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GESTATIONAL DIABETES MELLITUS THROUGH THE LENS OF *AYURVEDA*: A COMPREHENSIVE REVIEW OF *GARBHINI PRAMEHA* WITH A CLINICAL CASE STUDY

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ABSTRACT

Gestational diabetes mellitus (GDM) is typically defined as hyperglycemia that is diagnosed or develops during pregnancy. Gestational diabetes mellitus (GDM) is one of the most prevalent metabolic disorders complicating pregnancy and is associated with significant maternal, fetal, and long-term metabolic consequences. Despite advances in screening and management, GDM continues to pose challenges owing to its increasing prevalence and the lifelong risk of progression to type 2 diabetes mellitus in affected women, as well as adverse metabolic programming in the offspring. This article combines a comprehensive review of the current literature with a representative clinical case to provide an *Ayurveda* perspective on GDM. The review discusses the diagnosis of GDM from modern and *Ayurveda* concepts, antenatal evaluation, management strategies, maternal and fetal complications, preventive measures to improve pregnancy outcomes, postpartum strategies to reduce the future risk of diabetes, and the role of epigenetic changes in influencing long-term maternal and offspring health. The accompanying clinical case illustrates the practical application of these principles in patient care and highlights the value of obstetric management with *Ayurveda* principles. This combined approach aims to enhance the understanding of GDM, importance of early diagnosis and support comprehensive, evidence-informed management across the continuum of pregnancy and beyond.

Key words: GDM (Gestational Diabetes Mellitus), *Garbhini Prameha*, *Ayurveda*, Pregnancy.

1 INTRODUCTION

Gestational diabetes mellitus (GDM) is defined as glucose intolerance first recognized during pregnancy.[1] It is one of the most common metabolic disorders complicating pregnancy. The global prevalence of GDM has increased substantially owing to rising maternal age, obesity, sedentary lifestyles, and changing dietary patterns.[2] In India, GDM affects approximately 10-20% of pregnancies, making it a major public health concern.[3] Maternal hyperglycemia is associated with adverse obstetric outcomes. Furthermore, women with GDM and their offspring remain at increased risk of developing type 2 diabetes mellitus and other metabolic disorders later in life. Early diagnosis, appropriate antenatal surveillance, medical nutrition therapy, lifestyle modification, and pharmacological treatment when indicated constitute the cornerstone of contemporary GDM management.

From an *Ayurveda* perspective, GDM may be correlated with *Garbhini Prameha*. *Ayurveda* emphasizes preventive and individualized care through *Garbhadhana Samskara*, *Garbhini Paricharya*, *Pathya Ahara*, appropriate *Vihara*, and pregnancy-safe therapeutic interventions aimed at maintaining maternal metabolic balance while supporting fetal growth. The present article reviews the current evidence on the diagnosis and management of GDM from both modern and *Ayurveda* perspectives, including antenatal care, dietary and lifestyle modification, maternal and fetal complications, preventive strategies, and postpartum follow-up. A representative clinical case is presented to illustrate the practical application of an individualized approach in the management of GDM through *Ayurveda* principles.

Aims

To provide a comprehensive overview of gestational diabetes mellitus, develop an evidence-based protocol for its diagnosis, management through *Ayurveda* Practices, and follow-up using modern and *Ayurveda* principles, and demonstrate its application through a representative clinical case.

Objectives

- To review the current concepts of gestational diabetes mellitus, including its epidemiology, pathophysiology, and diagnostic approaches from both modern and *Ayurveda* perspectives.
- To summarize the antenatal evaluation, investigations, and evidence-based management of gestational diabetes mellitus.
- To discuss the maternal, fetal, and neonatal complications of gestational diabetes mellitus and strategies for their prevention.
- To propose an integrative protocol for the diagnosis, antenatal care, scope for management through *Ayurveda* Practices, postpartum follow-up, and prevention of long-term diabetes in women with gestational diabetes mellitus.
- To explore the role of epigenetic changes in influencing maternal and offspring metabolic health.
- To illustrate the practical application of the proposed *Ayurveda* protocol through a representative clinical case.

2 METHODOLOGY

Relevant literature from classical *Ayurveda* texts and modern medical literature on gestational diabetes mellitus was collected from libraries, electronic databases, and authentic internet sources, critically analyzed. Based on the available evidence, an *Ayurveda* management protocol was formulated and supported by a representative clinical case.

2.1 Overview of Gestational Diabetes Mellitus

Gestational diabetes mellitus (GDM) is defined as carbohydrate intolerance first recognized during pregnancy, most commonly presenting during the second or third trimester due to pregnancy-induced insulin resistance.[4] Globally, GDM affects approximately 1 in 6 live births, with prevalence varying according to ethnicity, diagnostic criteria, and geographic region. India bears a particularly high burden, with prevalence estimates approaching 20-22%.[5]

2.2 Etiology of Gestational Diabetes Mellitus (GDM)

\GDM results from inadequate pancreatic β-cell compensation for the physiological insulin resistance of pregnancy.

2.3 Risk factors (Etiology)

Advanced maternal age (>25 years), Overweight or obesity before pregnancy, Family history of diabetes mellitus in first-degree relatives, Previous history of GDM, Previous congenital fetal anomaly, Glycosuria during pregnancy, PCOS, High-risk ethnic groups (e.g., South Asians, East Asians, Pacific Islanders), Previous delivery of a macrosomic baby (birth weight ≥4 kg), Previous unexplained stillbirth or recurrent pregnancy loss, Sedentary lifestyle and unhealthy dietary habits, Underlying impaired β-cell function or undiagnosed pre-existing Type 2 diabetes mellitus.[6]

2.4 Pathophysiology of Gestational Diabetes Mellitus (GDM)[7]

Gestational diabetes mellitus (GDM) develops when the normal insulin resistance of pregnancy exceeds the body's ability to maintain normal glucose homeostasis. As pregnancy progresses, placental hormones including human placental lactogen (hPL), placental growth hormone, progesterone, estrogen, cortisol, and prolactin progressively reduce maternal insulin sensitivity. This physiological adaptation ensures a continuous supply of glucose to the growing fetus but also increases maternal insulin requirements. In healthy pregnancies, pancreatic β-cells compensate by increasing insulin secretion. However, in women with underlying insulin resistance, β-cell dysfunction, obesity, or a genetic predisposition, this compensatory response is inadequate, resulting in maternal hyperglycemia. Pregnancy-associated low-grade inflammation further worsens insulin resistance and contributes to abnormal glucose metabolism. Maternal glucose freely crosses the placenta, whereas insulin does not. As a result, fetal hyperglycemia

stimulates excessive insulin secretion by the fetal pancreas, leading to fetal hyperinsulinemia. This contributes to adverse antenatal and perinatal outcomes. Thus, GDM results from the interaction between pregnancy-induced insulin resistance and inadequate β-cell compensation in susceptible women.

2.5 Effects of Pregnancy on Diabetes[8]

Pregnancy is a diabetogenic state characterized by progressive insulin resistance and increased insulin requirements, particularly during the second and third trimesters. These physiological adaptations increase the risk of hyperglycemia, ketosis, and diabetic ketoacidosis, while hypoglycemia may occur during early pregnancy or with insulin therapy. Therefore, close glycemic monitoring and periodic adjustment of treatment are essential throughout pregnancy.

2.6 Effects of Diabetes on Pregnancy[9]

2.6.1 Maternal Complications

Poor glycemic control increases the risk of spontaneous abortion, preterm birth, pregnancy-induced hypertension, polyhydramnios, recurrent urinary tract infections, vulvovaginal candidiasis, and maternal metabolic complications such as diabetic ketoacidosis, hypoglycemia, retinopathy, and nephropathy. During labour, women are more likely to experience prolonged labour, shoulder dystocia, perineal trauma, postpartum hemorrhage, and an increased need for operative delivery. In the puerperium, diabetes is associated with delayed wound healing, puerperal sepsis, and impaired lactation.

2.6.2 Fetal Complications

Maternal hyperglycemia is associated with fetal macrosomia, polyhydramnios, fetal growth restriction (in diabetic vasculopathy), fetal distress, and intrauterine fetal demise. Neonatal complications include hypoglycemia, respiratory distress syndrome, hyperbilirubinemia, cardiomyopathy, prematurity, and increased perinatal mortality. Poor glycemic control during organogenesis also increases the risk of congenital malformations, while long-term offspring are at higher risk of obesity, glucose intolerance, type 2 diabetes, and adverse neurodevelopmental outcomes.

2.7 Diagnosis of Gestational Diabetes Mellitus

Gestational diabetes mellitus is often asymptomatic and is usually detected during routine antenatal screening. Symptomatic women may present with polyuria, polydipsia, fatigue, recurrent urinary tract infections, vulvovaginal candidiasis, or glycosuria.

2.7.1 Screening[10]:

Table 1: Screening for risk categories

Risk Category	Screening Recommendation	Criteria
Low Risk	No routine screening	Age <25 years, Low-risk ethnicity, No first-degree relative with diabetes mellitus (DM), No history of abnormal glucose metabolism, Normal pre-pregnancy weight, No previous macrosomic infant (normal previous birth weight)
Moderate Risk	Screen at 24-28 weeks of gestation	Presence of one or more of the following: Age ≥25 years, High-risk ethnicity, Overweight before pregnancy, Previous infant with high birth weight (macrosomia)
High Risk	Screen as early as possible (at first prenatal visit)	Presence of one or more of the following: Overweight/obesity, First-degree relative e with type 2 diabetes mellitus (DM2), High-risk ethnicity, Previous history of gestational diabetes mellitus (GDM), Previous macrosomic baby.

First screening: At first antenatal visit (preferably between 12-16 weeks or at earliest contact with the healthcare provider).

Second screening: At 24-28 weeks of gestation, even if the first test is negative.

Third screening (for high-risk women or if clinically indicated): At 32-34 weeks of gestation to detect late-onset GDM. If the initial test is performed very early in pregnancy, a repeat test should be conducted after an interval of at least 4 weeks, depending on the gestational age and risk factors.

Target Blood Glucose Levels (DIPSI-2009)[11]: Fasting plasma glucose (FPG): <90 mg/dL and Mean plasma glucose: 105-110 mg/dL for good fetal outcome.

75 gm oral glucose tolerance test WHO criteria[12]

Table 2: WHO criteria for OGTT

Plasma glucose (2hr pppg)	Pregnant women	Non pregnant
> 200mg%	Diabetes	Diabetes
140 - 199mg %	GDM	Impaired glucose tolerance
120 - 139 mg %	Gestational glucose intolerance	Normal
< 120 mg %	Normal	Normal

Table 3: WHO criteria for one step and two step screening

One step screening by WHO (IADPSG)	One step screening (Diabetes in pregnancy study group of India)	Two step screening
Done fasting	Administer irrespective of fasting 75 g oral glucose tolerance test with 300ml of water, within 10 min	Administering 50g glucose challenge test irrespective of meals
75g oral glucose tolerance test sample collect 1hr and 2 hrs	Diagnosis if one or more threshold are met or exceeded	If the value meet or exceeds the threshold ≤ 200mg /dl then administer 100gm oral glucose tolerance test
Fasting >92 mg/dl 1 hr >180 mg/dl 2hr >153 mg/dl One value - GDM	2 hr > 140 mg/dl = GDM	Two or more value meet or exceed the threshold below then diagnosed as GDM

Table 4: Criteria for diagnosis of GDM: o' sullian and mahan modified by carpenter and coustan and national diabetes data group

Criteria for diagnosis of GDM worth 100gm oral glucose (o' sullian and mahan modified by carpenter and coustan and national diabetes data group)[13] **GTT: Venous plasma (mg/dl)**		
Time	Carpenter and Coustan	NDDG (National diabetes data group)
Fasting	95 mg/dL	105 mg/dL
1 hour	180 mg/dL	190 mg/dL
2 hour	155 mg/dL	165 mg/dL
3 hour	140 mg/dL	145 mg/dL

GDM is diagnosed when any two values are met or elevated.

2.8 Management of Gestational Diabetes Mellitus

The goals of GDM management are to maintain maternal euglycemia, prevent maternal and fetal complications, achieve optimal fetal growth, and ensure safe timing and mode of delivery.

Preconception Counselling (for women with pre-existing diabetes): Although GDM is diagnosed during pregnancy, women at high risk or with pregestational diabetes should receive preconception counselling.

Objectives: To Achieve optimal glycemic control before conception (HbA1c <6-6.5%). To Assess diabetic complications (retinopathy, nephropathy, hypertension). To Start folic acid supplementation (0.4 mg/day). To Educate regarding self-monitoring of blood glucose (SMBG), diet, exercise and insulin therapy.

2.9 Antenatal Care: Antenatal Evaluation and Investigations

Women with GDM require close antenatal surveillance.

- **Follow-up:** Monthly visits up to 28 weeks, Fortnightly visits from 28-36 weeks, Weekly visits after 36 weeks until delivery.[14]
- **Antenatal assessment:** Maternal weight gain, BP, Urine examination, Blood glucose monitoring, Fetal growth assessment, Screening for maternal complications.
- **Medical nutrition therapy (MNT):** Medical nutrition therapy is the cornerstone of GDM management.
- **Caloric requirement:** 30 kcal/kg/day for normal-weight, 24 kcal/kg/day for overweigh, 12 kcal/kg/day for morbidly obese women.
- **Dietary composition:** Carbohydrates: 40-50% (prefer complex carbohydrates), Protein: 20%**,** Fat: 30-40%, Saturated fat: <10%.
- **Meal pattern:** Three main meals: Breakfast - 25%, Lunch - 30%, Dinner - 30%**.** Three snacks distributed throughout the day.
- **Blood Glucose Monitoring:** Frequent self-monitoring of blood glucose (SMBG) is recommended.
- **Recommended SMBG Schedule in GDM:** Depending on the patient's glycemic control, blood glucose is commonly checked: Fasting blood glucose (FBG) - before breakfast,1-hour or 2-hour postprandial (PP) after each main meal (as per local guidelines). Occasionally at bedtime or 2-3 AM, especially in women receiving insulin, to detect nocturnal hypoglycaemia.[15]
- **Target blood glucose values:** Fasting: <95 mg/dL, Pre-meal: <100 mg/dL, 2-hour postprandial: <120 mg/dL, 2 AM glucose: >60 mg/dL. HbA1c should be monitored periodically, aiming for <6% if achievable without hypoglycaemia.
- **Exercise:** Moderate physical activity (e.g., walking for 20-30 minutes after meals) improves insulin sensitivity and assists in glycemic control unless contraindicated. Acts by, Lowering free fatty acid and increasing blood flow to insulin sensitive tissue. Contracting muscle stimulate glucose transport. Decrease the insulin requirement.[16]
- **Pharmacological Therapy:** Drug therapy is indicated when glycemic targets are not achieved despite diet and exercise.
- **Insulin Therapy in Gestational Diabetes Mellitus (GDM):** Insulin is the treatment of choice when glycemic targets are not achieved with Medical Nutrition Therapy (MNT) and physical activity within 1-2 weeks. The insulin regimen should be individualized according to the patient's blood glucose profile and gestational age.
- **Indications for Insulin Therapy:** 1)Failure to achieve target blood glucose levels despite MNT and exercise. 2)Fasting plasma glucose >90-95 mg/dL despite dietary management. 3)Persistent postprandial hyperglycaemia.
- **Choice of Insulin Regimen: 1**) Elevated fasting glucose: Initiate basal insulin (NPH or long-acting insulin) at approximately 0.2 U/kg/day. 2) Elevated postprandial glucose: Add rapid-acting insulin (Lispro or Aspart) or regular insulin before the affected meal. 3) Both fasting and postprandial hyperglycaemia: Use a multiple daily injection (MDI) regimen consisting of one basal insulin injection with rapid-acting insulin before each meal.

Table.5: Total Daily Insulin Requirement During Pregnancy[17]

Stage of Pregnancy	Insulin Requirement (U/kg/day)
Pre-pregnancy	0.6
First trimester	0.7
Second trimester	0.8
Third trimester (up to 34 weeks)	0.9
Term (35-39 weeks)	1.0
Postpartum	0.55

In women with morbid obesity, the insulin requirement may increase to 1.5-2.0 U/kg/day because of marked insulin resistance.

Insulin Dose Distribution: The total daily insulin dose is generally divided as:

- 50% basal insulin (NPH or long-acting insulin such as insulin glargine or detemir).
- 50% prandial insulin, divided equally before breakfast, lunch, and dinner using rapid-acting insulin analogues (Lispro or Aspart).

Premixed Insulin Regimen: Women with GDM may be started on 4 units of premixed (70/30) insulin before breakfast. The dose can be increased by 2 units every 4 days until glycemic targets are achieved (usually not exceeding 20 units/day). If post-breakfast glucose remains elevated, 50/50 premixed insulin may be considered. In women with pregestational diabetes mellitus (PGDM), treatment is usually initiated with 8 units of premixed insulin, with subsequent dose titration based on glucose monitoring.

Monitoring: Frequent self-monitoring of blood glucose (SMBG) is essential to adjust insulin dosage and prevent hypoglycaemia. Medical Nutrition Therapy should always be continued alongside insulin therapy.

Table 6: 7-Point and 4-Point Glycemic Monitoring[18]

7-Point Monitoring	4-Point Monitoring
Pre-breakfast (Fasting)	Pre-breakfast (Fasting)
1-hour post-breakfast	-
Pre-lunch	Pre-lunch
1-hour post-lunch	-
Pre-dinner	Pre-dinner
1-hour post-dinner	-
Bedtime	Bedtime

Seven-point monitoring provides a detailed glycemic profile and is preferred during insulin initiation or dose adjustment, whereas four-point monitoring is suitable for routine follow-up in women with well-controlled GDM.

- **Oral Hypoglycemic Agents**: Among oral antidiabetic agents, metformin (FDA Pregnancy Category B) is the preferred option and is usually initiated at 500 mg once daily, with gradual dose escalation up to 2.5-3 g/day in divided doses as required. Glyburide (glibenclamide) is another alternative; although both metformin and glyburide cross the placenta, current evidence has not demonstrated teratogenic effects. However, metformin is increasingly favored because of its efficacy, safety profile, and better maternal acceptance.
- **Fetal Surveillance:** Detailed anomaly scan at 18-22 weeks. Serial ultrasonography for fetal growth. Assessment of fetal well-being from 28 weeks. Non-stress test (NST) and biophysical profile (BPP) in selected cases. Doppler velocimetry if fetal growth restriction or vascular disease is suspected.

Table 7: ANC monitoring for fetal survillance

Trimester	Gestational Age	Investigations / Surveillance	Purpose
First Trimester	11-13+6 weeks	HbA1C (preferably before 14 weeks in women with overt diabetes or high-risk GDM)	Elevated HbA1c is associated with an increased risk of congenital malformations.
	11-13+6 weeks	Combined first-trimester screening: PAPP-A, Free β-hCG and Nuchal Translucency (NT) scan	Screening for chromosomal abnormalities and early fetal structural assessment.
Second Trimester	18-22 weeks	Targeted anomaly scan (Level II ultrasound)	Detection of major fetal structural anomalies.
	20-24 weeks	Fetal echocardiography (when indicated)	Detection of congenital cardiac anomalies, especially in women with pregestational diabetes or poor glycemic control.
	From 28 weeks (every 3-4	Growth ultrasonography	Monitoring fetal growth, macrosomia or fetal growth restriction (FGR).

	weeks if indicated)		
	As indicated	Umbilical artery Doppler	Assessment of placental function in cases of FGR, hypertension or suspected placental insufficiency.
Third Trimester	From 28 weeks	Daily fetal movement count (Kick count)	Assessment of fetal well-being.
	32-34 weeks onward	Non-Stress Test (NST) / Biophysical Profile (BPP)	Antepartum fetal surveillance in women requiring medication or with poor glycemic control and other complications.
	Every 3-4 weeks	Serial growth ultrasonography	Monitoring fetal growth, amniotic fluid volume and detection of macrosomia or FGR.

Timing and Mode of Delivery[19]: Early hospitalisation

Table 8: Time for Induction of labour:

TIME for induction	
GDM is controlled, no complication	Not before 39 weeks, obstetrically indicated
GDM on insulin therapy	Induction of labor at 38 weeks and if associated with vascular complications after 37 weeks

- **Method of induction:** (1)Usual insulin bed time dose prior to day of induction to be administered (2) No breakfast and no morning dose to be given on the day (3) Normal saline infusion to be done (4) Induction done by Low rupture of membrane. (5) Oxytocin drip to be started simultaneous (6) Iv drip 1lt of 5 % dextrose with 10 units of soluble insulin as per requirement if patient was previously on insulin (7) Infusion rate 100 - 125 ml/hr (1-1.25 units/hr) to be maintained (8) Blood glucose level estimated hourly (100mg/dl) (9) Epidural analgesia ideal for pain relief (10) C-section:- if no labor within 6-8 hours or unsatisfactory progression
- **During Labour:** Monitor capillary blood glucose hourly. Maintain maternal glucose between 80-100 mg/dL. Administer intravenous insulin with dextrose infusion when indicated. Epidural analgesia is preferred if available.

Table 9: Constant insulin infusion for the intrapartum period

CONSTANT INSULIN INFUSION FOR THE INTRAPARTUM PERIOD		
BLOOD GLUCOSE (mg/ dl)	INSULIN DOSAGE	FLUIDS 125 ML / HR
<100	0	5%dextrose / lactated ringer's solution
100- 140	1.0	dextrose/lactated ringer's solution
141- 180	1.5	normal saline
181- 220	2.0	normal saline
>220	2.5	normal saline

2.10 Caesarean Section

Indications include: Fetal macrosomia (>4 kg), Poor glycemic control, Fetal compromise, Obstetric indications (e.g., previous caesarean section, malpresentation, severe preeclampsia).

Procedure: (1) Scheduled for early morning. (2) Breakfast and insulin dose omitted (3) Capillary blood glucose to be checked (4) NS infusion started (5) Dextrose and insulin dose are maintained as in induction method (6) Pre - pregnancy dose started of insulin administered/adjusted by blood glucose level (7) Epidural anesthesia is better than general (8) Oral feeding can be started soon after delivery

- **Postpartum Care:** Insulin requirements decrease rapidly after delivery. Blood glucose should be reassessed after delivery. Adjust medicine dose 24 hours after delivery. Blood glucose monitoring to be done based on the sugar levels. Perform a 75-g OGTT at 6-12 weeks postpartum to detect persistent diabetes or impaired glucose tolerance. Encourage exclusive breastfeeding. Counsel regarding healthy lifestyle modifications and future diabetes risk.
- **Care for the baby**: Keep in NICU for at least 48 hrs. Treat complication effectively if arises. Look for congenital malformation. Check blood glucose within 2 hrs. Should be given Vit K 1 mg IM. Breast feeding within 1.2 - 1hr and repeat at 3-4hr to minimize hypoglycemia
- **Contraception**: Barrier methods, Copper IUCD or LNG-IUD, Progestin-only contraceptives, Sterilization if the family is complete.
- **Overt Diabetes:** A patient with symptoms of diabetes mellitus (polyuria, polydipsia, weight loss) and random plasma glucose level of 200 mg/dl or more is considered overt diabetic. The condition may be pre-existing or detected for the first time during present pregnancy. According to American Diabetic Association Diagnosis is positive if: The fasting plasma glucose exceeds 126 mg/dl, The 2 hours post glucose (75 g) value exceeds 200 mg/dl, HbA1C > 6.5%
- **Prevention of Long-Term Diabetes :** A 75-g oral glucose tolerance test (OGTT) should be performed at 6-12 weeks postpartum, followed by periodic diabetes screening using fasting plasma glucose, HbA1c, or OGTT every 1–3 years, depending on individual risk factors (annually for high-risk women and every 2-3 years for low-risk women). Lifestyle modification, including weight management, a balanced diet, regular physical activity, and exclusive breastfeeding for the first six months, should be encouraged to reduce future metabolic risk. Women should also be screened early in all subsequent pregnancies. Approximately 50% of women with GDM develop type 2 diabetes within 10-15 years after delivery, and the recurrence risk of GDM in future pregnancies is 30-50%, highlighting the importance of continued surveillance and preventive care.

2.11 Epigenetic Changes and Fetal Programming

According to the Developmental Origins of Health and Disease (DOHaD) hypothesis, the intrauterine environment plays a crucial role in determining the future metabolic health of the fetus. In gestational diabetes mellitus (GDM), maternal hyperglycemia alters the intrauterine environment, leading to epigenetic changes that modify gene expression without altering the DNA sequence. These changes affect fetal metabolism and insulin function, a phenomenon known as fetal programming, which increases the offspring's risk of developing obesity, insulin resistance, type 2 diabetes mellitus, metabolic syndrome, and cardiovascular disease later in life. This emphasizes the importance of maintaining good glycemic control during pregnancy to improve the long-term health of both the mother and the child.

3 REPRESENTATIVE CLINICAL CASE

3.1 Description of patient:

Table 10: Description of the patient

Name: Mrs. XYZ	OPD No: 241288	Married life: 1 year
Age and sex: 30 years - Female	Date of first visit:15/9/25	Primigravida

- **Main Complaint:** Patient came with the c/o one and half months of amenorrhea
- **Asscociated complaints:** Generalised weakness, vomiting, giddiness, increased frequency of micturation, white discharge and itching in genitalia at times since 1 week.
- **History of presenting illness:** A 29-year-old woman presented to the Outpatient Department of Prasuti Tantra and Stree Roga, Sri Sri College of Ayurvedic Science and Research (SSCASR), Bengaluru, on 15/09/2025 with a history of 1½ months of amenorrhoea, associated with vomiting, giddiness, generalized weakness, increased frequency of micturition, and occasional white vaginal discharge with genital itching for one week. Pregnancy was confirmed by a positive urine pregnancy test (UPT), which was subsequently confirmed by serum β-hCG estimation and an early pregnancy ultrasound.
- **Brief History:** The patient was a known case of PCOS with a 10-year history of irregular menstrual cycles, weight gain. She had presented to the same hospital one year earlier for same and was also diagnosed with diabetes mellitus during evaluation. She underwent a comprehensive *Ayurveda panchakarma* line of management, including *Deepana-Pachana, Classical Vamana, Shamana Chikitsa*, along with individualized dietary and lifestyle modifications focusing on regularisation of glucose levels, menstrual cycles and bringing the vitiated Doshas to normalcy. Following treatment, her menstrual cycles became regular, glycaemic control improved, and HbA1c levels normalized (Before treatment: 10%; 3 months After treatment: 6%). In September

2025, she conceived naturally. Owing to her history of PCOS and diabetes, she was screened early for gestational diabetes, and her HbA1c was 8.2%. She was subsequently managed with *Nishamalaki Vati, Asanadi Kashaya* and individualized dietary and lifestyle measures, along with regular antenatal follow-up, maternal blood glucose monitoring, and fetal surveillance throughout pregnancy along with other medications mentioned in timeline table.

- **Purva-vyadhi vruttanta:** K/c/o- PCOS since 10 years, history of DM last year for which after 3 months of treatment blood sugar levels were normalized.
- **Kula vruttanta:** Maternal: Diabetic Mellitus , Paternal: Diabetic Mellitus
- **Rajo-vruttanta:** Previous Menstrual History: 4-5 days/60-65 days, Pain + and Clots + on First and Second day of menstrual cycle, D1-D5- 2-3 pads/day, 40-50% soakage/day.
- **Marital history:** Married Since 1 year
- **Contraceptive history:** Nil
- **Obstetric history:** Nil

3.2 Examination

Table 11: Examination of the patient

General examination:	Systemic examination:	Local examination:
Pallor, icterus, edema, lymphadenopathy - absent, BP- 120/70 mmhg, PR-89 bpm, Built- medium, Weight- 61 kg, BMI- 26 kg/m^2	CNS: Patient is well oriented to person, place and time CVS: S1 S2 heard RS: NVBS heard	Neck- NAD, Breast- B/L soft and non-tender with everted, P/A- Uterus not palpable

- **Investigations:** mentioned in timeline table no.12.
- **Diagnosis:** GDM- Garbhini Prameha
- **Treatment Plan:** mentioned in timeline table no.12.

3.3 Timeline:

Table 12: Timeline of the case study with observations and intervention

Visit	Observation	Intervention
15/09/2025	C/o- One and half months of amenorrhea Generalised weakness, vomiting, giddiness, increased frequency of micturition, white discharge and itching in genitalia on and off at times since- 1 week. LMP- 06/08/2025 UPT + POG:5 Weeks 4 days Urine routine & microscopy: acidic, clear, Pus cells-5-6/hpf, , Epi cells- 6-8/hpf, RBS 263mg/dl, HbA1C: 8.2 %, Serum-HCG-292 mIU/ml (4-5weeks) ANC Profile done- Normal Weight- 62 kg, BP- 120/70 mmhg No pedal edema	Tab. *Nishamalaki Vati* 2 BD A/F *Syp. Asanadi Kashaya* 3 tsp TID A/F with equal quantity of water Daily SBGM-4 point Diet plan: Use of Laghu, Balya, Deepaniya Ahara, Kapha-medohara, Pramehahara guna pradhana like Yava, red rice, Khapali ata instead of wheat, Bajra, Green leafy vegetables and fruits with low glycemic index One Amla every morning lifestyle modification advised: avoid exhaustion, Vatavardhaka activities, walking after meals for 10 min
24/09/2025	C/o- loss of appetite, white discharge, increased frequency of micturition, on and off constipation Early pregnancy scan: GA by LMP 7W Scan: GA of 5 weeks 3 days	Tab. Leptadene 100mg 1 TID A/F Tab. Duphaston 1 BD A/F CSM (Continue same medication) X 1 month Daily SBGM-4 point (fasting, ppbs after each meal, bed time)

	Fetal pole is not visualised. Small subchorionic hemorrhage noted in inferior aspect measuring 7x5.8x5mm (vol-1 to 2cc). B/L PCOD HCG: 8567 mIU/mL (6-7 weeks of pregnancy) Weight- 63kg, BP- 120/86 mmhg	Diet plan and lifestyle modification advised
13/10/2025	C/o- loss of appetite, increased frequency of urination, constipation, fatigue reduced by 80% GA by LMP-9wwks By scan SLIUG of 8 weeks , CRL 16.5mm corresponding to GA of 8 weeks, FHR 156 regular Yolk sac well formed, Decidual reaction satisfactory, CL- 3.5cm, EDD 20/05/2026. Weight : 62kg, BP- 120/80 mmhg ANC- examination done	CSM X 1 month Daily SBGM-4 point Diet plan and lifestyle modification advised
8/11/2026	C/o- loss of appetite, increased frequency of urination, constipation, fatigue absent First trimester screening scan: GA by Scan: 12weeks, EDD by scan: 23 may 2026 Nasal bone +, FHR +, Tricuspid valve dopler normal, Cx 33mm with no funneling. Uterine artery PI is raised with B/L notches Advised for uterine artery doppler at 23-24weeks of pregnancy. Rescan after 4weeks for early anomaly scan Weight: 62kg, BP: 110/80 mmhg ANC- examination done	CSM Tab Shelcal 500 mg 1 OD Daily SBGM-4 point Diet plan and lifestyle modification advised
10/11/2025	C/o- fatigue, weakness since 2-3 days HbA1C: 7.4% Lipid profile: HDL: 38L RFT: Creatinine: 0.5 L, Blood urea: 10 L, Hb: 10.6 gm% (L) Urine routine and microscopy: Acidic, Ketones +, Pus cell 2-3 /hpf Epi cell 4-5 /hpf Thyroid profile: T3: 130 ng/dl, T4: 9.88 µg/dl, TSH: 5.070 µIU/ml high HCG: 63281(16-23w) Dual marker: Low risk for trisomy 21,18, 13 and PE before 34 weeks, Low predisposition for fetal microsomia . Weight-62.5 kg, BP- 130/90mmhg ANC- examination done	Blood sugar Monitoring: FBS BF and AF for breakfast and lunch Before dinner and at bed time. CSM Stop Duphaston Tab. Thyroxine 50 mcg 1 tablet empty stomch Tab. Aspirin 150 mg 1 H.S. Tab. *Arogyavardhini Vati* 1 TID B/F x 1 month Diet plan and lifestyle modification advised
19/11/2025-26/11/2025	SBGM by CGM- Fluctuations in blood sugar levels observed Weight-62.5 kg, BP- 120/80mmhg ANC- examination done	CSM Daily SBGM-7 point on CGM (continuous glucose monitoring machine) Diet plan and lifestyle modification advised

26/11/2025	Advised: for OGTT FBS: 88 OGTT 1 hr: 186 2 hr: 146	CSM Daily SBGM-7 point on CGM Diet plan and lifestyle modification advised
3/12/2025	Follow up- Fluctuating sugar spikes RBS- 156 mg/dl Weight- 62 Kg, BP: 120/90 mmhg ANC- examination done	CSM CGM Diet plan and lifestyle modification advised
13/12/2025	Follow up- O/B 2/3 trimester scan Extremely restricted review due to maternal habitus SLIUG of 17 W, EDD 23/05/2026, Placenta Anterior, Presentation Breech, Liqour Normal EFW 182+/-18.2 gms. B/L renal pelvices appear prominent measuring 2.9 mm on left and 2.9mm on righ. B/L renal vortices appear normal. The fetal bladder appears normal. Rescan 22-23 weeks for fetale chocardiotochography and late anomaly scan. Weight: 62.5 kg, BP: 120/80 mmhg ANC- examination done	Inj.TT 1st dose given CSM *Tab. Punarnavadi mandura* 2 BD A/F x 1 month CGM Diet plan and lifestyle modification advised
3/1/2026	Follow up- OB-2/3 trimester scan: SLIUG of 20Weeks, EDD 23/05/2026 Placenta: anterior, Presentation: cephalic, Liquor: Normal, EFW: 364+/-36.3, FHR FM + regular. B/L renal pelvices appear prominent 4.6mm on left and 4.6 mm on the right. B/L renal cortices appear normal. Rescan at 23-24 weeks for fetal echocardiography and late anomaly scan Weight- 62 Kg, BP: 120/90 mmhg ANC- examination done	Inj. TT 2nd dose given CSM CGM Diet plan and lifestyle modification advised
23/01/2026	Follow up Referal to GP for sugar level spikes done Weight- 62.5 Kg BP: 120/80 mmhg ANC- examination done No pedal edema	Tab. Glycomet SR 500 1 tab 15 min before lunch to be continued Syp. Dextorange 10ml after lunch x 3 months Tab. Folvite 5mg 1 OD after breakfast x 3 months CSM CGM Diet plan and lifestyle modification advised
31/01/2026	Follow up- 2/3rd trimester scan report: SLIUG of 24 weeks by scan By LMP 25 Weeks 3 days, EDD 23/05/2026 Placenta- anterior, Cephalic presentation Liquor normal, EFW 684+/-68.4 gms No chromosomal anomlies. FHR regular+ Uterine artery doppler Normal	CSM Tab.Ca+ vit B12 1 OD A/F CGM Diet plan and lifestyle modification advised

	CL- Normal, Rescan after 4 weeks. Weight- 62 kg, BP: 110/80 mmhg ANC- examination done	
11/02/2026	C/O – frequent urination, white discharge, itching in genitalia since 1 week POG 27 weeks Pedal edema + since 2-4 days BP 110/80 mmhg, Weight 63 kg White discharge ½ times/day-transperant Itching + Bowel: once/day-satisfactory Appetite: Improved – 3meals/day Sleep: Satisfactory 6-8 hrs Urine 5-6times/day, 1/2/night time Jihwa alipta ANC- examination done Investigations: HbA1C- 6%, Hb- 9.0 g/dl, Platelet count- 2.35 lakhs/mm3, RBS- 166 mg/dl U-R and M Acidic, turbid, Albumin Trace, Pus cells: 30-35 /hpf, Epi cells: 8-10 /hpf, Bacteria- Present	Tab.Orofore XT 2 OD A/F X 1 month Alkaline syrup 3tsp TID A/F Chandraprabha Vati 1 TID A/F 1 week Tab . HS Cal 1 OD A/F Tab.Glycomet SR 500 mg 1 OD (after lunch) X 1 month CSM Diet Plan coconut water- one/day Follow up scan on 4/3/26 CGM Diet plan and lifestyle modification advised
22/02/2026	C/O – frequent urination, white discharge, itching in genitalia reduced by 60% Urine routine and microscopy Acidic, Clear, Albumin Absent Pus cells: 2-3/hpf Epi cells: 3-4/hpf Bacteria- Absent Weight- 63 kg BP: 110/80 mmhg ANC- examination done No pedal edema	Tab.Orofore XT 2 OD A/F X 1 month Alkaline syrup 3tsp TID A/F Chandraprabha Vati 1 TID A/F 1 week Tab . HS Cal 1 OD A/F X 1 month CSM Tab.Nishamalaki Asanadi Kashaya Punarnava ,andura Leptadiene Tab.Thyroxine Tab.Glycomet SR 500 mg Diet Plan: previously planned + coconut water- one/day Follow up scan on 4/3/26 CSM, CGM, Diet plan and lifestyle modification advised
27/02/2026	C/O - White discharge, Frequency of urination reduced by 30% Weight 62.5 Kg, BP: 110/70 mmhg ANC- examination done	CSM CGM Diet plan and lifestyle modification advised
28/02/2026	Follow up- OB-2/3 Trimester Scan report SLIUG of 28 weeks, EDD 23/05/2026 Placenta: Anterior grade 2 maturity, Presentation: Cephalic, Liquor- Normal, EFW- 1225+/- 122.5 FHS + regular	CSM CGM Diet plan and lifestyle modification advised

	Weight 62.5 Kg, BP: 110/70 mmhg ANC- examination done	
4/3/2026- 16/3/2026	Spikes in blood sugar levels observed on SBGM- CGM	CSM, CGM, Diet plan and lifestyle modification advised
18/3/2026	C/O- On and off constipation since a 1week Weight 62.5 Kg BP: 110/80 mmhg ANC- examination done No pedal edema	*Ajamoda Arka* 10 drops in warm TID before food CSM, CGM, DFMC Diet plan and lifestyle modification advised
6/4/2026	C/o- constipation reduced NST GRBS- 133 mg/dl Wight 62kg, BP-100/70 mmhg, Pulse 105 bpm ANC- examination done	CSM, CGM DFMC Diet plan and lifestyle modification advised
8/4/2026	NST Weight- 61.5kg BP- 110/70 mmhg Fluctuating BG on CGM ANC- examination done	CSM CGM DFMC Diet plan and lifestyle modification advised
15/4/2026	NST Weight- 61.5kg BP- 110/70 mmhg Fluctuating BG on CGM ANC- examination done	CSM CGM DFMC Diet plan and kifestyle modification advised
22/4/2026	C/o pain in abdomen since 1 day POG of 37 3 D Weeks Weight- 61.5kg, BP- 110/70 mmhg, Hb- 11.1 g% ANC profile done RBS- 107 mg/dl, PC-2.23 lskhs/mm3 Urine routine and microscopy: Acidic, Pus cells-8-10 hpf, Epi cells-6-8/hpf USG -growth scan- SLIUG with POG- 36 W Liquor normal, Cephalic presentation, Placenta Anterior wall-grade 2/3 maturity, Single loop of cord around neck, EFW: 2802+/- 280 gms. ANC- examination done	CSM + Syp alkalin 2tsp TID A/F Tab. Neeri 1 TID A/F CGM DFMC Diet plan and lifestyle modification
27/4/2026 28/4/2026	RBS- 206 mg/dl Fasting-154mg/dl, PPBS-143mg/dl Weight: 61.5 kg, BP-120/70 mmhg ANC- examination done	CSM, CGM DFMC Diet plan and lifestyle modification
2/5/2026	C/O- Fluctuating BG levels observed on CGM	Continue as advised previously
6/5/2026	Primi with POG 37 weeks with C/O- Fluctuating BG levels observed on CGM RBS: 97 mg/dl, PC-2.23 lakhs/mm3, Hb: 11.1 g/dl Urine Routine and microscopy:	Posted for LSCS A live healthy male baby weighing 2781 gms cried immediately after birth on 7/5/2026 Further Post-op Monitoring was done as per the GDM guidelines.

	Pus cells- 20-25, Epi cells- 8-10, Albumin- Present +, Ketone- Absent General and systemic examination: Nothing contributory Local examination: Neck- no cervical lymphadenopathy Breast- B/L-soft, Non-tender P/A- Uterus- term, no contractions FHR- 143 bpm regular, FM + NST- Reactive Weight: 61.8 kg, BP- 100/70 mmhg Diagnosis: Term Pregnancy with GDM (fluctuating sugar levels)	

4 RESULT

- A live healthy male baby weighing 2781 gms cried immediately after birth on 7/5/2026
- Further Post-op Monitoring was done as per the GDM guidelines.
- Post-op management with GDM guidelines and *Sootika Paricharya* was advised as followed
- *Sootika Paricharya:*
- *Ahara- Panchakola churna* along with food (barley, red rice *Ganji*, green leafy vegetables, red rice, dil leaves rasam, warm and soothing food.
- *Pippali-Shatavari churna Ksheerapaka* 50ml TID A/F
- *Vihara*- Udarapatta bandhana, Raksha karma was followed.
- Patient was discharged with follow up advises and oral medications, diet plan.
- Oral medication: Oral antibiotics as post-op guidelines for GDM.

Further *Sootika Paricharya*, diet and lifestyle modification advised with following medications for 1 month

Tab.Nishamalaki Vati 2 BD A/F	**Tab.Amrutadi Vati 2 BD**	**Tab. Folvite 5mg, 1 OD A/F**
Asanadi Kashaya 3tsp TID A/F	Panchakola Churna with food	Tab.Thyroxine 50 mcg 1 OD empty stomach
Dashamoola katutraya Kashaya 10ml TID B/F	Tab.Divon+ 1 SOS	

Follow up after 7 days, BSL monitoring advised at home.

5 DISCUSSION

5.1 GARBHINI PRAMEHA

Although *Garbhini Prameha* is not described as a distinct disease entity in the classical Ayurveda texts, its clinical features closely resemble Gestational Diabetes Mellitus (GDM). *Acharya Kashyapa* states that diseases occurring during pregnancy are governed by the same *Dosha* and *Dushya* principles as those occurring in non-pregnant individuals. Hence, GDM can be correlated with *Garbhini Prameha*. *Prameha* is not included among the classical *Garbhopadravas*; however, the increasing prevalence of hyperglycemia during pregnancy and its similarity in clinical manifestations support this correlation. The term *Prameha* is derived from *Pra* (excessive) and *Mih* (to void), denoting excessive and turbid urination (*Prabhuta Avila Mutrata*).[20] *Acharya Vagbhata* and *Madhava Nidana* describe *Prameha* as frequent, profuse, and turbid micturition, while *Bhaisajya Ratnavali* mentions pregnancy-associated *Ojameha*. Management should be individualized after assessing *Dosha, Dushya, Agni, Prakriti, Kala,* and *Vaya*, while ensuring maternal and fetal well-being.

5.2 NIDANA

Acharya Sushruta classifies *Prameha* into *Sahaja* (hereditary) and *Apathyanimittaja* (acquired), while *Dalhana* attributes *Sahaja Prameha* to abnormalities of *Shukra* and *Shonita*, indicating a hereditary predisposition. The etiological factors of *Garbhini Prameha* are comparable to those of *Apathyanimittaja Prameha*. *Acharya Charaka* describes excessive consumption of *Madhura*, *Guru*, *Snigdha*, and *Kapha*-promoting foods, including curd, milk, jaggery, freshly harvested grains (*Navanna*), meat of domestic, aquatic and marshy animals, along with sedentary habits, excessive sleep (*Diwaswapna*), physical inactivity (*Avyayama*), and laziness (*Alasya*), as the principal causative factors of *Prameha*. These factors promote *Kapha*, *Meda*, and *Kleda*, leading to *Santarpanottha Vikara*.

During pregnancy, frequent intake of high-calorie foods, sweets, carbohydrate-rich beverages, and fat-rich diets, together with reduced physical activity and excessive rest, further aggravates *Kapha* and predisposes susceptible women to *Garbhini Prameha*.

While describing *Garbhopaghatakara Bhava*, the classical texts state that regular consumption of *Madhura Rasa* during pregnancy predisposes the fetus to *Prameha* and *Atisthulata*. *Kashyapa* further mentions that habitual intake of sweet foods and excessive sleep during pregnancy may result in offspring with *Prameha*, *Atisthulata*, *Mandagni*, *Tandra*, and impaired development, emphasizing the influence of maternal diet and lifestyle on fetal health.

This verse highlights that excessive nourishment, *Kapha*-promoting diet, and sedentary lifestyle constitute the primary etiological factors for *Prameha*, which can be extrapolated to *Garbhini Prameha* in the presence of pregnancy-induced metabolic changes

Table 13: Nidana for Garbhini Prameha

Nidana[21]	**Examples**
Aharaja	*Navanna, Ksheera, Dadhi, Ikshu, Guda, Tila, Anoopa Mamsa, Gramya Mamsa, Hayanaka, Vilepi,* excessive *Amla* and *Lavana Rasa*
Viharaja	*Diwaswapna, Alasya, Asyasukha,* sedentary lifestyle, lack of exercise
Santarpanottha	Overnutrition and excessive *Kapha*-promoting diet and lifestyle

5.3 Purvaroopa and Roopa

Table 14: Purvarupa for Garbhini Prameha

Stage	**Classical Features**	**Clinical Correlation in GDM**
Purvarupa (Prodromal features)	*Shrama, Dourbalya, Sweda, Anga Gandha, Shithilangata, Shayyasana Rati, Gala-Talu Shosha, Madhurasyata, Kara-Pada Daha, Trishna, Ati Nidra, Gaurava, Upadeha, Ati Roma-Nakha Vriddhi, Mutre Pipilika*	Fatigue, weakness, excessive sweating, increased thirst, dry mouth, excessive sleep, burning sensation of palms and soles, recurrent vulvovaginal infections, glycosuria.
Purvarupa in Pregnancy	*Yoni Kandu, Yoniat Shweta Srava Vriddhi, Madhurasyata, Hasta-Pada Tala Daha, Sweda Adhikya*	Vulvovaginal candidiasis, excessive vaginal discharge, sweet taste in mouth, burning sensation, excessive sweating.
Rupa (Clinical features)	*Prabhuta Mutrata, Avila Mutrata* (Sushrutacharya, Madhava Nidana) *Vivrudham Garbham Ati* (excessive fetal growth leading to difficult labour)	Polyuria and turbid urine due to glycosuria. Fetal macrosomia with increased risk of obstructed labour and shoulder dystocia.

5.4 Samprapti

The *Samprapti* of *Garbhini Prameha* is comparable to that of *Apathyanimittaja Prameha*, with pregnancy acting as a physiological state that facilitates disease manifestation. The pathological *Kapha* and *Kleda* vitiation established during the pre-conception period or after conception due to *Mithya Ahara-Vihara*, when superimposed on the physiological increase in *Kleda* during pregnancy, leads to *Kapha*-Dushti. Aggravated *Kapha* impairs *Jatharagni* and *Dhatvagni*, resulting in *Ama* formation, *Medodushti*, and *Dhatu Shaithilya*. Owing to the similarity in properties of *Kapha* and *Meda*, the vitiated *Kapha* further aggravates *Meda*, producing excessive *Kleda*. Pregnancy itself is characterized by

physiological *Kleda Vriddhi* and is considered a *Santarpana Yogya Avastha*. During pregnancy, *Anartavata*, nourishing *Madhura-Snigdha Ahara*, reduced physical activity, and physiological metabolic adaptations further promote *Kleda* accumulation. During the second trimester (*Pitta Kala*), alterations in *Agni* may further impair the normal metabolism and elimination of *Kleda*. Thus, the pre-existing pathological increase in *Kapha* and *Kleda*, together with the physiological increase in *Kleda* during pregnancy, results in excessive *Kleda Vriddhi*. The accumulated *Kleda* localizes in the *Medovaha* and *Mutravaha Srotas*, producing *Srotodushti* and increased urinary excretion (*Prabhuta Mutrata*). Ultimately, *Kapha*-predominant *Tridosha Dushti*, *Agnimandya*, *Ama*, *Medodushti*, excessive *Kleda*, and *Mutravaha Srotodushti* culminate in the manifestation of *Garbhini Prameha*, which closely correlates with the insulin-resistant state of Gestational Diabetes Mellitus.

5.5 Samprapti Ghatakas

Table 15: Samprapti Ghataka for Garbhini Prameha

Dosha: Kapha-pradhana Tridosha	**Srotodushti: Sanga followed by Atipravritti**
Dushya: Rasa, Mamsa, Meda, and Kleda	Udbhava Sthana: Amashaya and Pakvashaya
Agni: Jatharagni and Dhatvagni Mandya	Sanchara Sthana: Sarva Sharira
Ama: Jatharagnijanya Ama	Vyakta Sthana: Mutravaha Srotas (systemically in Sarva Deha)
Srotas: Medovaha and Mutravaha Srotas	Rogamarga: Madhyama Roga Marga

- **Classification of *Prameha*[22]** *Prameha* is classified based on etiology into *Sahaja* (hereditary) and *Apathyanimittaja* (acquired due to improper diet and lifestyle), based on *Dosha* into *Kaphaja*, *Pittaja*, and *Vataja*, and based on body constitution into *Sthula (Balavan)* and *Krisha (Dourbala) Pramehi*. Among these, *Garbhini Prameha* closely correlates with *Apathyanimittaja Prameha* due to its association with carbohydrate intolerance and metabolic alterations during pregnancy.
- ***Chikitsa*:** The management of *Garbhini Prameha* should focus on achieving optimal maternal glycemic control while ensuring fetal safety. *Acharya Kashyapa* advocates *Sukshma Chikitsa* for diseases occurring during pregnancy, emphasizing gentle and individualized management with protection of the fetus.[23] Since pregnancy is a *Santarpana Yogya Avastha*, treatment should be aimed at correcting the aggravated *Dosha* without causing depletion of maternal or fetal *Dhatu, Ojas*.
- Principle of treatment for *Prameha* should be with following understanding: *Acharya Sushruta* recommends that treatment should reduce the aggravated *Dosha* through appropriate *Shodhana* or *Shamana* measures that are compatible with the patient's strength and physiological status in *Prameha Chikitsa*. *Dalhana* clarifies that in pregnancy, *Shamana Chikitsa*, along with appropriate *Ahara* and *Vihara*, should be preferred over intensive *Shodhana*. Similarly, *Bhavamishra* states that treatment should normalize only the excessive *Dosha* and *Dushya* while preserving normal physiological tissues.
- Accordingly, the management of *Garbhini Prameha* should primarily include *Nidana Parivarjana*, *Pathya Ahara*, lifestyle modification, regular antenatal and blood glucose monitoring, and individualized *Shamana Chikitsa*.
- ***Shamana Aushadhi**: Kshaya Aviruddha Aushadhi* such as *Haridra-Amalaki Yoga, Nisha-Amalaki, Sarvamehahara Kashaya, Giloya Satva, Chandraprabha Vati, Asanadi Kashaya, and Punarnava* preparations may be considered based on *Dosha*, *Prakriti*, and clinical condition, with careful assessment of their safety during pregnancy.
- ***Pathya-Apathya:** Ayurveda* emphasizes *Ahara* as an integral component of treatment along with *Aushadha*. The concept of *Pathya* is based on maintaining *Dosha* equilibrium and restoring *Agni*, thereby preventing disease progression and supporting recovery. As pregnancy is a physiological state where minimal medical intervention is advocated, dietary regulation (*Pathya Ahara*) forms the cornerstone of the management of *Garbhini Prameha*.
- **Diet and lifestyle management:** *Madhura Nitya Pramehinam* (Cha. Sha. 8/21), So *Madhura Ahara* should be avoided in *Prameha* and *Madhura Ahara* is a very important thing in *Garbhini Paricharya*, Modification of *Garbhini Paricharya* as a part of *Yukti-Vyapashraya Chikitsa* has to be considered and *Pathya-Apathya* has to be planned. In *Garbhini Prameha*, these dietary principles should be modified in accordance with *Garbhini Paricharya* to ensure adequate maternal nutrition, optimal fetal growth, and effective glycemic control.
- ***Pathya*:** *Yogaratnakara* recommends *Satapathya* for pregnant women, advocating wholesome, nourishing, and easily digestible foods such as *Shashtika Shali*, *Mudga*, *Godhuma*, *Laja Satva*, *Navaneeta*, *Ghrita*, *Ksheera*, *Rasala*, *Madhu*, *Sharkara*, *Panasa*, *Kadali*, *Dhatri*, and *Draksha*, administered judiciously according to the patient's digestive capacity and glycemic status.

In *Garbhini Prameha*, dietary management should focus on foods with a low glycemic index and high nutritional value to achieve optimal maternal glycemic control while ensuring adequate fetal nutrition. Small, frequent meals (6-7 feeds/day) comprising whole grains, roasted cereals, *Mudga Yusha*, *Laja Manda*, *Takra*, skimmed milk, *Jangala Mamsa Rasa*, and vegetables such as cucumber, carrot, and capsicum are recommended.

Dietic regimen should be timely followed under dietic rules, *Ashtavidha Ahara-Vishesha Ayatana, Ahara-vidhi-vidhana, Dwadasha Ashana Pravicharana.* Classical *Ayurveda* texts recommend *Laghu, Kapha-Medohara*, and metabolically balanced foods for the management of *Prameha*. Among cereals, *Yava, Purana Shali*, and millets such as *Shyamaka, Kangu*, and *Kodrava* are preferred. *Mudga, Chanaka, Adaki*, and *Kulattha* are the commonly recommended pulses owing to their easy digestibility and nutritional value. Vegetables such as *Karavellaka, Patola, Bimbi*, and *Shigru* are advocated for their *Tikta* and *Kashaya* properties that support glucose metabolism. Among dairy products, Takra is preferred because of its *Laghu*, *Deepana-Pachana*, and *Kapha-Vatahara* properties, whereas *Go-Ksheera* and *Go-Ghrita* should be consumed judiciously according to maternal metabolic status. Dietary modification should be individualized based on blood glucose levels and maternal nutritional requirements.

- ***Apathya*:** Foods with a high glycemic index, including refined sugar, sweets, bakery products, refined flour etc should be avoided. Salt restriction may be considered in women with oedema. *Sauviraka, Tusodaka, Sukta, Maireya, Sura, Asava, Ikshurasa,* and *Anupa Mamsa* are considered unsuitable, as they promote *Kapha* and *Kleda*, there by aggravating *Prameha*.
- **Herbs in *Ayurveda* for GDM-*Garbhini Prameha*:** Commonly used drugs include *Haridra* (*Curcuma longa*), *Daruharidra* (*Berberis aristata*), *Guduchi* (*Tinospora cordifolia*), *Amalaki* (*Emblica officinalis*), *Nishamalaki, Karavellaka (Momordica charantia), Asana (Pterocarpus marsupium), Madhunashini (Gymnema sylvestre), Methi (Trigonella foenum-graecum), Jambu (Syzygium cumini), Nimba (Azadirachta indica), Bilva (Aegle marmelos), Twak (Cinnamomum verum), Bhumyamalaki (Phyllanthus niruri), Musta (Cyperus rotundus),* and *Tambula (Piper betle).* These herbs based on their *Rasa, Guna, Veerya, Vipaka, Karma, Prabhava* proves and are reported to improve insulin sensitivity, enhance pancreatic β-cell function and insulin secretion, reduce hepatic glucose production, improve glucose utilization, and exert antioxidant and anti-inflammatory effects. However, their use during pregnancy should be individualized, limited to formulations with established safety, and regular glycemic monitoring.
- **Life style management:** Lifestyle modification including trimester-specific exercise, prenatal yoga, postprandial walking (15-20 minutes), adequate sleep, avoidance of *Diwaswapna* and *Ratri Jagarana*, and stress reduction contributes to improved insulin sensitivity and maternal well-being.

5.6 Assessment parameters for Antenatal care in GDM:

Table 16: Assessment parameters for Antenatal care in GDM:

Assessment Parameter	Timing/Frequency	Purpose
Clinical assessment	Every antenatal visit	Assess weight gain, blood pressure, symptoms of hyperglycemia/hypoglycemia, UTI, edema, and obstetric complications.
Self-Monitoring of Blood Glucose (SMBG)	Daily (4-7 point profile as indicated)	Monitor fasting and postprandial glucose levels and adjust medicinal dose.
HbA1c	At diagnosis (if early pregnancy) and every 4-8 weeks if indicated	Assess long-term glycemic control (less useful in late pregnancy).
Urine examination	Every visit/ when indicated	Detect proteinuria, glycosuria, ketonuria, and urinary tract infection.
Renal and liver function tests	When indicated	Baseline evaluation and monitoring in women with associated medical disorders.
Ultrasonography	Dating scan, anomaly scan (18-22 weeks), growth scans every 3-4 weeks from 28 weeks	Assess fetal growth, amniotic fluid volume, and detect macrosomia or fetal growth restriction.
Fetal echocardiography	20-24 weeks (if indicated)	Detect congenital cardiac anomalies, especially in pregestational diabetes or poor early glycemic control.

Daily fetal movement count	From 28 weeks	Monitor fetal well-being.
Non-Stress Test (NST)	From 32-34 weeks in women on medication or with complications	Assess fetal well-being.
Biophysical Profile (BPP)	When NST is non-reactive or high-risk pregnancy	Comprehensive assessment of fetal condition.
Umbilical artery Doppler	When fetal growth restriction or placental insufficiency is suspected	Assess fetal circulation and placental function.
Fundal height and fetal heart rate	Every antenatal visit	Routine monitoring of fetal growth and viability.

Role of CGM monitoring and SMBG: Optimal glycemic control is the cornerstone of GDM management. Self-Monitoring of Blood Glucose (SMBG) remains the standard method for monitoring fasting and postprandial blood glucose levels, helping clinicians assess the response to treatment and make timely modifications to diet, lifestyle, and therapy. Continuous Glucose Monitoring (CGM) complements SMBG by providing continuous glucose profiles, detecting nocturnal and postprandial glucose fluctuations that may not be captured by intermittent testing, and is particularly valuable in women with unstable glycemic control or those requiring insulin therapy.

In the present case, SMBG was used during the initial phase of management to closely monitor glycemic status and assess the patient's response to Ayurvedic treatment and lifestyle modifications. As the pregnancy progressed and occasional fluctuations in blood glucose levels were observed, CGM was introduced to obtain a more comprehensive assessment of glycemic patterns. This facilitated early identification of glucose excursions and allowed timely therapeutic decisions, contributing to better glycemic control and a favourable maternal and neonatal outcome.

Blood Glucose Targets, Scope of Ayurveda, and Red flags requiring Immediate referral: *Ayurveda* treatment should not use different glycemic targets from conventional obstetric practice. Maternal and fetal safety requires adherence to internationally accepted glucose targets. Recommended targets include: Fasting glucose: **<**95 mg/dL, 1-hour postprandial: <140 mg/dL, 2-hour postprandial: <120 mg/dL. *Ayurveda* management principles for *Garbhini Prameha* serve as a complementary approach in women with GDM who achieve these targets through *Pathya Ahara*, lifestyle modification (*Vihara*), Herbs-*Aushadha Dravya* indicated in *Prameha* and suitable for *Garbhini Prameha* and regular Self-Monitoring of Blood Glucose (SMBG). *Ayurveda* medicines should be considered only when these targets are maintained with dietary regulation and close monitoring. Failure to achieve targets within 1-2 weeks should prompt escalation to insulin according to standard guidelines. *Ayurveda* management should always recognize situations requiring obstetric intervention.

Table 17: Understanding of Red flags

Maternal red flags include:	Fetal red flags include:
Persistent fasting glucose ≥95 mg/dL despite treatment	Polyhydramnios
Severe postprandial hyperglycemia	Fetal macrosomia
Ketonuria or suspected diabetic ketoacidosis	Fetal growth restriction
Hypertension or pre-eclampsia	Abnormal Doppler velocimetry
Reduced fetal movements	Non-reactive NST/BPP

These situations require immediate obstetric assessment and should not be managed with *Ayurveda* medicine alone as there are not much evidence based medication explored in *Garbhini Prameha.* Ayurveda medicine have a complementary role in, Mild GDM controlled with Medical Nutrition Therapy (MNT) and *Aushadha Dravya* indicated in Prameha and *Garbhini Prameha*. Improving insulin sensitivity through dietary regulation (*Pathya Ahara*) and appropriate lifestyle modifications (*Vihara*). Reducing oxidative stress and inflammation and improving maternal metabolism. However, *Ayurveda* medicine should not replace insulin therapy when indicated.

Table 18: BG status and suggested approach

Blood glucose status (cut off values for Blood glucose levels)	**Suggested approach**
Within target values	Continue Diet, MNT, lifestyle modification, and supportive Ayurvedic measures under supervision.
Mild elevation after MNT	Consider carefully selected, pregnancy-safe *Ayurveda* interventions with frequent SMBG.
Persistent hyperglycemia above targets	Initiate insulin according to obstetric guidelines while continuing supportive *Ayurveda* dietary and lifestyle measures.
Severe hyperglycemia or complications	Immediate referral for specialist obstetric management.

Role of PMOS leading to diabetes in pregnancies: Polycystic Ovary Syndrome (PCOS)/Polyendocrine metabolic syndrome (PMOS)is a major risk factor for Gestational Diabetes Mellitus (GDM) due to pre-existing insulin resistance, obesity, hyperandrogenism, and β-cell dysfunction. Pregnancy further increases insulin resistance through placental hormones, thereby increasing the risk of hyperglycemia and GDM. From an Ayurvedic perspective, PCOS can be correlated with *Kapha-Meda Dushti*, *Agnimandya*, *Artava Dushti*, and *Srotorodha*, which, when combined with the physiological *Kleda Vriddhi* of pregnancy, predispose to *Garbhini Prameha*. Therefore, preconception counselling, weight optimization, lifestyle modification, and correction of metabolic disturbances are essential to reduce the risk of GDM and improve maternal and fetal outcomes.

In the present case, the patient had a long-standing history of PMOS with associated menstrual irregularities and impaired glycemic control. She had previously undergone Ayurvedic *Pancakarma* followed by *Shamana Chikitsa*, which resulted in regularization of her menstrual cycles and significant improvement in blood glucose levels, ultimately enabling conception. However, continued *Nidana Sevana* (persistent exposure to etiological factors) likely contributed to the recurrence of *Dosa* vitiation and worsening insulin resistance during pregnancy, culminating in the development of GDM. This case highlights the importance of sustained dietary and lifestyle modifications, along with preconception metabolic optimization and continued antenatal monitoring, to minimize the risk of GDM and improve maternal and fetal outcomes.

Role of *Garbhadhana Samskara*- as a preventive management in general and present case study: *Garbhadhana Samskara* represents the *Ayurveda* concept of preconception care aimed at achieving healthy conception and healthy progeny. Classical texts advocate *Sharira Shuddhi* through appropriate *Panchakarma* in suitable individuals, along with *Dinacharya*, *Ritucharya*, and *Rajaswala Paricharya*, to optimize the health of *Beeja*, *Yoni*, *Garbhashaya*, and *Manas*. In women at risk of GDM, particularly those with PCOS, obesity, or pre-existing diabetes, preconception care should focus on metabolic optimization through good glycemic control, weight management, a balanced diet, regular physical activity, folic acid supplementation, and correction of *Kapha-Meda Dushti* and *Agnimandya*. These measures may reduce the risk of *Garbhini Prameha* and improve pregnancy outcomes.

In the present case, *Ayurveda Panchakarma* line of management in preconception period followed by dietary and lifestyle modification resulted in improved glycemic control, regularization of menstrual cycles, successful conception, and a healthy pregnancy outcome. This highlights the potential role of *Garbhadhana Samskara* which helped in conception and may have helped to prevent further maternal and fetal complications during pregnancy.

***Ayurveda* to tackle the complications of GDM:** Ayurveda management of *Garbhini Prameha* focuses on preventing complications through *Nidana Parivarjana*, individualized *Pathya Ahara*, *Kledahara Chikitsa*, *Agni Deepana*, and appropriate lifestyle measures such as *Mridu Vyayama* and *Chankramana*. Treatment should follow the principle of *Kshaya Aviruddha Chikitsa* with careful assessment of *Dosha*, *Dushya*, *Kala*, *Vaya*, and *Agni*.

In the present case, these *Ayurveda* principles were incorporated throughout pregnancy, along with regular antenatal monitoring and glycemic surveillance. This individualized approach helped maintain satisfactory glycemic control, supported fetal well-being, and contributed to the successful prevention and management of GDM-related maternal and fetal complications, resulting in a favourable pregnancy outcome.

Role of *Garbhini Paricharya* and modification of *Garbhini Paricharya* in GDM: The principles of *Garbhini Paricharya* remain valuable but require modification in women with GDM. *Acharya Sushruta* describes formulations such as

Garbhasthapaka Ghrita, Shwadanshtrasiddha Ghrita (6th month), and *Prithakparnyadi Ghrita* (7th month) to support maternal and fetal well-being when clinically indicated.[25] As advised by *Acharya Kashyapa*, *Tikshna Chikitsa* and *Shodhana Karma* are contraindicated during pregnancy, and management should primarily rely on *Shamana Chikitsa*.

"Garbhini paricharya has been told for *Swastha Purusha* keeping in mind the physiological changes happening in *Garbhini Avastha* with respect to *Tridoshas*, for maintainance of *Agni* and *Rasayana* to improve nourishment for both mother and baby."

So where management of DM, *Tikta-Katu-Kashaya Dravya* are advised so modification of *Garbhini Paricharya* with *Yukti* where the *Chikitsa* of *Prameha* is contraindicated for *Garbhini* and *Pathya* for *Garbhini* is contraindicated in Prameha, management becomes tricky and modification of *Garbhini Paricharya* is a cornerstone in management of GDM-*Garbhini Prameha.*

Recommended modifications: Individualized dietary planning with low glycemic index, balanced meals, Avoidance of excessive calorie intake, Regular walking and pregnancy-safe exercise, Weight monitoring and periodic glucose assessment, Individualized use of safe *Ayurveda* formulations only under specialist supervision. Modification like in 4th month Shashti Shali rice with curd is advised instead of it, we should give *Jangala Mamsaras* which is advised in 4th month by *Aacharya Sushruta*.

Excessive intake of milk, ghee, sweets, jaggery, sugar-rich preparations, and heavy (*Guru*) foods traditionally advised in normal pregnancy should be modified or restricted according to glycemic status.

Panchakarma procedures and strong purification therapies (*Shodhana*) are contraindicated during pregnancy.

In the present case, the principles of *Garbhini Paricharya* were carefully adapted to meet the patient's metabolic needs while ensuring optimal maternal and fetal well-being. Instead of routinely following the classical dietary recommendations, the emphasis was placed on a low glycemic index, *Pramehahara* diet comprising *Yava, Bajra, red rice, Khapli ata*, green leafy vegetables, and other *Kapha-Medohara* foods. The patient was also advised to consume one *Amla* daily, walk for 10 minutes after each meal (*Chankramana*), avoid exhaustion and *Vatavardhaka* activities, and adhere to regular antenatal follow-up. Considering the pregnancy status, only safe *Shamana* medications with *Pramehahara* properties, such as *Nishamalaki Vati* and *Asanadi Kashaya*, were prescribed to help maintain blood glucose levels while adhering to the principles of *Garbhini Chikitsa*. These interventions were individualized and modified according to the patient's clinical condition throughout pregnancy. Blood glucose was monitored initially with SMBG and later with CGM, allowing early identification of glycemic fluctuations and timely therapeutic modifications whenever required. This individualized approach, integrating modified *Garbhini Paricharya*, *Shamana Chikitsa*, dietary regulation, lifestyle modification, and close maternal-fetal surveillance, may have helped maintain satisfactory glycemic control and contributed to a favourable pregnancy outcome with the delivery of a healthy term neonate.

Mode of action of *Ayurveda* medication and Dietary modification in GDM in general and present case study: The management of *Garbhini Prameha* is aimed at correcting *Agnimandya*, alleviating *Kapha-Meda Duṣṭi*, reducing excessive *Kleda*, and restoring normal metabolism. Dietary modification forms the cornerstone of management by restricting *Madhura*, *Guru*, and high glycemic index foods while encouraging the intake of *Laghu*, *Kapha-Medohara* foods such as *Yava, Mudga, Takra, Karavellaka,* and *Laja Mantha*. Owing to their predominantly *Laghu* and *Rukṣa Guṇa*, these foods help improve *Agni*, reduce *Kapha* and *Meda*, facilitate proper metabolism, and minimize excessive *Kleda*, thereby supporting glycemic control. The *Ayurveda* formulations selected in this case possess properties that complement these dietary measures. *Nishamalaki Vati*, predominantly having *Tikta* and *Kashaya Rasa*, *Laghu Guna*, and *Ushṇa Virya*, acts as *Dipana*, *Pachana*, *Kapha-Medohara*, and *Pramehahara*. It enhances *Agni*, improves insulin sensitivity, reduces oxidative stress, and supports normal glucose metabolism. *Asanadi Kashaya*, with its *Tikta-Kashaya Rasa*, *Laghu Guna*, and *Kapha-Medohara* properties, promotes *Agni Dipana*, reduces *Kapha-Meda Dushti*, clears obstructed *Srotas*, and helps maintain metabolic homeostasis. *Arogyavardhini Vati*, characterized by *Tikta-Katu Rasa*, *Laghu Guṇa*, and *Ushna Virya*, improves both *Jatharagni* and *Dhatvagni*, thereby correcting metabolic dysfunction, reducing *Ama* formation, and supporting physiological glucose metabolism. *Punarnava Mandura*, possessing *Tikta-Kashaya Rasa*, *Laghu*, and *Ushna Virya*, exerts *Kledahara*, *Shophahara*, and *Raktavardhaka* actions, thereby reducing edema, improving hematological status, and maintaining fluid balance during pregnancy.

In the present case, individualized dietary counselling, along with pregnancy-safe *Pramehahara Shamana Chikitsa* comprising *Nishamalaki Vati, Asanadi Kashaya, Arogyavardhini Vati,* and *Punarnava Mandura*, may have helped improve *Agni*, reduce *Kapha-Meda Dushti* and excessive *Kleda*, and maintain satisfactory glycemic control throughout pregnancy. These interventions, combined with regular antenatal surveillance, blood glucose monitoring through SMBG and CGM, and timely obstetric care, contributed to a favourable maternal and neonatal outcome with the delivery of a healthy term male baby.

Postpartum care & counselling: From an *Ayurveda* perspective, *Sutika Paricharya* plays an important role in restoring maternal health, correcting *Agni*, and maintaining *Dosha* equilibrium.[26] In women with GDM, classical *Sutika Paricharya* should be modified by avoiding excessive *Guru*, *Snigdha*, and *Madhura* dietary regimens, while emphasizing balanced nutrition, gradual physical activity, and continued glycemic monitoring. Once the puerperal period is complete and the mother has regained adequate strength, appropriate *Panchakarma* may be considered according to *Ritu*, *Dosha*, and individual assessment to promote long-term metabolic health. In the present case, continued adherence to *Pathya Ahara*, *Vihara*, postpartum glycemic follow-up as mentioned in postpartum counselling earlier, and individualized *Sutika Paricharya* may help sustain the glycemic control achieved during pregnancy, reduce the risk of progression to type 2 diabetes mellitus, and prevent recurrence of GDM in future pregnancies.

6 CONCLUSION

Gestational Diabetes Mellitus is a challenging metabolic disorder of pregnancy that demands timely diagnosis, close maternal and fetal monitoring, and appropriate therapeutic intervention to achieve favourable pregnancy outcomes. While contemporary obstetrics provides reliable tools for diagnosis and surveillance, the principles of Ayurveda offer a holistic and individualized approach to the management of *Garbhini Prameha*.

The management of *Garbhini Prameha* should be planned after careful assessment of *Dosha, Dushya, Agni, Kala,* and the physiological changes occurring during pregnancy. Appropriate modification of *Garbhini Paricharya*, along with *Nidana Parivarjana*, individualized *Pathya Ahara*, pregnancy-compatible *Pramehahara Shamana Chikitsa*, and suitable lifestyle measures, can help maintain maternal metabolic balance while supporting normal fetal growth and development. Women with pre-existing PMOS require special attention, as persistent metabolic disturbances and continued *Nidana Sevana* may increase their susceptibility to GDM during pregnancy.

In the present case, Ayurvedic management was planned according to these principles, while contemporary obstetric guidelines were followed for diagnosis, glycemic assessment, and maternal-fetal surveillance. The individualized treatment protocol, regular dietary counselling, close blood glucose monitoring, and timely obstetric follow-up helped maintain satisfactory glycemic control throughout pregnancy and resulted in the delivery of a healthy term neonate without major maternal or neonatal complications.

Although conclusions cannot be drawn from a single case, the clinical outcome suggests that a well-planned, *Yukti*-based *Ayurveda* approach (*Yuktivyapashraya Chikitsa*) may be beneficial in the management of *Garbhini Prameha*. Further prospective clinical studies with larger sample sizes are needed to strengthen the evidence and better define the role of Ayurvedic management in women with GDM.

STATEMENTS ON COMPLIANCE WITH ETHICAL STANDARDS

Disclosure of conflict of interest

The authors declare no conflicts of interest regarding this manuscript.

Statement of informed consent

Informed consent was obtained from the patient.

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