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INTRAUTERINE GROWTH RESTRICTION – ITS REVIEW AND CORRELATION WITH *GARBHASHOSHA, UPAVISTHAK AND UPASUSHKAK* MENTIONED IN AYURVEDA

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ABSTRACT

Intrauterine growth restriction (IUGR) refers to inability of a foetus to achieve full growth potential while in utero where estimated foetal weight (EFW) is below 10th percentile. IUGR foetuses have substantial increase in perinatal morbidity (3 times) and perinatal mortality (8 times). Owing to its long term complications, the growth restricted foetus represents an enormous potential burden for the society.[1] The aim of the study is to review the literature of IUGR and co-relate it with *garbha shosha*, *upavishtak* and *upasushkak* mentioned in Ayurveda. The treatment of IUGR is according to the cause, the gestational age and the viability of the foetus. According to Ayurveda, IUGR due to maternal cause can be correlated with *garbha shosha* (drying of the foetus) mentioned by *Acharya Charak*. In this, *vata dosha* dries up the circulatory system of foetus. The treatment is to provide adequate maternal nutrition. Placental cause of IUGR can be correlated to *upavisthak/ upasushkak* mentioned by *Acharya Vaghbhat*. In this, vitiated *dosha* cause obstruction in the passage of blood vessels of the umbilical cord. The 3 types of *upavisthak-vataj, pittaj and kaphaj* can be correlated to the complications of IUGR which are maternal asphyxia, jaundice, severe anaemia respectively.

KEYWORDS: Intrauterine growth restriction, *upavisthak, upasushkak, garbha-shosha, Ayurveda,* low-birth weight.

INTRODUCTION

Various definitions for intrauterine growth restriction are as follows[2]

- Estimated foetal weight (EFW) < 10th percentile.
- Abdominal circumference (AC) below the 5th percentile.
- EFW < 10th percentile with abnormal Doppler indices in the umbilical artery or middle cerebral artery.
- Weight at birth < 2500 gms (low birth weight).

➢ Normal foetal growth pattern[3]

It occurs in 3 phases

1) First phase – between 4-20 weeks.
   Only hyperplasia because of rapid mitosis
2) Second Phase – between 20-28 weeks
   There is hyperplasia as well as hypertrophy of cells (mitosis starts decreasing, whereas cell size starts increasing.)
3) Third phase- this is the last phase from 28 weeks to term
   There is only hypertrophy of cells.

➢ Types of IUGR[4,5]

1) Symmetrical- if the pathology occurs in early foetal life (first 16 weeks), it affects the hyperplasia phase, and thus it will affect the growth of all organs of the body resulting in symmetrical IUGR.
2) Asymmetrical – If the insult occurs in later half of pregnancy, during the hypertrophy phase of foetal growth, there is redistribution of blood to vital organs like heart and brain whereas blood to other organs like liver and splanchnic circulation is decreased leading to asymmetrical IUGR.

Some differential features are

Features	Symmetrical	Asymmetrical
Cause	Congenital malformations, intrauterine infections	Maternal /Foetal/ Placental factors
Ponderal index	Normal	Low
USG parameters	HC, AC, FL and EFW below 10th percentile for GA	HC, FL normal, AC decreased. Brain sparing effect is seen.
Treatment Prognosis	Causative factor is usually not correctable.	Cause can be treated in most cases.

3) Another type- type 3 is also mentioned by some authors. It is known as intermediate or combined IUGR.

It contributes to 5% cases of IUGR

It affects hyperplasia and hypertrophy phase of cell growth

Has features of symmetrical as well as asymmetrical IUGR.

Carries worst prognosis

According to the period of onset of the pathology, some describe IUGR as.

Early onset IUGR- onset before 32 weeks

Late onset IUGR- onset after 32 weeks

- **Causes of IUGR**[6,7]

It can be grouped into 4 headings

1) MATERNAL

Low socioeconomic status

Maternal malnutrition

Drugs- warfarin, phenytoin

Addictions- smoking, alcohol, substance abuse

Pre-eclampsia, chronic hypertension causing uteroplacental insufficiency

Gestational diabetes mellitus

Thrombophilias

2) FOETAL

Chromosomal and genetic defects such as trisomy 18, 13, 21; Turner's syndrome.

Congenital infections – TORCH Infections, malaria, tuberculosis.

Structural anomalies- CHD, anencephaly, renal agenesis, inborn errors of metabolism

Multiple pregnancy.

3) PLACENTAL

Abnormal placentation conditions like placenta praevia, abruption placenta.

Placental abnormalities- circumvallate placenta, marginal, or velamentous insertion of cord.

Placental tumour – chorioangioma.

Single umbilical artery.

4) IDIOPATHIC – The cause of foetal growth restriction is unknown.

- **Diagnosis of IUGR**

CLINICAL DIAGNOSIS[8]

1) Measuring SFH (Symphysiofundal height)

Normally, SFH increases about 1 cm/week between 14-32 weeks

A lag of 4 cms or more certainly suggests growth restriction.

2) Measuring AG (Abdominal girth)

Measured at umbilicus in inches

AG increases by 1 inch/week after 3 weeks

If AG does not correspond to GA, then IUGR is suspected.

3) Maternal weight- If found inadequate or decreasing then IUGR is suspected.

- **Investigations**

1) Ultrasonography

AC < 10^{th} percentile

FW< 10^{th} percentile

HC/AC > 1, after 32 weeks (Asymmetrical IUGR)

HC/AC ratio normal in symmetrical IUGR

FL/AC > 0.24 (Asymmetrical IUGR)

Abdominal circumference and estimated foetal weight are the most accurate ultrasound parameters for diagnosis of IUGR.

It is the rate of growth that is more important than the absolute value at a given time.

Doppler ultrasonography is essential to evaluate placental disease and foetal compromise.

2) Other investigations

Hb, BSL, RFT,

Serology for TORCH

Specific investigations for thrombophilias if needed

3) Invasive investigations- Foetal blood sampling for karyotype and infection screen (IgM levels)

Amniocentesis for foetal lung maturity.

➢ **Management**[9]

There is no form of therapy currently available which can reverse IUGR, the only intervention possible is delivery.

1) Identify and treat the cause if found,
2) Modified rest (bed rest in left lateral position)
3) Maternal nutrition- high calorie and protein diet, antioxidants, hematinics and omega 3 fatty acids, arginine rich diet is given.
4) Maternal oxygen therapy – administration of hyperbaric oxygen at a rate of 8L/min round the clock.
5) Foetal surveillance- 2 weekly foetal assessment using DFMC, NST, Ultrasonography with colour Doppler.

Stage	Findings	Prognosis
Stage 0	EFW or AC < 10th percentile; umbilical artery and MCA Doppler are normal	Good (outpatient management)
Stage 1	EFW or AC < 10th percentile; abnormal umbilical artery and MCA Doppler	Good (delivery at 37 weeks gestation)
Stage 2	EFW or AC < 10th percentile; absent or reversed umbilical artery doppler flow	Moderate (inpatient management)
Stage 3	EFW or AC < 10th percentile; absent or reversed ductus venosus doppler flow	Poor (delivery at 32 weeks gestation)

➢ **Indicators for early delivery**

- Multi vessel doppler study and the biophysical profile score are abnormal
- Oligohydramnios
- Maternal status or obstetrical indications necessitate delivery
- None or poor foetal growth (on foetal surveillance)

In other words, if there is foetal growth; continue foetal surveillance until 38 weeks, then deliver. While considering early delivery, the risks of foetal death versus the hazards of preterm delivery must be considered.

Labour management

Vaginal delivery – can be allowed as long as there is no obstetric indication for caesarean section and foetal heart rate is normal.

Caesarean section – growth restricted foetus having hypoxia which is to be delivered on urgent basis may be delivered by caesarean section.

- **Complications of IUGR[10]**

1) Antepartum Complications - Oligohydramnios

Foetal distress

IUFD

2) Intrapartum Complications – Perinatal asphyxia

Intraventricular haemorrhage

Meconium aspiration

RDS

3) Long term complications - Cerebral palsy

Behavioural and learning problems

Altered postnatal growth

Obesity, insulin resistance, type 2 diabetes mellitus

Cardiovascular disease

- **AYURVEDIC CONCEPT**

1) IUGR due to maternal factors

Charaka - Garbhashosha[11]

- If food is not available for foetus then *garbha shosha* occurs i.e. foetal growth restriction occurs, *paristruti* i.e. miscarriage can occur.
- There is tendency of post-term pregnancy (as foetus becomes mature after a longer period of time)
- This condition is mentioned as *garbhashosha* by *Acharya charaka* can be correlated with IUGR due to maternal factors (e.g. malnutrition)

2) Symmetrical IUGR due to foetal factors

a) ***Acharya Sushruta - Vatabhipanna garbha*** (foetus that is hampered due to *vata dosha*)[12]

- This entity is mentioned by *Acharya sushruta*
- *Vata dosha* is the main causative factor causing *shosha* of *garbha.*

- This can be correlated with symmetrical IUGR
- *Acharya Dalhana* while commenting on the above *sloka*, has mentioned that
- due to the effect of *vayu*, the foetus has absence of *ojas*.
- *Dalhana* has further quoted *shuska garbha lakshan* of *Vruddha Kashyap* that- the *rasa* either flows slowly or does not flow in the *rasavaha nadi* of the foetus thus it develops very slowly.

b) According to *Acharya Vaghbhat*[13]

- *Vata dosha* does *shoshan* (dries up) *rasavaha strotas* i.e. circulatory system of the foetus
- There is tendency of post term pregnancy

➢ **Treatment**

As it is due to maternal malnutrition causing *vata prokop*, this *vata dosha* causes *garbha shosha*. So the treatment mentioned by *Acharyas* are *vata shamak* (drugs that pacifies *vata*) and *bruhana* (drugs that provide nutrition to the baby).

- Avoid dry food.[14]
- Use milk and meat soup. Milk should be prescribed as it provides nourishment and stability to the foetus.[15]
- Milk medicated with of *yastimadhu (*Glycyrrhhiza Glabra), fruit of *kashmari* (Gmelina Arborea) with *sariva* (Saraca Indica) and mixed with sugar should be prescribed. Meat soup of carnivorous animals mixed with *bruhaniya* drugs and fat should be given.[16]

Similarly in modern science, maternal nutrition is the treatment for IUGR due to maternal malnutrition. Maternal nutrition- high calorie and protein diet, antioxidants, hematinics and omega 3 fatty acids, arginine rich diet is given.

3) IUGR due to placental causes[17]

a) Upavisthak (asthang sangraha)

Big foetus that has crossed the age of viability, if the mother intakes the food that is contraindicated in pregnancy, then vaginal bleeding or other vaginal discharges start.

Vata aggravated due to this bleeding; withholding *pitta* and *kapha* compresses *rasavaha nadi* of the foetus. In the same way as the paddy does not develop properly if water does not reach the field due to obstruction with leaves, grass etc. similarly because of the obstruction to the *rasavaha nadi*, it causes improper flow of ras, the foetus does not grow properly and becomes *upavisthak* or *upasushkak.*

Here, *rasavaha strotas* can be correlated to umbilical vessels, so if they are obstructed, circulation becomes hampered, so growth restriction occurs.

Thus *upavisthak/upashukak* mentioned by *Acharya Vaghbhat* can be correlated to placental insufficiency with abnormal Doppler waveforms causing IUGR.

b) According to *Acharya bhel*[18]

The foetal circulation is markedly impaired due to obstruction in the *shira mukha* (umbilical vessels/chorionic villi).

This results in foetal growth restriction. This under developed foetus remains in the uterus for years just like the foetus of elephant.

Because of the bleeding per vaginum occurring after the foetus has become *jatasara* (i.e has completed 4 months of gestational age), it does not develop properly, gets desiccated and remains in the uterus.

There is tendency of post term pregnancy.

Thus this entity explained by *Acharya bhel* correlates with placental insufficiency causing IUGR.

➢ Complications as mentioned by Ayurveda[19]

Acharya vaghbhat after mentioning *upavisthak/upasushkak* has further explained as three types of the same. These types can be considered as complications of *upasushkak*. They are - 1) *vataj* 2) *pittaj* 3) *kaphaj*

a) Vataj upasushkak

The mother has following symptoms.

- Passage of liquid, fragmented, frothy stool with sound
- Retention of urine
- Back ache, pain in sacral and cardiac regions
- Yawning, insomnia,
- Severe coryza, dry cough and lassitude of body
- Feeling of iching like sensations in ears
- Pricking pain in temporal region
- Creeping of ants like sensation all over the body

- severe cutting like pain in abdomen
- syncope, drowsiness,
- loss of appetite,
- Body is gradually emaciated and skin becomes crackled, discoloured and rough.
- These symptoms can be correlated to maternal distress as a complication of IUGR.

b) Pittaj upasushkak

- The mother has following symptoms.
- Passage of coppery or green coloured stools
- Feels as if smoke is filling her mouth and throat
- Suffers from vomiting of acidic taste
- Unconsciousness
- Burning sensation over abdomen and cardiac region
- Eyes, mouth and nails become yellow, red or like cow's urine in colour
- Blackening of skin
- Weakness
- Continuous pain

These symptoms can be correlated to jaundice in pregnancy.

c) Kaphaj upasushkak

The mother has following symptoms

- Sweet taste of mouth
- Nausea
- Vomiting containing mucus
- Loss of appetite
- Salivation
- Cough
- Dyspnoea
- whiteness of extremities and eyes

This can be correlated to anaemia

➢ **Treatment of *upvisthak/upasushkak***

1) Oral administration of *Mahapaishachik ghrut, vacha ghrut.*[20]

2) *Acharya vaghbhat* has advised to use ghee with food, thus emphasizing on the importance of ghee as medicine as well as diet in *upavisthak*. Also, only medicated ghee can also be taken as food.[21]
3) Lastly, if in *upavisthak/upasushkak*, growth of the foetus is not occurring then by the use of pungent and purgative drugs, deliver the foetus irrespective of the gestational age.[22]
4) *Acharya dalhana* has mentioned to give *sheer basti* (enema with medicated milk) in 8th month. Also, he has advised intake of oleated food.
5) The meat of testicles of goat and eggs of fish are also indicated for use. This is due to the principle of Ayurveda- like increases like substances, so for the development of foetus, similar substances that contain eggs should be used.

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