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Conceptual study of Gestational diabetes mellitus (GDM) and pre GDM condition in trail of *supraja*

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ABSTRACT-

In this era altered life style many problems arise during pregnancy, due which obtaining a *supraja* i.e., healthy progeny is very difficult. Gestational diabetes mellitus is one of the burning problems. The abnormal glucose tolerance during pregnancy is associated with high risk for mother and child with poor outcome like miscarriage, stillbirth, heavy birth weight neonates, congenital malformations which will be morally and socially demanding. These depends upon directly on control over blood sugar levels. The short-term intensive care given by expert team give a long term pay off in avoiding these problems. Early detection, pre conceptional care in known diabetic, proper meal plan, insulin treatment, keeping euglycemia, periodical monitoring of mother and fetus health is the main line of treatment by modern science. Ayurvedic fundamentals of *dincharya*, *rutucharya*, diet and *yoga*, *shodhana* can be applied successfully in case of GDM. This review article will give strategic insight from various literature of modern science and *Ayurveda*.

Key words- *Diabetes, Pregnancy, GDM, yoga*

INTRODUCTION-

Diabetes is leading problem in today's era. As we all know lifestyle changes very much, People become inactive towards exercise, healthy food habits and *shodhana* mentioned in *Ayurveda*. This manifest many diseases; diabetes is one of among them. diabetes is actually a metabolic dysfunction where blood sugar level remains high. In a diabetic patient develop various complications over the period like heart disease, chronic kidney disease, retinopathy, neuropathy.

In females if pregnancy and diabetes come together worsen the condition. As per WHO definition of GDM is carbohydrate intolerance results in hyperglycemia of variable severity with onset or first recognition during pregnancy [1]. When a known diabetic female conceives it is named as pre gestational diabetes mellitus (pre

GDM) [2]. the prevalence of Diabetes among the women in reproductive age is rising also there is increased number of cases of GDM i.e. gestational diabetes mellitus. Prevalence of GDM in India's various area is between 4% to 14% [3-8].

During ANC there is continuous change in mothers' carbohydrate metabolism. Insulin resistance due to placental hormones raise the insulin secretion as pregnancy advances. Gestational Diabetes develops when this compensation fails to provide required quantity of insulin [9]. Increase in age and obesity on maternal side are significantly aggravates the situation.

Maternal and fetal complications and comorbidities are directly related to the degree of hyperglycemia. Specifically involves the risk of spontaneous abortion, still birth, pre-eclampsia, fetal anomalies, macrosomia, and hypoglycemia, hyperbilirubinemia, respiratory distress syndrome in neonates [10]. Chances of obesity, hypertension and DM in offspring increases as well.

It very important to counsel before conception to avoid such complications due to GDM and pre GDM. Pre conceptional care should be taken in terms of controlling BSL and HbA1c for known cases of DM. blood sugar levels should be monitored periodically and strictly maintained in target range for pregnancy. Lifestyle behavior should be changed to support the medicine treatment. Splitting breakfast in two halves, instead of taking single time full quantity, and Appropriate meal plan can help [11]. Insulin and OHA drugs need to continue throughout pregnancy. Routine fetal growth monitoring might help in avoiding complications.

In *Ayurveda* there is no direct reference for GDM. *Garbha vridhi* (Macrosomia) is mentioned one of the complications which causes difficulty in *prasuti* (delivery) [12]. To avoid complications of GDM we can used ayurvedic medicine, diet mentioned in *prameha* and exercise mentioned in *garbhini paricharya*. Combine therapy modern medicine and ayurvedic fundamentals may effectively reduce maternal with offspring complications, helps to produce *supraja* i.e., healthy progeny.

AIM-

To find out best way to avoid complication and obtain *supraja* (healthy progeny) in GDM and pre GDM.

OBJECTIVE-

To review the modern science concepts and *ayurvedic* fundamentals in managing GDM and pre GDM cases.

Need for study-

In present era due to sedentary life style there is increasing number of cases of GDM and Pre GDM which give rise to many complications in mother and child also, if remain unidentified and untreated.

MATERIALS AND METHODS-

The literature was searched related to diabetes, GDM, *prameha, garbhini*, etc. from various books, various review and research articles, case reports published. Related Information is gathered, assessed and summarized.

ETIOLOGY AND PATHOPHYSIOLOGY OF GDM-

- Sluggish first phase insulin release
- Autoimmune destruction of pancreatic beta cells
- Impaired beta cell function
- Increased insulin degradation
- Decreased tissue sensitivity to insulin
- Excessive insulin action resistance on glucose utilization due to placental hormones
- Not able to increase insulin secretion to overcome insulin resistance develops gestational diabetes

RISK FACTORS WHICH PROGRESS GDM TO T2DM AT POST-PARTUM-

- Degree of glucose tolerance during and after pregnancy
- Need for insulin therapy during pregnancy
- Elevated fasting plasma glucose more than 105 mg
- Obesity
- Choice of contraception

EFFECT OF GDM ON THE FETUS-

- Glucose is provided to fetus from placenta by the action of diffusion and amino acids by active transport
- Abnormal mixture of maternal nutrients modifies gene expression in fetal cells
- Trimester wise complication

In 1st trimester	In 2nd trimester	In 3rd trimester
growth retardation	Polyhydramnios	Hypoglycemia
Placental insufficiency	Hypertrophic cardiomyopathy	Hypocalcaemia
Malformations	Erythraemia	Hypomagnesemia
Fetal wastage	Pre-eclampsia	Hyperbilirubinemia
	Respiratory distress syndrome	Macrosomia
	Low IQ	Intrauterine death
	Fetal loss	

EFFECTS OF GDM ON MOTHER-

- Hypoglycemia
- Diabetic ketoacidosis
- Retinopathy
- Nephropathy
- Hypertension
- Diabetic gastropathy
- Polyhydramnios

SCREENING FOR GDM

Screening is very important because any unrecognized case may lead to perinatal fetal loss and complication. Ideally It should be done in every ANC.

Indications for GDM screening-

- Age >25 years
- History of DM in family
- Obesity (pre pregnancy BMI>25)
- History of PCOD
- Previous History of -unexplained perinatal loss
  - congenital malformation in infants
  - IUD
  - polyhydramnios
  - pre-eclampsia
  - large infant for gestational age

WHO criteria for diagnosis GDM (75 gm OGTT)-

2hr >200mg/dlDiabetes/pre-GDM

2hr >140mg/dlGDM
2hr >120mg/dlGestational glucose intolerance (GGI)

MANAGEMENT OF GDM–

Preconception counseling and care-

- Should be incorporated with routine diabetes care
- If found diabetic then Family planning should be advised to optimize HbA1C for pregnancy.
- Importance of achieving glucose level as close to normal as is safely possible (ideal HbA1C <6.5%)
- Women with preexisting diabetes – planning for pregnancy – ideally consult to endocrinologist, dietitian, diabetologist
- Standard preconception care should be augmented with focus on nutrition, diabetes education, screening for diabetic complication and comorbidity
- Should be screened for diabetic retinopathy, before pregnancy, in every trimester until 1 year postpartum

Glycemic targets in pregnancy-

- Self-monitoring of BSL fasting and PP are recommended in both GDM and pre GDM
- Mean blood plasma glucose level around 105mg%
- Fasting plasma glucose level < 95mg/dl
- 1hr PP glucose level < 140mg/dl
- 2hr PP glucose level < 120mg/dl
- HbA1C < 6% if this can be achieved without hypoglycemia
- HbA1C <7% relaxed if necessary to prevent hypoglycemia

Lifestyle behavior change-

- It is very essential component of management of GDM
- It may suffice for treatment in many women

Insulin therapy-

- Most preferred medication for GDM and pre GDM as first line treatment
- Metformin and Glyburide should not be used as 1st line agents as both cross placenta and enter in fetal circulation
- Pen injectors are very useful and the patient's acceptance is excellent.
- Combination of regular (1/3) and intermediate acting (2/3) insulin can be used effectively
- Euglycemia can be maintained with insulin administration after timely monitoring blood glucose.
- In woman with GDM does not require insulin once labor begins.

Medical nutritional therapy (MNT)-

- Nutritional counseling.
- Meal plan aims to provide required calories to provide proper nutrition for mother and fetus and to avoid excess weight gain and post prandial hyperglycemia.
- Splitting the usual breakfast into two equal halves, one portion should be taken at 8am and 10am which helps to avoid undue peak in plasma glucose levels after ingestion of total quantity of breakfast.

To manage Preeclampsia-

- Low dose aspirin 100-150 mg/day should be started at 12 to 16 weeks of gestation

To manage Hypertension-

- Pregnant patients with diabetes and known case hypertension target BP should be less than 140/90 mm/hg [13]
- Potentially harmful medications in pregnancy i.e., ACE inhibitors, angiotensin receptor blockers, statins should be stopped at conception

Postpartum care-

- Insulin resistance decreases immediately post-partum.
- Insulin requirements need to be evaluated and readjusted for initial few days post-partum
- OGTT test should be done and diagnosed with nonpregnancy diabetic criteria.
- Women with history of GDM if found to have prediabetes should receive intensive life-style interventions and metformin to prevent diabetes. And if found normal then should be screened in every three years
- Should include psychosocial assessment and support for self-care
- Lactation can increase risk of overnight hypoglycemia and insulin dosing should be adjusted
- Effective contraceptives should be used immediate post-partum period, and family planning option reviewed at regular intervals to avoid unplanned pregnancy.

GDM IN VIEW OF *AYURVEDA*-

In *Ayurveda* there is no direct reference of GDM and pre GDM. Only *garbha vriddhi* is described as a complication, due to this there is excessive increases in size of abdomen and difficulty in labor [14]. We can say that *garbha vriddhi* (over weight fetus) is due to GDM.

Measures for prevention of GDM by *Ayurveda*-

Every woman should be well physically and mentally to cope up stress of pregnancy. Acharya have suggested *shodhana* karma before pregnancy to increase the strength of body. To correct the problem and strengthen the *rutu, kshetra, ambu, beeja*; *shodhana* [15] and *punsanvahana* is described in *ayurvedic samhita*. *Punsanvahana* is recommended for healthy progeny itself [16]. Then month wise diet plan and medicine for pregnant woman for wellbeing of her and child. Basti karma is advised by acharyas during 8th and 9th month of pregnancy. In Ayurveda detailed management of diabetes by *aahara, vihara, aushadha chikitsa* is described very well [17].

***Aahar* advised by *Ayurveda* in *Prameha*-**

Vegetable	Bitter gourd, fenugreek, spinach, cucumber, radish, drumstick, broccoli
Pulses	Green gram, Bengal gram, chick pea
Cereals	Adequate quantity barley, oats, *shashtik shali*, pearl millet, less quantity- wheat
Fruits	Plum, kiwi, orange, guava, apple, peaches, gooseberry
Dry fruits	Almond, apricot, walnut
Spices	Turmeric, cinnamon, garlic, fenugreek seeds

Kashyapacharya - Lasunaksheerpaka, Satmya ahar sevan, dugha
Vagbhatacharya - Phala ghrita, mahakalyana ghrita, Jeevaniya gana dravya
Yogaratnakar - Shashtik shali, mudga, godhuma, laja, saktu, navaneeta, ghrita, amalaki, draksha

Vihar advised by _Ayurveda_ in _prameha_-

Yogasana - Siddhasana, shavasana, marjarasana, adho mukha sarvangasana, vajrasana,
Pranayama- ujjayi pranayama, bhramari pranayama, anuloma-viloma
Exercise – *chankramana*, moderate house work
Vihar should not be excess and harmful for pregnancy.

Ayurvedic supportive medicine [18]-

Singal drugs- *Musta, Daruharidra, Arjuna, Khadir, Lodhra, Guduchi, Patol, Vata, Udumbar, Gudmar, Asana, Shilajit, Kumbha* and *Mamejaka*.

Kalpa-

Arogyavardhini vati, Garbhapalarasa, garbha rakshaka Kashaya, khadiradi Kashaya, phala sarpi, chandraprabha vati, vasant kusumakar rasa, kathaka khadiradi Kashaya, maha tiktaka Kashaya, chandanasava, Asanadi Kashaya, Nishamalaki vati, Goranchi vati.

CONCLUSION-

According to modern science care should be taken earlier as possible as before pregnancy. During pregnancy maintaining euglycemia is the goal for avoiding complications in mother as well in child. So, *Ayurveda* also have recommended *shodhana*, medicine and diet for healthy pregnancy. If both are applied well then certainly results will be glorifying in condition like GDM and pre GDM.

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