)	T–0 FBS (mg/dl)	T-1 BP (mmHg)	T–1 FBS (mg/dl)	T-2 BP (mmHg)	T–2 FBS (mg/dl)	T-3 BP (mmHg)	T–3 FBS (mg/dl)
Case 1	115/98	121	115/99	120	118/96	112	118/96	107
Case 2	104/84	199	108/84	186	109/87	182	109/87	182
Case 3	139/89	233	137/91	238	135/96	221	135/96	221

T-0: Before the intervention, T-1: Immediately after the intervention, T-2: 30 min after the intervention, T-3: 45 min after the intervention, BP: Blood pressure, FBS: Fasting blood sugar