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An Ayurveda perspective of development of fetus (Mamsanumasik Garbha Vriddhi) : A critical Review

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Abstract: Sushrut samhita is one of those Ayurvedic classic which deals with human anatomy and physiology. It gives precise description of Garbha vriddhi and vikas kram though there were no modern imaging techniques like sonography. Different Granthas state various views regarding Garbha utpatti and Garbha vriddhi Acharyas have also mentioned Garbhini lakshanawhich are helpful in diagnosis of early pregnancy. Charak has mentioned signs observed in Garbhiniwith progression of pregnancy. Whereas modern obstetrics is one of the most cardinal branches which concerned with human reproduction. This science provides each minute detail regarding foetal growth and development. Tremendous research hasbeen done in the field of modern obstetrics. Foetal deaths and neonatal mortality is always an issue of concern. One can get relevant references of these issues in Samhitas. Acharyas has mentioned topic of Garbhain concise form. Extensive study and discussion are essential to understand ancient concept of Garbhavikas. Review of Ayurvedic text along with modern text will help to obtain knowledge regarding this. This study is an attempt to elaborate and compare both ancient and modern concept of embryogenesis. There might be some variation when we consider both perspectives. But it is interesting to find similarities beside a huge gap of time.

KEYWORDS: Garbha vikas, Garbha utpatti, Garbha vriddhi

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INTRODUCTION:

Garbha gets the name of Sharira (physical body) when the amalgamation of Shukra, Shonita, Atma, Prakriti and Vikara in the Garbhashaya (uterus or womb). The knowledge of sharira begins with the knowledge of Garbha, which help to understand the conditions for the better management of pregnancy leading to the creation of healthy progeny and thus helps for the overall development of the whole society. Sushrut samhita is one of those Ayurvedic classic which deals with human anatomy and physiology. It gives precise description of Garbha vrudhhi and vikas kram in detail. According to Ayurveda, the union of shukra (spermatozoa), shonita (ovum) and Atma (soul) inside the uterus is known as garbha (embryo) ^[1]. The fertilization between Shukra and Shonita produces zygote which further develops into fetus. The Ritu, Kshetra and Ambu etc. play a vital role in the proper development of fetus. Different components originating from Five Elements takes part in the formation, development of the garbha. The whole process of development of the fetus from two cells to mature foetus is called Garbhavakranti. It includes the basis of the earliest embryology which was known to the

human being. In Ayurvedic texts the process of chronological development of the foetus is explained clearly. Extensive study and discussion is essential to understand ancient concept of Garbha vikas kram. Review of Ayurvedic text along with modern text will help to obtain knowledge regarding the fetal development. So the aim of study is an attempt to elaborate the concept of foetal development.

According to Ayurveda, the union of shukra (spermatozoa), shonita (ovum) and Atma (soul) inside the uterus is known as garbha (embryo). The linkage of prakriti (nature) and vikaras (variations) have the important impact besides the soul in the development of the foetus. Different components originating from Panchamahabhuta (Five Elements) takes part in the formation, development of the garbha. Similarly, some components of garbha (embryo) originate from the parents which are called as Matrija and Pitrija bhava ^[2] Atma and Sattva also have their roles in the development of the foetus as some of the qualities like memory, determination, knowledge, longevity and pride, birth in specific species, happiness are found to be arising from it. There are some differences between the opinion of Acharya

charaka and shushruta but the basic principles underlying the foetal development are similar. The whole process of development of the foetus from two cells to mature foetus is called Garbhavakranti. Garbhavakranti includes the basis of the earliest embryology which was known to the human being. In the Ayurvedic texts the process of monthly development of the fetus is explained clearly.

MATERIAL AND METHODS:

Ayurvedic Samhita and their commentaries, modern medical text books and published research papers, Articles, Medical journals and Internet

Type of study: Literary review study.

Masa-anumasika garbha vridhhi krama-

First month:

“Tatra prathame masi kalalam jayate”

According to charakacharya the spirit having no become the embryo in the first month after the conception being well compounded and tinged with all the elements, which appears as jelly like mass of no particular shape and with limbs emergent and latent. [3] Sushrutacharya and vagbhatacharya mentioned the shape of Kalala in the first month. [4] Acharya Harita explained the subject says that shukra after its union with

shonita attains the form of kalala during the first day itself. After ten days it becomes Budbuda, in fifteen days Ghana, in twenty days it becomes Mamsapinda and in twenty five days it become associated with all the Panchmahabhutas and by the end of the one month all the Tatva (Panchmahabhutas) become more conspicuous. [5]

Second month:

“Dvitiye

sitosmanilairabhiprapachyamananam

mahabhutanam sanghato ghana sanjayate, yadi pindah puman, stri cet pesi, napunsakam cedarbudamiti”

According to charakacharya during the second month that Kalala becomes hard mass due to aggregation of Panchmahabhutas getting cooked by cold (kapha), heat (pitta) and Anila (vata). If this mass assumes a round shape it will grow as a male fetus, if it assumes an elongated shape like muscles it will grow as a female fetus and if it like an arbuda (mass of irregular shapes) then it will grow as eunuch. [6] Sushrutacharya stated that the jelly like mass hardens into the form either of a knot or a tendon or an egg. Of these the knot shaped is male, the tendon shaped is female and egg shaped is eunuch. [7]

In Harita samhita it has been said that the Garbha after attaining the growth of fifty days old exhibit the probability of sprouting organs on the body surface. [8]

Third month:

“Tritiye hastpadasirasam panchapindaka nirvantante angapratyangavibhagasca sukshmobhavati”

Anga means shadangas or 6 parts i.e. two upper limbs, two lower limbs, trunk (Thorax and abdomen) and head. Pratyanga means the organs located in these six angas. In the third month of pregnancy five buds (pindaka) are formed. These buds represent the formation of 4 limbs (two upper limbs and two lower limbs) and head respectively. The anga-pratyanga begins to form but all these are in miniature form. The foetus takes the shape of human outline. It is also an important phase in development of heart. Diet factor is essential in this month [9][10]

Acharya Harita mentioned that during third month of gestation the fetus give rise to Hasta, Paada and third and half month Shira in goes to Sarvada [11]

Acharya Kashyapa describes that all the Indriyas and organs forms simultaneously in the third month of gestation in respective order. The initiation of Spandan(movement),

Chetana(consciousness), Vedana(pain) and the mind of fetus is more active to Sukha and Dukha in the third month [12]

Fourth month:

“Chaturthesarvangapratyangavibhagahprav yaktobhavati,
garbhahridayaprayaktibhavaccetanadhatur abhivyakto bhavati, kasmat? Tatsthanatvat tasmadgarbhascaturthe

masyabhiprayamindriyarthesu karoti, dvihridayam ca narim dauhrdinimacaksate”

According to charakacharya and Acharya Kashyapa in the fourth month the fetus becomes stabilized, consequently the pregnant woman shows a pronounced increase in the body weight

[13] Acharya Sushruta has mentioned that in the fourth month of gestation all the major and minor parts become clearly demarcated. Because of clear development of the heart of the fetus, Chetana dhatu (conscious spirit, Atma or soul) becomes expressive of desires. Why so? Because of the heart being his seat (of Atma/soul). Hence in this month the fetus expresses desires in the objects of the sense organs. The pregnant woman thereafter called as Dauhridini because of having two hearts. By not fulfilling these desires, the woman will give birth to a child who is either

a hunch-back, of distorted arms, lame, inactive, dwarf, of distorted eyes or with no eyes at all. Hence, whichever thing the woman desires that should be given to her. Only after getting her desires fulfilled she gives birth to a child who will be valiant and long lived^[14]. According to Garbhpnishada in the fourth month the belly and hip are formed.

Acharya Harita mentioned the most characteristic structure is that the appearance of Loma (hairs) on the body surface.^[15]

Fifth month:

“Panchame manah pratibuddhataram bhavati”

According to Charakacharya in the fifth month there is a greater increase in fetus, in accession of flesh and blood rapidly than the other months. Therefore at this time the pregnant woman becomes exceedingly emaciated.^[16]

Sushrutacharya explained that Mana becomes more developed along with Chetana Dhatu (consciousness). Atma and Manas enter into the body at the time of conception. That's why sushrutacharya specified the word “Pratibuddhatara” of these two. The functions of Mana are

Indriyabhigraha, Swasya Nigraha, Uha and Vichara may start in this month said by Acharya Dalhana^[17].

Acharya Harita opines that Garbha becomes more “Sujiva” (capable to live independently)^[18]

Sixth month:

“Sashthe Buddhih”

According to Charakacharya in the sixth month there is a greater increase in the accession of strength and pigmentation to the fetus than during the other months, consequently at this time the pregnant woman losses strength and colour exceedingly^[19] According to Sushrutacharya the Buddhi develops in the sixth month^[20] according to Vagbhatcharya in the sixth month Pitruja Bhava like Kesah, Sira, Snayu, Roma, Nakha are develops^[21] Harita Acharya says Garbha Sphurana (quivering of fetus) occurs in this month^[22]

Seven month:

“Saptame sarvangapratyangavibhagah pravyaktatarah”

According to Charakacharya in the seventh month the fetus develops in all ways, therefore at this time the pregnant woman becomes exceedingly restless i.e. tired^[23]

According to Suhruatacharya and Vagbhatcharya in the differentiation of all the major and minor parts becomes clearer with their functions ^[24]

According to Kashyapacharya all the major and minor body parts are fully developed and whole body gets completely associated with 'Vata', 'Pitta' and 'Kapha' in the seven month ^[25]

Acharya Harita does not mention any other characteristic of rowing fetus.

Eighth month:

"Ashtame sthiribhavatyojah, tatra jatascenna jivennirojastavannairrtabhatvancca, tato balim mamsaudanamasmai dapayet"

According to Charakacharya, suhruatacharya and Vagbhatcharya in the eight month Ojas (strength or vitality) becomes unstable if birth takes place then the fetus does not survive because of absence of Ojas and Nairutyuas(demons) snatching away their portion. So the demons should be offered oblation of rice cooked along with meat ^[26]

Fetal development according to texts of modern human embryology ^{[32][33]} –

Month	Height	Weight	Characteristics
1	1cm	1gm	Rudiments of eyes, ears and nose are visible. Buds corresponding to the limbs are distinct; umbilical cord is short and thick.

Haritacharya opines that in the eight month the 'Pachakagni' starts functioning ^[27]

Ninethmonth:

"Navamadasamaikadasadvadasanamanyata masminjayate, atonyatha vikari bhavati"

According to Charakacharya from first day of ninth month after completion of eight month till the end of tenth month is known as the period of parturition ^[28]

According to Suhruatacharya birth of the fetus may take place in any one of the ninth, tenth, eleventh or twelfth months. Birth taking place apart from these months is abnormal ^[29]

According to Vagbhatcharya even a single day beyond the period of eight month till the period of twelfth month is considered as a period of parturition ^[30]

Haritacharya mentioned that in tenth and eleventh month Garbha goes to Vairagya in Garbhavaas(uterus) it is the cause for delivery ^[31]

2	2.5-3cm	4gms	Fingers and toes begin to appear. Head portion is disproportionately large due the development of brain. External genitals are seen but sex is not differentiated in it. External ear begins to develop.
3	8cm	30-45gms	Fingers and toes are seen distinctly and are having nails. There is beginning of sex differentiation. Face is well formed; lip movements typical of sucking appear.
4	16cm	100gms	Sex is now distinctly differentiated. Lanugos (soft hairs) are already appeared on the body; umbilical cord is thin, long and exhibits twisting. Placenta is well formed, heart begins to beat.
5	24cm	300gms	Skin is covered with vernix caseosa (fatty material), few hairs appears on the head. Fetus makes movement causing slight flutter in the lower abdomen of the mother (known as quickening).
6	30cm	680gms	Nails are distinct, eyebrows and eyelashes are formed. Fetal movements are apparent and even visible in some women.
7	35cm	1100gms	Eyes are open. Heart sounds can be distinctly heard and its rate varies from 120 to 140 beats per minute. Fetus if born alive has a feeble cry, makes vigorous movements but seldom survives as the lungs are not adequately developed for respiration.
8	40cm	1570gms	Bones of the head are soft and flexible. Fetus viable and can be reared by artificial methods.
9	45cm	2.5kg	Skin is smooth. Respiratory, digestive and circulatory organs are well developed. Cartilage of the nose, ears are distinct and soft. Fetus can survive without any complication.
10	50cm	3.5kg	There are plenty of hairs on the head, nails project over the finger tips, skin is pink, body plump and covered with fatty material. There is urine in the bladder and feces in the bowel.

DISCUSSION:

Ayurveda has explained month wise fetal development comprehensively, with its own principles. There are some differences between the opinion of Charaka and Sushruta but their basic principles are same underlying the fetal development. It is interesting fact that the details regarding month wise fetal development were noted in a period when the instruments, equipments, technology of the modern science were not present. Ayurveda compares human conception to the germination and sprouting of a seed and its transformation into a plant. Ayurveda gives great importance to the quality of the seed i.e. ovum and sperm. The mother also provides soil (uterus), nutrition and the right season for seed to grow. So, more emphasis should be given to the nutrition of the woman to keep her vital and pure. As Charakacharya describes, in the first month shukra (sperm) and shonita (ovum) unite and form a seed (zygote). This seed divides and redefines and form a rounded mass. This seed mass has the capacity to manifest all types of tissues and organs. Three days after fertilization embryo divide again to form a 16-cell morula. Embryo turns in the form of a three layered disc i.e. three germ layers which is called embryonic

disc. All the structures and different organs are going to manifest from these three layers. In the beginning the foetus obtains its nourishment from rasa which is supplied by mother. That clearly means nourishment and development of the foetus depends upon all the Shadbhava (six factors of conception). Acharya mentioned six procreative factors (shadgarbhakarabhavas) which have an important impact on the process of fertilization and development of the foetus. These factors are Matrija (maternal), Pitrija (paternal), Sattvaja (mind), rasaja (nutritional), Satmyaja (wholesomeness) and Atmaja (soul). Out of these six shadgarbhakara bhavas Matrija, Pitrija and Atmaja bhavas cannot be changed as they come from the parents. But the other three i.e. Rasaja, Sattmyaja and sattvaja bhavas if practiced properly can produce healthy impact on the foetus. Components that are going to build foetus in the uterus originates from panchmahabhutas (the five elements). We can differentiate different bhavas (components) that are originating from panchamahabhuta. Different sonographic studies also reveal that maternal lifestyle, drug addiction have the great impact on the foetal development. In Ayurveda, it is said

that a woman needs to have sound mind and be in good physical condition during pregnancy as the fetal development is directly affected by her. The stress, sorrow, anxieties of the mother is unknowingly passed onto the unborn child. So, all the feelings of a pregnant woman should not be ignored. As in the second and third month of foetal development, stability of the fetus is important or it becomes comparatively more stable, the pregnant woman should involve herself in gentle activities for relaxation and calmness. Charakacharya says that, In the third month, all sprouting parts become evident. In this period of foetal development all the systems of the body gets established. The head is still large in size. Using ultrasonography the sex of the foetus can be determined by examination. The heart of the foetus makes relation to the mother by vessels. Foetal heart chambers are formed. Umbilical vein conveys oxygenated blood from mother to foetus through placenta. FHS can be heard with the help of the stethoscope. Describing the development of the foetus in the fourth month Charakacharya says that, the foetus looks like human being. The shape and all the parts of the body is almost formed. As per the modern science

palpation of the foetal body parts can be made. Foetal movements can be felt by placing the hand over uterus. Sushrutacharya called the pregnant woman as *dauhradini* (with two hearts). Cravings of the pregnant woman should get fulfilled. According to my opinion, as foetus gets its nutrition from mother's body, she feels the deficiency of certain things and she wishes to eat them. I think cravings of pregnant woman can be explained by it. In the fifth month, increase in the body mass and blood of the foetus. FHS can be clearly heard. Foetal movements can be clearly felt by mother. The FHS varies 140-160 per min. but decreases to 120-140 per min. afterwards. In the sixth month, Foetus acquires well developed form in physical and mental aspect. Mother looks radiant. The skin of the foetus becomes reddish and wrinkled due to the lack of underlying connective tissue. In the seventh month, the testies descend downwards. A foetus born during this period (i.e. sixth or the early seventh month) has survived with great care. In the eighth month, Deposition of fat under the skin and wrinkles disappear. As per modern science skin becomes stretched and tight due to the more deposition of underlying fat. If the birth of a child takes place in this month, it is

very difficult to survive. Charakacharya describes gestation period of 9-12 months. As per modern science, the duration of the gestation is considered as 9 months. At the time of birth the crown heel length is about 50 cms. Considering each month of foetal development as per Ayurveda, many facts that Ayurveda scholars have described in their samhitas are found to be true on the basis of sonographic studies.

CONCLUSION:

At this stage, the fruitful conclusions which have emerged through the discussion of the available concept are being presented as follows- Ayurvedic embryology explains month wise foetal development along with the antenatal care of the pregnant woman which is found to be true on the basis of modern science. By adopting various methods described in Ayurveda embryology, smooth pregnancy can be ensured. Similarly good health can be given to mother and child. While studying the fetal development in Ayurveda, we are surprised to know the span of their intellect. Though there is no mention of their research methods or any equipments, still they have described minute details of embryology long ago. If we can understand their line of thinking and follow their path we

will be able to understand Ayurveda thoroughly and go ahead following their footprints. Mother supplies the seed (ovum), bhumi (uterus) as well as nutrition through blood (rasaja and sattvaja bhava) to foetus so ayurved gives utmost importance to mother's physical and mental health. Ayurveda has described in detail how a pregnant mother should be happy. One should nurture a pregnant woman like a precious flower. So this work is a pathway for future research which intend to verify old facts with modern tools.

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