

CONCEPT OF MANSANUMASIKA VRIDDHI KRAMA IN AYURVEDA IN CONTEXT
TO EMBRYOGENESIS AND FOETAL DEVELOPMENTDr. Pathania Deepak*¹, Dr. Rana Shivani², Dr. Kumar Vinod³ and Prof. Sharma Rakesh⁴¹MD Scholar, Dept. of *Kaumarbhritya*, R.G.G.P.G. Ay. College & Hospital Paprola, District Kangra, H.P.²MD Scholar, Dept. of *Swasthavritta*, R.G.G.P.G. Ay. College & Hospital Paprola, District Kangra, H.P.³Reader, Dept. of *Kaumarbhritya*, R.G.G.P.G. Ay. College & Hospital Paprola, District Kangra, H.P.⁴Prof. & HOD, Dept. of *Kaumarbhritya*, R.G.G.P.G. Ay. College & Hospital Paprola, District Kangra, H.P.

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ABSTRACT

“Motherhood is neither a duty nor a privilege, but simply the way that humanity can satisfy the desire for physical immortality and triumph over the fear of death.-Rebecca West *Ayurveda* is not merely a medical science but it is a science of life. The ancient *Ayurvedic* literature described in various *Samhita*, is not only unique but also scientific as modern medical sciences. The formation of zygote and embryo & subsequent development of the embryo into various stages of development and maturity over a period of 9 months is called *Garbha* in *Ayurveda*. The process of development of foetus takes place in a slow and steady phase and get completed in around 9 months. The whole process is called *Garbha Utpatti* or *Garbhavkranti* i.e. development and maturity of fetus. In this paper we have described ‘*Masanumasik Garbha Vriddhi Krama*’ or month wise development of foetus according to *Ayurvedic* as well as modern science.

INTRODUCTION

Ayurveda is an ancient system of medicine which has been originated from “*Atharvaveda*”. In *Ayurveda*, *Acharya* defines the human body under the concept of *Sharira*. *Sharira* is made up of the *Anga*, *Pratyanga*, *Indriya* and *Avyava*. There is systematic description of foetal development i.e. *Garbhavakranti* or *Garbha Masanumasika Vikasa* which starts from *Shukra-shonit sanyog* i.e., fertilization. The *Vikasa* means the development which takes place in sequential manner. The combined semen and ovum (*Sukra* and *Sonita*) in the womb, mixed with (the eight categories known as) the *Prakriti* and (her sixteen modifications known as) *Vikara*, and ridden in by the *Atma* (self-conscious self), is called the fetus. There is consciousness in the embryo. The *Vayu* (or the vital force) divides it into *Dosha*, *Dhatu*, *Mala*, etc., limbs, and organs, etc. The *Teja* (or the heat latent in the fecundated matter) gives rise to the metabolism of the tissues; the *Apa* (water) keeps it in a liquid state; the *Kshiti* (earth) is embodied in the shape of its species; and the *Akasha* (ether) contributes to its growth and development. A fully developed fetus with all its parts, such as the hands, feet, tongue, nose, ears, buttocks etc. and the sense-organs is called *Sharira* or body. While modern embryology defines the formation of body and organs on the basis of theory of trigeminal disc or layers (Ectoderm, Mesoderm, Endoderm) as well as tissue

differentiation theory. Ultimately dermal layers give rise to different tissues and all organs.

AIMS AND OBJECTIVES

1. To study the *Masanumasika Vriddhi Krama* given in *Charak Samhita* & *Sushruta Samhita*.
2. To study the modern aspect of embryogenesis and foetal development.

MATERIAL AND METHODS

First Month

Aacharya Charak: During the first month of gestation, *Atma* gets mixed up or vitiated by all the *Dhatus* (tissue) and takes the form of jelly because of intimate mixture of five *Mahabhuta*. During this month, the embryo bears no particular form and organs of the embryo are both manifested and latent.^[1]

Acharaya Shushruta: During the first seven days *Kalal* is formed which is semisolid, slimy and sticky in nature. The fertilized ovum becomes *Kalal* and *Budbuda*.^[2]

Modern science: In first month the body stalk is differentiated & the chorionic sac is approximately 1cm in diameter There are villous cores in which angioblastic chorionic mesoderm can be distinguished & a true intervillous space that contain maternal blood.

- During the end of 3rd week, fetal blood vessels in the chorionic villi appear. In the 4th week, a

cardiovascular system has formed & thereby a true circulation is established both within the embryo & between the embryo and the chorionic villi.

- By the end of 4th week, the chorionic sac is 2-3 cm in diameter & the embryo is 4-5mm in length.
- Partitioning of the primitive heart begins in the middle of the 4th week.
- Arm and leg buds are present, & the amnion is beginning to unsheathe the body stalk, which thereafter becomes the umbilical cord.^[3]
- Upper limbs appear as paddle shaped buds.^[4]

Second Month

Acharya Charak: During second month of gestation, the embryo takes a compact form in the shape of knot, elongated muscle or tumor (round and elongated). The knot shaped embryo leads to the production of a male foetus, the muscle shaped to a female foetus and the tumour shaped to an eunuch one.^[5]

Acharaya Shushruta: In this month *Sheeta*, *Ushma* and *Anila*, *Guna* help to turn, the *Panchabhautika* embryo into a compact mass called as *Ghana*. *Garbha* takes a compact form in the shape of a *Pinda*, *Peshi* or *Arbuda* which helps in identification of the gender. The *Pinda* shaped *Garbha* leads to the production of a *Pumaan* child, the *Peshi* shaped *Garbha* produces *Stree* child and *Arbuda* shaped *Garbha* produces *Napunsak* child.^[6]

Modern science: At the end of sixth week the embryo is 22 to 24 mm long, and the head is large as compared with the trunk. The earliest synapses in the spinal cord develop at 6 to 7 weeks. The heart is completely formed.

- Fingers and toes are present & the arms bend at the elbows.
- The upper lip is complete, the external ears form definitive elevations on either side of head.^[7]
- Lower limb buds & the external ear starts forming.^[8]
- The tail disappears.^[9]

Third Month

Acharya Charak: During third month of gestation, all the senses and limbs along with their organs manifest themselves simultaneously. Thus the senses and organs of the foetus are simultaneously manifested except those that are manifested only after birth. For example, teeth, secondary sexual characteristics like beard and breasts, signs of puberty like the production of semen and ovum and such traits are developed later.

As soon as sense are manifested in embryo, its mind gets associated with feelings and from that time onwards, there is pulsation in the embryo & the desire for whatever was experienced in the previous life of the individual. The condition according to the wise is known as *Dauhrida* or bicardiac state.

The heart of the foetus which is derived from the maternal source is connected with the mother's heart through the channels carrying nutrient material. These

channels carry the desires of the one to the other. If such desires are ignored, the foetus may either be destroyed or get deformed. The proper maintenance and protection of the pregnant mother is a good as the maintenance or protection of the foetus itself.^[10]

Acharaya Shushruta: In the third month *Sarva Indriya*, *Sarva Angavayava* manifests them simultaneously. Five buds (*Pindaka*) develop representing the formation of four limbs and head respectively. The *Anga Pratyanga* begins to form but all are in very minute form. Development of heart and all the sense organs also starts.^[11]

Modern science: The uterus usually is just palpable above the symphysis pubis.

- Crown rump length is 6 to 7 cm.
- Centres of ossification appear in most fetal bones & the fingers and toes have been differentiated.
- Skin and nails have developed & scattered rudiments of hair disappear.
- The external genitalia are beginning to show definitive signs of male and female gender.
- The fetus begins to make spontaneous movements.
- The fetus also appears to have well defined neck.^[12]
- Urine formation begins.^[13]
- Process of ossification is seen in all long bones.^[14]

Fourth Month

Acharya Charak: During the fourth month of gestation, the foetus gets stabilized. Therefore, at that time, pregnant women specifically get excessive heaviness in her body.^[15]

Acharaya Shushruta: In the fourth month *Garbha* becomes stable and dense. Due to the increase in mass, pregnant lady feel the heaviness in body. *Anga*, *Pratyang* are more prominently developed. The *Sukshma* forms of all body parts acquire certain form and shape. The *Chetana Dhatu* also gets manifested because the *Hridaya* becomes evident and due to this *Garbha* starts movements and responds to sensory stimuli.^[16]

Modern science: the fetal crown –rump length is 12 cm & the weight is 110 gm.

- By 14 weeks, gender can be determined by experienced observers by inspection of the external genitalia.
- Eyes movements begin at 16 to 18 weeks, coinciding with midbrain maturation.
- Lower limbs get well developed.^[17]
- Proportion of the size of the head relative to the rest of the body is less as compared to that in the 3rd fetal month.^[18]

Fifth Month

Acharya Charak: During the fifth month of gestation, there is an excessive increase of flesh and blood of the foetus. The nutrition of the mother is utilized for the

growth of the child during this month. Therefore at that time the pregnant mother grows excessively thinner.^[19]

Acharaya Shushruta: In the fifth month mind becomes well active due to increased *Mansa* and *Shonita*. The *Mana* of fetus becomes more *Sajiva*. The blood and muscle tissue of the *Garbha* increases.^[20]

Modern science: This is the midpoint of pregnancy as estimated from the beginning of the last menses.

- The fetus now weighs somewhat more than 300 gms & weight increases in a linear manner.
- From this point onward, the fetus moves about every minute & is active 10-30% of the time.^[21]
- Hairs on the head & eyebrows can be seen.^[22]

Sixth Month

Aacharya Charak: In comparison with other months, there is excessive increase in the strength & complexion of the foetus during the sixth month of gestation. Therefore, at that time the pregnant woman loses her strength and complexion considerably.^[23]

Acharaya Shushruta: In the sixth month the development of intellect or *Buddhi* occurs.^[24]

Modern science: The fetus now weighs approximately 630 gms.

- The skin is characteristically wrinkled & fat deposition begins.
- The head is still comparatively large and eyebrows & eyelashes are usually recognizable.
- The canalicular period of lung development, during which the bronchi & bronchioles enlarge & alveolar ducts develop, is nearly completed.
- A fetus born at this time will attempt to breathe, but many will die because the terminal sacs required for gas exchange have not yet formed.^[25]

Seventh Month

Aacharya Charak: There is an all round development of the foetus during the seventh month of gestation. Therefore, a pregnant woman becomes exceedingly deficient in all aspects of her health.^[26]

Acharaya Shushruta: In the seventh month there is an all-round development of the *Garbha* occurs. Differentiation of all the *Anga Pratyanga* becomes clearer.^[27]

Modern science: The crown rump length is approximately 25cm & the fetus weighs about 1100 gms.

- The thin skin is red and covered with vernix caseosa.
- The pupillary membrane has just disappeared from the eyes.
- Isolated eye blinking peaks at 28 weeks.
- Lung alveoli begin to secrete surfactant, which helps to maintain the patency of the alveoli of the lungs sign of respiratory system maturity.

- The otherwise normal neonate born at this age has a 90% chance of survival without physical or neurological impairment.^[28]

Eighth Month

Aacharya Charak: During the eighth month of gestation, the *Ojas* formed in its body moves to the body of the mother and vice versa through the channels carrying nourishment from the mother to the foetus because of immaturity of foetus. Therefore, at that time, the pregnant woman often has a wavering feeling of joy and sorrow. Similar is the condition of foetus. It is because of this unsteadiness of the *Ojas* that the delivery of the foetus during this month is shrouded with danger. So reckoning of the eighth month of pregnancy should be avoided.^[29]

Acharaya Shushruta: In the eighth month of pregnancy, life is fatal for *Garbha* and *Garbhini*. *Ojas* travel between the mother and the child alternately through placenta and umbilical cord. *Ojas* are considered to be the purest form of all *Dhatus*, which decide the vitality, immunity and strength of the body and without it life becomes unstable.^[30]

Modern science: At 32 weeks the fetus has attained a crown-rump length of about 28 cm and a weight of approximately 1800gm.

- The skin surface is still red and wrinkled.
- Toe nails are present.
- Body starts filling out & testis descending.
- Fingernails reach fingertips.^[31]
- Pupillary light reflex can be elicited.^[32]

Ninth month- Acharaya Shushruta: In this month full growth of foetus is completed. In *Ayurveda Samhitas* normal gestational period is said to be 9 to 12 months.^[33]

Aacharya Charak: Even the first day after month i.e. from the first day of the ninth month till the end of the tenth month is known as parturition. Normally delivery takes place during this period. Retention of foetus in the pelvis thereafter is abnormal.^[34]

Modern science: By 36 weeks, the fetal crown rump length averages about 32 cm and the weight is approximately 2500 gms.

- Because of subcutaneous fat deposition the body has become more round & the previous wrinkled facial appearance has been lost.
- Lanugo hair almost absent.
- Toe nails reach toe tips.
- Testis in scrotum or palpable in inguinal canals.
- Fingernails extend beyond fingertips.^[35]

By 38-40 weeks is considered as term from the onset of the last menstrual period. The fetus is now fully developed. The average crown rump length is about 36 cm & weight is approximately 3400 gms.

DISCUSSION

Aacharyas in *Ayurveda* states that the formation of first product of conception in the shape of *kalala* and attains the shape resembling *sleshma* in which all the body parts though present are not conspicuous whereas modern obstetrics states that at the end of first month a fertilized egg grows within a water filled sac which is called as amniotic cavity. Development of placenta takes place which has nutritive and excretory functions. Emryoblast results in the formation of morula which contains multicellular mass and fluid. As quantity of fluid increases, morula gets transformed into blastocyst giving rise to three germ layers * Endoderm * Mesoderm * Endoderm.

2nd Month: *Aacharyas* in *Ayurveda* states the determination of the sex of the child taking a compact form in the shape of *Pinda*, *Peshi* or *Arbuda* to be born as male, female or eunuch respectively. Modern science states that at sixth week baby's heart begin to separate into four chambers and it beats about 150 times in a minute. Embryo has comparatively large head than trunk. Although it is not possible to confirm gender of foetus by USG until after 15 weeks, his genitals begin to form at 9th week.

3rd Month: *Acharya Charaka* has stated the formation of *Sarva Indriya*, *Sarva Avyayava* or the five parts of the body become manifested i.e. the head, two legs, two arms and also minor parts. Simultaneously, with the head etc. the knowledge of pleasure and pain also develop. Modern Science mentions about the appearance of fingers, toes and development of skin & hair. Variation in external genitalia begins.

4th Month: *Aacharyas* have mentioned the stability of *Garbha* and the demarcation of organs into *Anga*, *Pratyanga* and *Vibhaga*. Manifestation of *Chetna Dhatu* becomes obvious. The women now possess two hearts and are known as *Dauhradini* and all her desires should be met accordingly whereas modern science mentions about the beginning of eye movements which indicates the maturation of Midbrain. Determination of fetal sex is possible as external genitalia show definitive signs of male or female.

5th month: *Aacharyas* have mentioned that in comparison to previous months, the pregnant woman grow excessively thinner because growth of *Mamsa*, *Shonita* in foetus is more prevalent in this month. *Aacharya Sushruta* mentions that mind becomes clearly manifested. Modern Obstetrics states that the foetus becomes more active with the appearance of lanugoes covering all body and hairs at scalp. Maturation of cochlear function begins as foetus can respond to sound. At 19th week, foetal brain starts to form separate areas which are specialized for sense of smell, taste, hearing, vision and touch.

6th Month: *Aacharyas* state that excessive increase in *Bala*, *Varna* of the *Garbha* and *Aacharya Sushruta* mentions about the intellect. Modern science states the recognition of eyebrows and eyelashes along with the development of lungs.

7th Month: *Aacharyas* states the overall development of foetus. Therefore, woman becomes weak excessively. Modern science states the covering of skin by vernix caseosa and production of blood cells at bone marrow which takes place in liver and spleen.

8th Month: *Aacharyas* states the instability of *Ojas* and the *Garbha* born in this month does not survive as the *Ojas* continuously transfers from mother & foetus and vice versa. Modern science states the development of most internal systems and the brain becoming more complex and skin becoming smoother.

9th Month: *Aacharyas* states that after one day of eighth month is the time for the birth of the child and if it remains inside the vitiated *Vata* leads to abnormalities. Modern obstetrics states the pregnancy at full term.

CONCLUSION

Ayurvedic embryology explains month wise fetal development along with the antenatal care of the pregnant woman which is found to be true to some extent when correlated with modern science.

By adopting various methods described in *Ayurvedic* embryology, smooth pregnancy can be assured. Similarly good health can be given to mother and child. *Aacharyas* through their span of intellect and without any investigating tools or equipments; they still had managed to describe minute details of embryology long ago.

Ayurveda defines *Avyayava utpatti* in terms of different combinations and architectures of *Dosha*, *Dhatu*, *Updhatu* and *Mala* as the basic infrastructures of body. While modern embryology defines the formation of body and organs on the basis of theory of trigeminal disc or layers (Ectoderm, Mesoderm, Endoderm) as well as tissue differentiation theory. Ultimately dermal layers give rise to different tissues and all organs.

Though many similarities between *Masanumasika Vriddhi Krama* and modern embryology can be seen but some dissimilarity can also be evaluated. Thus it can be concluded that by proper insight and exploration of the ideas of *Maasanumasika Vriddhi Krama* by *Aacharyas*; a more elaborative and clear understanding of the modern concept of embryology and fetal development can be established.

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