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A rationale approach to Gestational Diabetes Mellitus through Ayurveda - Case Series

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ABSTRACT

Introduction: Gestational diabetes mellitus results in stages of carbohydrate tolerance levels with its first onset during pregnancy. This happens due to the alterations in the glucose metabolism during pregnancy. The incidence of diabetes complicating pregnancy has increased approximately 40% from 1989-2004. The increasing prevalence of type-2 diabetes in pregnant younger women has led to adverse maternal complications and fetal mortality and morbidity. **Methodology:** Here is a case series of 3 primigravida patients admitted in the In-patient department of *Prasuti Tantra & Stree Roga*, SDM Hospital, Hassan, 2 of these patients in 2nd trimester and 1 patient in 3rd trimester with increased blood glucose levels first diagnosed during pregnancy. They were given *Ahara, Vihara* and *Aushadha* as per principals of *Ayurveda*, *Nishamalaki* tablet and *Asanadhi Gana Kashaya* was given in same quantity and duration. Regular diabetic chart was maintained in the In-patient department and alternative day blood sugar levels were measured. **Discussion:** The holistic approach of treating gestational diabetes mellitus with Ayurveda utilizing the concept given by *Acharyas* have shown good results in patients paving the way in controlling the blood sugar levels and preventing the complications caused by GDM on both mother and the fetus. There was reduction in the blood glucose levels and no complications were noticed during delivery. Hence here is an article regarding rationale approach to GDM through *Ayurveda*.

Key words: *Gestational Diabetes Mellitus, Ayurveda, Garbha Avastha Janya Prameha, Case Series.*

INTRODUCTION

Diabetes is one of the common complications of pregnancy. Women can be classified into two categories - Pregestational/overt in whom diabetes is recognized before pregnancy and the other in whom diabetes is recognized in pregnancy.^[1] Gestational diabetes mellitus is defined as severe stages of

glucose intolerance which first appears in pregnancy, because of physiological changes in glucose metabolism during pregnancy. Pregnancy causes a diabetogenic state because decreased sensitivity to the action of insulin due to the placental hormones such as cortisol, HPL, prolactin etc. and there is tissue insulin insensitivity.^[2] Insulin resistance is an impaired response to insulin that characterizes normal pregnancy. The physiologic result of insulin resistance is an increase of insulin secretion by the pancreatic β cells. The same metabolic changes characterize obesity, a well-known factor on the path of the metabolic syndrome to the end point of type 2 diabetes mellitus. Women with GDM are unable to increase insulin production to compensate for the increased insulin resistance. Insulin resistance and the relative insulin deficiency due to the pancreatic β -cell deterioration are the primary metabolic changes in GDM, and same process occurs in prediabetes stages of type 2 diabetes mellitus. Gluconeogenesis is

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increased as a result of hepatic insulin resistance and relative insulin deficiency.^[3]

Incidence and prevalence of gestational diabetes mellitus

The prevalence of diabetes is increasing globally and India is no exception. The 1997 WHO estimates of the prevalence of diabetes in adults showed an expected total rise of > 120% from 135 million in 1995 to 300 million in 2025.^[4] These numbers also include GDM, and should alert physicians to the need to direct special attention to this population, especially in developing countries. In 1995 the world had seen 118 million gestational diabetes mellitus and in 2010 it was 221 million. It was increased by 87%. In India 6.2 million live births are affected by hyperglycemia in pregnancy. Of which 5.9 million are due to gestational diabetes mellitus.^[3]

The increasing prevalence of type-2 diabetes mellitus in general and in younger people in particular has led to an increasing number of pregnancies^[5] with complications, adverse maternal effects including an increase in frequency of gestational hypertension and cesarean delivery.^[6]

Pregnant lady who is obese, maternal age <30yrs, with past history of GDM, family history of DM/GDM, history of PCOD, persistent glycosuria, a history of delivering a baby with birth weight \geq 4kg, history of recurrent abortions, unexplained stillbirths, gestational hypertension should be screened for glucose during pregnancy.

Glucose screening is done as a routine investigation during ANC visit, during first month the presence of glycosuria and elevated RBS levels are checked and if there is risk for GDM the glucose screening is done by OCGT (oral glucose challenge test) and GTT (glucose tolerance test) by oral intake of glucose and testing for the elevated blood glucose levels in the maternal blood and urine during 24-28 weeks of gestation.

Understanding of Gestational diabetes in Ayurveda

Vyaadi

Direct references of *Garbhini Prameha* (Gestational Diabetes Mellitus) is not described in *Bruhat Trayee*

and *Laghu Trayee*. Scattered references are found in classics.

Maternal nutrition plays an important role in fetal growth and development. Food taken by the *Garbhini* serves three main purposes; it helps in proper growth of the fetus, maintaining maternal health for her and for lactation after childbirth. By the proper *Ahara Rasa*, *Raktadhatu* produced from it indirectly forms the *Apara* (placenta) and from *Rasadhatu Garbha Nabhi Nadi*.^[7-8] Hence the right diet is considered the most important factor .

If the *Garbhini Stree* consumes more of *Kapha Vardhaka Ahara*, *Ati Madhura Sevana* without considering the quantity (*Matra*) and *Agni*^[8] along with *Viharas* such as *Adyashana*, *Diwasapna* causes *Atisantarpana* state; it leads to *Agni Dusti* causing *Ama Utpatti* and there will be *Uttarottara Dhatu Dusti*, and causes *Medha Dusti* leading to *Prameha* and symptoms such as *Prabhuta Avila Mutrata*, *Ksuda Atimatrata* etc. Hence if there is any vitiation of *Dosha* or *Abhighata* during pregnancy, the same *Bhaga Doshana* occurs in *Garbha* has been explained (*Medha Dusti* creates *Prameha* in the mother and as well *Medo Dusti* in the *Garbha*.)

While explaining about *Garbhopaghatakara Bhava*, daily consumptions of *Madhura Rasa* lead to *Premea* and *Atisthulata* of *Garbha*.^[10]

Lakshanas

While describing the *Lakshanas* of *Garbha Vrudhi*,^[11] “*Vivrudham Garbham Ati*” meaning *Visheshena Vrudhi*; has been described which denotes the increase in the size of the body parts (macrosomia) and further adds that the labor becomes difficult in such cases.^[12]

Chikitsa Siddhanta

Acc to *Kashyapa* for *Jwaradi Vyaadhis* occurring in pregnancy, *Sukshma Chikitsa* has to be done with protection of the fetus and mainly *Santarpana Chikitsa* to be followed.

The main principal treatment of *Garbhini Paricharya* explained in classics focuses on *Santarpana* in which *Tridosha Shamaka Ahara*, *Vata Anulomaka* and *Kapha*

predominant *Ahara* such as *Madhura Rasa*, *Ksheera*, has been advised which are *Prithvi Mahabhuta* predominant and helps in the growth of the *Garbha*. *Garbhini* should also consider her *Agni* status and consume food in proportionate quantity^[9] (acc to *Desha* and *Kala*).

MATERIALS AND METHODS

Here is a case series of 3 *Primipara* patients presented in the inpatient department of *Prasuti* and *Stree Roga* of Sri Dharmasthala Manjunatheshwara Hospital, Hassan.

Case 1	Case 2	Case 3
Primi	Primi	Primi
Age - 28yrs	Age - 22yrs	Age - 26yrs
H/O Amenorrhea since 8months	H/O Amenorrhea since 6 months	H/O Amenorrhea since 7 months
C/O increased frequency of micturition since 15days	on ANC screening found to be increased blood sugar levels	Diagnosed with GDM since 4 months
H/O past illness - K/C/O hypothyroidism (under medications)	Family history - all are said to be healthy	Family history - All are said to be healthy
Family history - all are said to be healthy	Admitted on 28/9/19	Admitted on 29/8/020
Admitted on 22/4/19	LMP - 6/4/020	LMP - 15/2/020
LMP - 27/8/18	EDD -13/1/020	EDD - 22/11/20
EDD - 4/5/19	POG - 26weeks 2 days	POG - 26weeks 6days
POG - 35weeks 2days		
Vayaktika Vrutanta	Vayaktika Vrutanta	Vayaktika Vrutanta
Appetite - Increased	Appetite - Good	Appetite - Good
Bowels - Normal	Bowels - Regular	Bowels - Regular
Micturation - Increased in frequency	Micturation - Increased in frequency	Micturation - Increased in frequency
Sleep - sound	Sleep - sound	Sleep - Sound

Gynecological history	Gynecological history	Gynecological history
M.C - Regular	M.C - Regular	M.C - Regular
General examination	General examination	General examination
G.C - Fair	G.C - Fair	G.C - Fair
Wt - 71kgs	Wt - 62kgs,	Wt - 82kgs
Ht - 152cms	Ht -155	Ht - 172cms
BMI - 30.7 (obese class 1)	BMI - 25 (overweight)	BMI - 27.7 (overweight)
Dashvidha Pareeksha Bhava	Dashvidha Pareeksha Bhava	Dashvidha Pareeksha Bhava
<i>Prakruti - Kapha Pitta Prakruti</i>	<i>Prakruti - Vata Pitta Prakruti</i>	<i>Prakruti - Kapha Vata Prakruti</i>
<i>Vikruta - Kapha Pradana Tridosha</i>	<i>Vikruta - Kapha Pradana Tridosha</i>	<i>Vikruta - Kapha Pradana Tridosha</i>
<i>Sara - Meda Sara Purusha</i>	<i>Sara - Rakta Sara Purusha</i>	<i>Sara - Meda Sara Purusha</i>
<i>Samhanana - Susamhita</i>	<i>Samhanana - Susamhita</i>	<i>Samhanana - Susamhita</i>
<i>Satmya - Madhura Rasa Satmya</i>	<i>Satmya - Madhura Rasa Satmya</i>	<i>Satmya - Madhura Rasa Satmya</i>
<i>Pramana - Supramanita</i>	<i>Pramana - Supramanita</i>	<i>Pramana - Supramanita</i>
<i>Satwa - Madyama</i>	<i>Satwa - Madhyama</i>	<i>Satwa - Avara</i>
<i>Ahara Shakti - Madhyama</i>	<i>Ahara Shakti - Madhyama</i>	<i>Ahara Shakti - Madhyama</i>
<i>Vyayama Shakti - Avara</i>	<i>Vyayama Shakti - Avara</i>	<i>Vyayama Shakti - Avara</i>
<i>Vaya - Yuvana</i>	<i>Vaya - Yuvana</i>	<i>Vaya - Yuvana</i>
Asta Sthana Pareeksha	Asta Sthana Pareeksha	Asta Sthana Pareeksha
<i>Nadi - 94bpm</i>	<i>Nadi - 72bpm</i>	<i>Nadi - 76bpm</i>
<i>Mala - Prakrita</i>	<i>Mala - Prakrita</i>	<i>Mala - Prakrita</i>
<i>Mutra - Increased in frequency</i>	<i>Mutra - Increased in frequency</i>	<i>Mutra - increased in frequency</i>
<i>Drik - Prakrita</i>	<i>Drik - Prakrita</i>	<i>Drik - Prakrita</i>
<i>Akruti - Prakrita</i>	<i>Akruti - Prakrita</i>	<i>Akruti - Prakrita</i>
<i>Sparsha - Prakrita</i>	<i>Sparsha - Prakrita</i>	<i>Sparsha - Prakrita</i>
<i>Jihwa - Lipta</i>	<i>Jihwa - Alipta</i>	<i>Jihwa - Lipta</i>

Investigations	Investigations	Investigations
On 22/4/19	On 28/9/19	On 24/08/20
FBS- 164.3mg/dl	FBS- 270mg/dl	FBS - 234mg/dl
FUS- traces	FUS 1%	FUS 1.5%
PpBS- 241.8mg/dl	PPBS-373mg/dl	PPBS - 309.9mg/dl
PPUS- 0.5%	PPUS- 1%	PPUS -2.0%

Nidanas

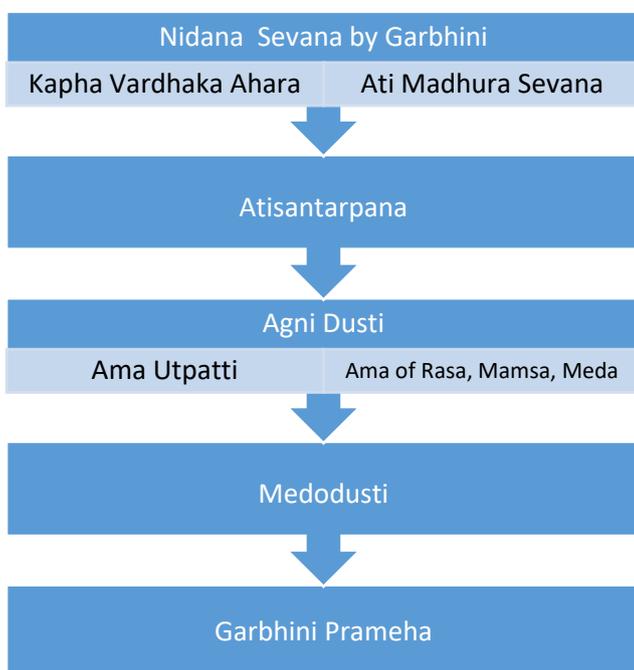
Due to excessive consumption of *Atisantarpita Ahara, Adhika Madhura Rasa Sevana, Kapha Pradhana Ahara Sevana, Adyashana, Diwaswapna* and other *Kapha Prakopaka Ahara Vihara Sevana* leads to *Atisantarpana*.

Purvarupa: *Shrama, Dourbalya.*

Rupa: *Prabhuta Avila Mutrata*

Samprapti Ghatakas

- *Dosha - Kapha Pradhana Tridosha*
- *Dushya - Rasa, Rakta, Mamsa, Meda*
- *Agni - Jataragni*
- *Ama - Jataragni Janya Ama*
- *Srotas - Medovaha Srotas*
- *Srotodusti - Atipravrti and Sangha*
- *Udbhava Stana – Ama Pakvashaya*
- *Vyakta Stana - Sarva Deha*
- *Rogamarga - Madhyama Roga Marga*



TREATMENT GIVEN

Ahara - Diabetic Diet

Timings	Kalpna	Quantity
8:30 AM	<i>Mudga Amalaka Yusha</i>	300ml
11.00 AM	<i>Methi Siddha Takra</i>	250ml
1.30 PM	<i>Yava Rotika + Veg Palya</i>	2 quantity
4.00 PM	<i>Ragi Peya</i>	300ml
7.00pm	<i>Veg soup / boiled vegetables</i>	1 bowl

Aushadha

Medicines	Dosage	
1) <i>T. Nishamalaki</i>	1-0-1	Before food
2) <i>Asanadi Gana Kashaya</i>	3tsp - 0 - 3tsp	Before food
Along with regular ANC medications		

After Treatment: Report of the 3 cases after following *Ahara, Aushadha* and *Vihara*

Investigations	Investigations	Investigations
On 26/4/19	On 11/10/19	On 28/04/20
FBS - 104mg/dl	FBS - 148mg/dl	FBS - 191mg/dl
FUS- absent	FUS traces	FUS 1%
On 29/04/19	PPBS - 181mg/dl	PPBS - 283mg/dl
FBS - 158.6mg/dl	PPUS- traces	PPUS-2.0%
FUS- absent		

RESULTS

Case 1

Before Treatment	After Treatment
On 22/4/19	On 26/4/19
FBS - 164.3mg/dl FUS- traces	FBS - 104mg/dl FUS- absent

PPBS - 241.8mg/dl PPU5 - 0.5%	On 29/04/19
	FBS- 158.6mg/dl FUS- absent

Case 2

Before Treatment	After Treatment
On 28/9/19	On 11/10/19
FBS - 270mg/dl FUS 1%	FBS - 148mg/dl FUS traces
PPBS - 373mg/dl PPU5- 1%	PPBS - 181mg/dl PPU5- traces

Case 3

Before Treatment	After Treatment
On 28/9/19	On 28/04/20
FBS - 270mg/dl FUS 1%	FBS - 191mg/dl FUS 1%
PPBS - 373mg/dl PPU5- 1%	PPBS - 283mg/dl PPU5-2.0%

There was marked decrease in the symptoms and laboratory investigation after following the *Ahara*, *Vihara* and *Aushadhi* principals as per *Ayurveda*.

DISCUSSION

Garbhini should be treated with utmost care, she has to be considered as the pot filled with oil and slight disturbance leads to spillage of the oil.^[13] Similarly slight alteration in *Ahara*, *Vihara* and *Aushadha* leads to complications of pregnancy.

Management of *Gasbhaavstajanya Prameha* should be done by proper assessment of *Dosha*, *Dushya*, *Agni*, *Prakruti*, *Kala*, *Vaya*. The risk group should be identified as prior as in Pre-Conceptional period and proper *Garbhadhana Samskara* should be provided as per classics;^[14] this is helpful in preventing gestational diabetes mellitus. Later on, proper *Garbhini Paricharya* with Do's and Don'ts of the *Garbhini* should be followed. *Prameha* should be treated for pregnant and non-pregnant women on the same principles as explained in the classics. Careful management by protecting the *Garbha* and *Garbhini* treatment should be given.^[15]

For proper development of *Garbha*, pregnant lady should take proper *Hita Ahara* and avoid *Vidahi*, *Dwidala Anna*, *Guru Ahara*, and *Ati-Tarpana Ahara*

should be avoided as it hampers the glucose metabolism.

Discussion on Ahara

The proper *Ahara* consumed in proper manner helps in the proper growth of the body. On other side if taken in improper manner leads to various kinds of diseases. All types of diseases can be cured without any type of medicine by just following wholesome regimen. Whereas even hundreds of medicines cannot cure a disease in absence of wholesome regimen.^[16]

An optimal diet for a pregnant woman with GDM provides adequate nutrition for fetal growth and maternal health while minimizing hyperglycemia and excessive weight gain. Carbohydrate containing foods have the greatest impact on postprandial blood glucose levels. Nevertheless, carbohydrate containing foods can be important sources of energy, vitamins, minerals, and fiber. It is recommended that women with GDM to consume at least 175 g of carbohydrate per day according to the Institute of Medicine Dietary Reference Intakes.^[17]

A major focus of medical nutrition therapy for GDM is modifying both the carbohydrate content and type of the meal plan to achieve and maintain normoglycemia while ensuring that nutrient needs are met. Distributing the carbohydrate intake throughout the day in three small-to moderate meals and two to four food items are recommended. In *Prameha*, the *Pathya* recommended are *Mantha*, *Amla*, *Masura*, *Mudga* and similar *Laghu Pathya*.^[18] Among *Shaka Varga* all vegetables except tubers are advised and in *Dhanya Vargas Mudga*, *Methika* is recommended and in *Phala Varga* fruits like *Dadima*, *Amalaki*, in *Mamsa Rasa Jangala Mamsa* is recommended.^[19]

Food items that contain greater than 5g of carbohydrate per serving (such as fruits, milk, grain products, starchy vegetables, and concentrated sweets) have the potential to increase blood glucose levels.^[20]

Here for the 3 patients the diabetic diet was planned and given timely. For morning breakfast *Yusha*

prepared with *Mudga* and *Amalaki* is given. *Acharya Shrangdhar* described the *Yusha* recipe as one *Pala* of *Dravya* (like *Kulatha*, *Mudga*) mixed with half *Karsha* of *Shunthi* and *Pippali Churna* and boiled in one *Prastha* or 16 times of water.^[21] *Mudga* (Green gram) - *Mudga* is the best among *Shimbhi Dhanya*. It is rich in iron (3.9 mg/100 gm) and potassium (1150 mg/100 gm). *Mudga* is best among pulses utilized in the form of soup.^[22] Many pulses have *Kaphamedohara* property and is considered as *Pathya* in *Prameha*. *Amalaki* alleviates *Tridoshas* and specially normalizes *Pitta Dosha*. *Vagbhata* describes *Amalaki* as the best drug for *Prameha* (diabetes) along with *Haldi* (turmeric). It is very rich in Vitamin C and contains many minerals and vitamins like Calcium, Phosphorus, Iron, Carotene and Vitamin B Complex. *Amalaki* is also a powerful antioxidant and acts as an Antiaging agent.^[23]

Later at 11.00 am *Methi Siddha Takra* was given. *Methika* is pungent, *Laghu* (light), *Snigdha* (unctuous) in nature, and hot in potency, best *Vatashamaka* and can be indicated in *Vataja Prameha*, including *Madhumeha*. Leaves, seeds, are common ingredients of daily Indian diet. It is found to have hypoglycemic, hypocholesterolemic property on pharmacologic screening. 25 Clinical studies carried out on *Methika* (fenugreek) seed powder in the dose of 9 g/day for 3 months, shown significant decrease in blood sugar levels, serum cholesterol, and triglyceride values.^[24-25]

For lunch *Yava Rothika* was prepared and given. *Yava* (Barley), which is high in fiber content (4g in 100g) among all relative grains, is highly recommended in Diabetic diet in different forms. *Ruksha* (dry) and *Kaphashamak* (pacifies vitiated *Kapha*) properties of *Yava* support its role on Diabetes. Use of the mixture of whole *Atta* of barley and wheat is considered *Kaphashamak* and is recommended for diabetics. Many recent researches also proved its efficacy in diabetes. Hence, found especially suitable cereal for diabetes mellitus.^[27]

Evening at 4.00pm *Ragi Peya* was given. *Ragi* (*Eleusine coracana*) is a minor millet utilized by the economically weaker section of the population

specifically with the aid of south India rural folk. The administration of *Peya* after main treatment procedure helps to achieve *Agni Deepana* and *Vata Anulomana* as well as sustaining the effect of treatment.

Discussion of *Aushadha*

The three pts were administered *Nishamalki* tablets and *Asnadi Gana Kashaya*. Here *Nishamalaki* is a compound formulation of *Nisha* and *Amalaki* is termed as "*Nishamalaki* and is recommended in Ayurvedic classics, proven efficacious and widely practiced in the management (treatment, prevention of complications) of *Madhumeha*. *Nishamalaki* is helpful for attenuation of hyperglycemia like insulin mimetic property, enhancement of peripheral tissue glucose uptake, improvement of insulin sensitivity, regulation (reduction) of Hepatic glucose production, regulation of glucose production by kidneys etc. in acute control of blood sugars as well as control of blood sugars upon long term administration along with prevention of diabetic complications (microvascular and macrovascular) apart from merely controlling hyperglycemia by many mechanisms like antioxidant property, improvement in Insulin sensitivity etc.^[28-29]

Asnadi Gana Kashaya: it contains drugs such as *Asana* (*Pterocarpus marsipium*), *Tinisha* (*Ogenia dalburgirides*), *Bhurja* (*Betula utilis*), *Meshashrunji* (*Gymnema svestris*), *Daruharidra* (*Berberis Aristata*). All these drugs are *Kashaya Rasa*, *Laghu Ruksha Guna*, *Sheeta Virya* and *Katu Vipaka* indicated in *Prameha*, *Medo Roga*.^[30]

This *Kashaya* was administered 3tsp three times a day before food.

CONCLUSION

The holistic approach of treating Gestational Diabetes Mellitus with *Ayurveda* utilizing the concept given by *Acharyas* have shown good results in patients paving the way in controlling the blood sugar levels and preventing the complications caused by GDM for reducing maternal mortality and morbidity rate.

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