

# A Comparative Study of Yogic Practices and Diet Therapy in the Management of Pre-Diabetes wsr to Glycemic Control: A Case Report

## Review Article

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### Abstract

Pre-Diabetes is growing with an alarming rate all over the world. It is a clinical entity between the normoglycemia and stage of Type II Diabetes mellitus. Faulty dietary habits and lifestyle errors play a key role in the pathophysiology of Pre-diabetes. Pre-diabetics have higher risk for cardiovascular diseases, fatty liver, kidney failure and other associated complications of diabetes. The reason for the rising incidence of Pre-diabetes is due to the lack of public awareness, observation, follow-up programs and self-awareness about the conditions of disease. This report is about a case of successful reversal of Pre-diabetes to normal stage through Yogic practices and diet therapy. The selected patient was prescribed Yogic practices and diet therapy throughout the intervention. The trial patient reported glycosylated (HbA1c) as high as 5.9 % and after the intervention of Yogic practice and diet therapy, it was reduced to 5.2%. After three months intervention, fasting blood sugar dropped from 110 mg/dl to 90 mg/dl and postprandial blood sugar dropped from 165 mg/dl to 132 mg/dl and Weight reduced from 93 kgs to 90 kgs. He was responded well in terms of clinical symptoms of Pre-diabetes after the completion of trial intervention. Besides, no other lifestyle modification interventions were enforced during the whole trial period. The results concluded that consistent diet therapy and regular Yogic practice can not only maintain the blood sugar levels in patient of Pre-diabetic but also improve the patient general health and wellbeing.

**Keywords:** *Asana*, Diet, Glucose, *Pranayama*, Pre-Diabetes, *Yoga*.

### Introduction

Pre-diabetes is a type of metabolic disorders that is considered as early stage of Type-2 diabetes mellitus. From last few decades the cases of Pre-diabetes are increasing rapidly all over the world. The cases of Pre-diabetes have been continuously rising globally and become an epidemic. The global prevalence of Pre-diabetes was estimated at 7.3% of the adult population in 2017, equivalent to 352 million individuals. By 2045 the prevalence is anticipated to increase to 8.3% of the global adult population, equivalent to an estimated 587 million individuals (1). It is multifactor disorders and is associated with variety of causative factors such as genetic, environmental, mental stress or etc. that may lead to develop Pre-diabetes and its related consequences. Holistic health is the basic need of all human life. If health is good, anybody can get the success in his life. But health depends on many things such as thinking, Yogic practices, life style

modification, diet and other aspects of life (2). Diet plays a very important role in care of health, care and cure of Pre-diseases. However, reduction in weight, optimal glucose levels and wellness can be achieved follow the dietary guideline. Yogic practices and diet therapy can easily care and cure the cases of Pre-diabetes for prolong period without any unwanted effect on the body systems (3). Regular Yogic practices calm the mind and improve overall health. Hence, it is useful in Pre-diabetes patients. It also stimulates the sympathetic nervous system and active pingala nadi, which increase metabolism (4). Yoga causes Parasympathetic activation which in turn helps to achieve overall metabolic and psychological improvement through stress reduction, increased insulin sensitivity and lipid metabolism (5).

### Patients Information

On 12/08/2023, a 40-year-old, married, non-smoking, non-alcoholic male patient reported to the outpatient Department of Kayachikitsa, Sir Sunderlal Hospital, Varanasi, India. He was complained of severe laziness, polydipisa, polyphagia and joint pain since the last 6-7 months.

The patient is a resident of the Chapra (Bihar State). He was screened for fasting blood sugar during the Sir Sunderlal Hospital, BHU, Varanasi to the treatment risk of polydipisa, weakness and joint pain based on symptoms. After his screening based on

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symptoms, it was diagnosed that he was at high risk for Pre-diabetes with a risk score of 110 mg/dl fasting, as shown in Table-2. After taking the written informed consent, the measurement for FBG and PPBG, HbA1c were taken at baseline and after three months. The result of the HbA1c test at baseline is 5.9%, which falls into the category Pre-diabetes according to American Diabetes Association guidelines. After three months of Yogic intervention and diet therapy, Pre-diabetes was seen in normal range.

**Timeline**

In the present case, Yogic intervention and Diet therapy was continued for 3 months starting from 12/08/2023 to 13/11/2023. Table1 shows the timeline of follow-up, history and clinical outcomes.

**Table 1: Timeline of disease activity and Intervention**

Timeline	Clinical Intervention
August 2023	After history taking and blood investigation, the patient was advised Yogic Practices and Diet Therapy interventions for 3 months. [Table 4-5]
September 2023	The patient advised continued intervention. An improvement in symptoms of Pre diabetes was observed.
October 2023	After two months of follow-up, the patient was advised to continue the intervention.
November 2023	All reports were found to be in normal range. It was decided to continue the same intervention if Pre-Diabetic symptoms persisted again.

**Clinical Findings**

The patient was subjected to fasting blood sugar (FBS) 110 mg/dl and postprandial blood sugar (PPBS)

165 mg/dl on 12/08/2023. Glycosylated percentage (HbA1C) tested on 12/08/2023 showed 5.9 %. The subjective symptoms showed increased in **Table-3**. Thus the patient was diagnosed with Pre-Diabetes by the Ayurvedic physician at Kayachikitsa OPD, Sir Sunderlal Hospital, Banaras Hindu University, Varanasi, India.

**Table 2: Biochemical characteristics of participant after three months of Yogic intervention and Diet Therapy**

Variable	Before	After
FBG	110 mg/dl	90 mg/dl
PPBG	165 mg/dl	132 mg/dl
HbA1c	5.9%	5.2%

**Table 3: Result Patients symptoms episodes before-after Intervention record**

Sr. No	Variables	Before Intervention	1st Follow-up	2nd Follow-up	3rd Follow-up
1	Polydipisa	+	-	-	-
2	Polyurea	-	-	-	-
3	Polyphagia	++	+	+	-
4	Burning sensation	+	+	+	-
5	Laziness	++	+	-	-
6	Joint Pain	+	-	-	-

(Nil -, Mild +, Moderate ++, Severe +++)

**Therapeutic Interventions:**

Under previous consultation patient was advised intervention treatment as mentioned (Table 4 and 5). The Pre-diabetic Yogic intervention session was conducted for a total period of 3 months with one session per day in morning for 6 days a week and each session was conducted for 30 minutes and dietary chart was hand over to the patients.

**Table 4: Pre-Diabetes Yogic Intervention: (August 2023 to November 2023):**

Sr. no	Yoga Practices	Duration
1	Suksham –Vyayama · Griva-Shakti Vikasaka, Skandh-Shakti Vikasaka · Kati-Shakti Vikasaka, Gulphha-Pada- Shakti	6 minutes
2	Asana · Trikonasana , Padahastasana , Mandukasana, Naukasana, Savasana, Bhujangasana	16 minutes
3	Pranayama · Bhramari-Pranayama	6 minutes
4	· Om Chanting	2 minutes
	<b>Total-time</b>	<b>30 minutes</b>

**Table 5: The Pre-Diabetic patients was advised follow this Diet Therapy plan**

Time	Diet Regimen	Calories
Upon arising	1 Cup milk tea (No sugar)	62
Breakfast	Poha Cooked / Upmaa Cooked / Multigrain Dalia Cooked/ 1 Multigrain Paratha/1 Cup Milk (No sugar)	917
Mid Morning	Fruits (Apple/ Jamun/ Guava/ Amala some dry fruits like Almond)	52
Lunch	Salad (As desired)/ Mixed Vegetables/ Dal (1 Medium Katori dal)/ 4 Chapatti Multigrain/ Dahi (1 Medium Katori)/ 1 Medium Katori Cooked Rice	358
Evening	Roasted Channa with 1 cup milk tea	202
Diner before	Green Vegetables (1 Medium Katori)/ 3 Chapatti multigrain/1 Medium Katori dal	408
Bed time	1 Cup milk (No sugar)	62
<b>Total</b>		<b>2061</b>

### Follow-up and outcomes

The first follow up of FBS, PPBS, Blood Pressure and BMI were done after one month and HbA1c, Renal function test (RFT), Liver function test (LFT), General health variables follow before and after intervention. The patient was stable, without any new complaints. His complaints like polydipsia, polyphagia, burning sensation in hand and feet, laziness, flabbiness of the body and joint pain were reduced. After one

month his FBS and PPBS were 106 mg/dl and 156 mg/dl respectively, showing a satisfactory reduction of blood sugar levels. He was advised to take a complete blood count (CBC), liver function test (LFT), renal function test (RFT), serum electrolytes and lipid profile tests (LPT) for a basic medical assessment and report back for follow up after a month. He was also advised to continue the Yogic practices and prescribed diet plan for another two months.

**Table 6: The Significant improvements were observed in the subjective as well as objective parameters of the patient**

Sr. No	Variables	Before Intervention 12/08/2024	After Intervention 1 <sup>st</sup> 14/09/2024	After Intervention 2 <sup>nd</sup> 10/10/2024	After Intervention 3 <sup>rd</sup> 13/11/2024
1	FBG	110 mg/dl	106 mg/dl	98 mg/dl	90 mg/dl
2	PPBS	165 mg/dl	156 mg/dl	140 mg/dl	132 mg/dl
3	BMI	31.1 kg/m <sup>2</sup>	30.7 kg/m <sup>2</sup>	30.6 kg/m <sup>2</sup>	30.1 kg/m <sup>2</sup>
4	BP	138/98 mmhg	130/90 mmhg	128/84 mmhg	124/82 mmhg
5	HbA1c	5.9%	-	-	5.2%
6	General Health	14	-	-	10
7	Cholesterol	193 mg/dl	-	-	160 mg/dl
8	Triglycerides	253 mg/dl	-	-	200 mg/dl
9	Total-Bilirubin	0.80 mg/dl	-	-	0.68 mg/dl
10	SGOT	62 u/l	-	-	52 u/l
11	SGPT	127 u/l	-	-	108 u/l

### Discussion

The traditional text descriptions of Yogic practices and dietary guidelines have a big impact on managing Pre-diabetes overall and they have emerged as adjuvant therapy for Pre-diabetes. Rajesh R et al. (2021) were found that Yoga therapy has a positive effect on FPG, PPG and HbA1c along with many anthropometry measures studied in this study. Yoga was found to be effective for controlling glycemic parameters in Pre-diabetes (6). Multiple studies suggest the role of Yogic practices in the amelioration of Pre-diabetes in an effective way. Yogic practices and Diet therapy are believed to exert long-term glycemic control (7). From this angle, Pre-diabetes can be prevented and managed with the use of Yogic practices and dietary therapy (8). The Pre-dietetic regimen that includes the exclusions of foods items those are high in sugar along with inclusion of pathyahara, eating in smaller portions thought the day and also adding a variety of fruits and vegetables every day helps to maintain the blood sugar levels (9). Yogic practices provide energy and endurance for daily activities (10).

### Patient's Perspective on Yogic practices and Diet therapy Intervention treatment received

When I decided to take the Yogic practices and Diet therapy intervention, I was worried about getting relief from my problems. I found Yogic therapy to be very helpful. Both Yogic therapy and Diet therapy had positive effects on my health. All of my blood sugar reports (FBS, PPBS and HbA1c) are now in normal range. Thanks to Yoga Therapy and Diet Therapy for helping the patient to become healthy.

### Limitation of case report

While this outcome was observed in a single patient, further research on a larger sample size would be necessary to establish evidence for the significant effectiveness of such dietary products and Yogic therapy in relieving symptoms of Pre-diabetes.

### Conclusion

In this particular case study cited, it can be concluded that the Yogic practices and diet therapy not only control FBS (90mg/dl), PPBS (132mg/dl) and HbA1c levels (5.2%) but also improve the general health of patients with Pre-diabetes. Yogic practices and diet therapy prove to be promising in reversing the Pre-diabetic glucose threshold into normal glucose threshold. Although, the other factors like age, chief of complaints, sleep and bowel habit by the participant also play a prominent role in the overall positive effect on the Pre-diabetic condition.

### Informed consent

Informed consent was obtained from the patient before the start of the intervention. Written consent for the publication of patient's clinical details was obtained before initiation of the therapy.

### Conflict of Interest

No conflict of interest in any manner is there to be declared by the author.

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