Ayurvedic approach to Embryogenesis: Exploring Fetal Development

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ABSTRACT

Background: Embryology in Ayurveda is the study of embryonic and fetal development using Ayurvedic principles. Ayurveda describes the conception process, fetal development, and the effect of Doshas (biological energies) on the fetus's growth and health. Ayurvedic embryology emphasizes the mother's health and well-being during pregnancy, as well as the effect of the father's Doshas on the child's genetic makeup. It also includes prenatal care guidelines, such as diet, lifestyle, and herbal remedies, to help the fetus develop normally. Aims: This review applies Ayurvedic concepts of Garbhasharir to embryology, analyzing the genesis of progeny using modern scientific knowledge. Materials and Methods: Brihattrayee along with other relevant literature were reviewed to identify the hidden core of embryology described in chapters about Garbhasharir. Results: The Ayurvedic essence outlines two types of processes in progeny genesis: dependent and independent, with dependent processes modifying and independent processes unaffected by parental efforts. Conclusion: Even though the embryology concepts outlined in Ayurveda extend back millennia, they are still relevant in today's scientific world when properly interpreted.

Key words: Embryology, Ayurved, Garbhasharir, Brihattrayee, Progeny, Genetic makeup.

INTRODUCTION

Embryology is the study of gamete development before birth, fertilization, and embryo and fetus development. Ayurvedic embryology is referred to as Garbhasharir. Some specific chapters in the Sushruta Samhita, Charak Samhita, and Kashyap Samhita that focus on embryology basics and embryology-related elements are spread throughout the books. Compiling extracts and linked sources would provide a good overview of the embryological basics given in Ayurveda. Ayurveda is primarily concerned with human health and disease, from conception to death. Everything's existence has now been proven both practically and scientifically. Ayurveda, as part of this science, requires extensive study and investigation to prove all of the truths provided by Acharyas in ancient times. Sharir Sthana is an Ayurvedic work that describes the notion of Garba Sharir in detail. The primary goal of Garbhasharir (embryology) as indicated in Ayurvedic texts is Suprajanan (Healthy Progeny). Modern embryology goes into great depth on embryo formation, fetal growth, and structural teratogenicity of bodily organs, whereas Ayurveda affirms the fetus’s structural, physical, and mental state. Ayurvedic literature provides a methodical account of numerous facts addressed in Ayurveda, which are quite similar in many ways to modern
science. There are several references to Garbhasharir in Brihattrayee (the three major Ayurvedic compendia) and their comments that must be interpreted appropriately in order to be relevant in the current age.

**CONCEPT OF EMBRYOLOGY IN AYURVEDA**

a) **Preconception Factors:** Ayurveda highlights preconceptional care to attain its goal of healthy offspring. Instructions to Rutumati progeny (menstruating women), also known as Rutumaticharya, have been recommended. During the menstrual period, a celibate woman ought to refrain from day sleep and other activities beginning on the first day. The mother's lifestyle and conduct throughout the Rutumati period have a significant impact on the characteristics of the impending fetus. The embryo's traits are directly influenced by the parents' diet and lifestyle before conception.

b) **Evolution & Body Parts:** The elements facilitated in an individual with the assistance of Panchamahabhuta include the characteristics of Akash (sound, auditory organ, all orifices, and distinctness); Vayu: touch, tactile organ, all activities (nervous system), actions in all bodily parts, and lightness. Tejas (vision, visual organ, complexion, heat, brilliance, digestion, intolerance, sharpness, and courage); Aap (taste, gustatory organ, all fluidity, immensity, coldness, unctuousness, and semen) and Prithvi’s (smell, olfactory organ, hardness and weightiness)

c) **Sex Determination:** The predominance of Shukra (semen) generates male children and Aartava (ovum) produces female children, however, the equality of both produces hermaphrodites. Sexual interaction on even days may result in the conception of a male child and a female on odd days. If a male child is to be conceived during these days, three or four drops of one of the following plants i.e., Lakshmana (Ipomoea sepiaria Roxb), Vishvadeva (Grewia populifolia), Sahadeva (Sida humilis Wild) and Vatashrunga (Ficus bengalensis Linn) with milk, should be placed in the right nostril (without spitting) of the woman.

d) **Garbh Vigyaan (Embryology):**

**Formation of Embryo:** Garbha (embryo) is the combination of Sukra (sperm), Shonita (ovum), and Jiwa (Atma with Sattwa) inside the uterus. Garbha (embryo) is developed by the six Garbha Sambhav Bhava: Matrutaha (mother), Pitrutaha (father), Aatmataha (self), Satmyataha (suitability), Rasataha (nutrition), and Satvataha (psyche).

**Masanumiska-Vriddhi (Month wise development of fetus)**

Acharya Charak insightfully stated Garbha Vigyaan. During the first month, it becomes mixed up with all of the Dhatu (Mahabhutas), and the embryo appears as Khetabhu (a jelly structure akin to Kapha) with no distinct shape and emerging and latent limbs. During the second month, the embryo forms a solid mass in the shape of Pinda (oval), Peshi (elongated), or Arbuda (circular). If the solid mass has the shape of Ghana (Pindakara), it denotes male progeny, Peshi suggests female progeny, and Arbuda indicates hermaphrodites. In the third month, all Indriyas (senses) and Angavayava (body parts) become visible. In the fourth month, the fetus gains stability, and the pregnant woman feels heavier. In the fifth month, Mamsa and Rakta grow and receive more food. In the sixth month, there is an increase in Bala (strength) and Varna (complexion) in the fetus compared to previous months. In the seventh month, all of the fetus's components are properly nourished or formed. The commentator Chakrapani has used Mansa Shonita etc. to represent all of the components. In eight months. Because of the fetus's immaturity in the eighth month, the Ojas are repeatedly exchanged from the mother to the fetus and from the fetus to the mother through the Rasavaha channels, hence the mother becomes pleased and dull alternately, likewise, the fetus. As a result, if the delivery occurs in this month, life becomes uncertain due to the instability of Ojas. As a result, a trained physician considers the eight-month period inaccessible (ineligible for birth). The period of delivery begins on the first day of the ninth month and lasts until the end of the tenth month.

**Factors for Normal Growth of Fetus:** The fetus grows in the womb as a result of the mother's good...
procreative powers, her excellent behavior, the mother’s proper mechanisms for *Upsnehan* (feeding) and *Upswedan* (heating), as well as the passage of time and natural occurrences.[10]

e) **Garbhopaghatakara Bhava** (Factors harmful to fetus): *Garbhopaghatakara Bhavas* are conditions that could harm or destroy a fetus or its development during pregnancy. According to Ayurveda, *Garbhopaghatakara Bhavas* should be avoided during pregnancy. *Garbhopaghatakara Bhavas* are a component of *Garbhini Paricharya*, which is a systematic approach to pregnancy that includes nutritional and other guidance. *Utkata Vishama Kathina Asana Sevana* sits on a tough, uneven, and hard seat. *Vata Mutra Purisha Vega Dharana* suppresses desires to pass urine and feces. *Daruna Anuchita Matra Sevana* engages in hard and improper physical exercise. *Tikshna Ushna Matra Sevana* prefers very hot or little meals. The factors which lead to death of the fetus, or abortion are - *Abhigahata* (injury), *Prapidana* (compression), *Shvabhruka Kupa* (peeping in deep pit or well), *Prapata Desha Avalokana* (travelling on jerking vehicles), *Apiya Matra Shravana* (listening to unpleasant words), *Uttana Shayana* (excessive sleeping in supine position), *Nabhayashraya Nadi Kanthamanuveshatati* (umbilical cord of fetus encircles his neck), *Vivruta Shayini* (women sleeping in open area), *Nakta Charini Chonmata Janyati* (wondering in night gives birth to psychotic child), *Shoka Nitya Bhrita Apachitama Alpayusha* (always seized with grief produces fearful and short-lived progeny).[11]

f) **Fetal Deformity:** *Charak*, in terms of fetal anomaly, explains that during fertilization in the seed (sperm or ovum), the part of the body that is damaged in its genetic source becomes aberrant or does not.[12] Unrighteous behaviors committed by parents may result in a fetus shaped like a serpent, scorpion, or pumpkin, among others. On the contrary, *Kubja* (humped), *Kuni* (deformed hand), *Pangu* (lame), *Mook* (dumb), and *Minmin* (muffled voice) neonates are caused by vitiated *Vata* or neglecting the pregnant woman's cravings.[13] *Doshas* (Bodily humor) cause anomalies in a child in the womb, just as wood, stone pieces, and water currents induce derangement in a tree in a river stream during the rainy season.[14]

g) **Prakruti** (natural constitution of the body): is determined by the *Dosa* that is dominant during conception. It is classified into seven types: three due to individual *Doshas*, three due to the combination of two *Doshas*, and one due to the sum of all.[15]

**DISCUSSION**

Preconception Factors are a dependent process. Parents have control over the various aspects stated in *Garbhashasir*, which can change their children’s physical and mental characteristics throughout their lives. In the case of *Rutumaticharya*, contemporary science has discovered that the ovum generated from the original oocyte is in the prophase of the first meiotic division before maturity. Since Ayurveda *Garbhashasir* requires menstrual women to be cared for, there must be a link between oocyte maturation and *Rutumaticharya*. Epigenetic studies have shown that dietary and other lifestyle choices impact offspring.

Formation of embryo, body parts, and soul are all autonomous processes that cannot be directly altered. *Rutukal*, *Garbhashaya*, *Aahar-Rasa*, and *Shukra-Artava* are the four most important aspects of the conception process. Healthy progeny cannot be born until all four of the preceding conditions are normal. In the presence of one of these variables, conception may or may not be feasible. If conception occurs under such conditions, there is always the potential of a defect. This process is almost independent because the majority of these entities can be planned and corrected to ensure a healthy fetus. The properties of *Panchamahabhuta* are professed by the respective *Mahat and Ahankara* of the individual. As a result, the effectiveness of structural features produced and evolved in the progeny varies by individual. This increases the variability among individuals. So, what differentiates them? *Ayurveda* believes in the soul, which is necessary for life to exist. The soul is unique to
each individual, and characters vary based on its traits. Righteous and unrighteous deeds associated to genesis are examples of stored information that can be used for an individual’s rebirth. This stored information allows the soul to participate in the coupling of ovum and sperm. The stored information is akin to genetic code. The number of chromosomes is unique to each species and plays a role in the reproduction process, as well as the overall development of the individual. In this approach, parents’ earlier births can be seen as the primary source of genetic information provided to their kids for creation and development. So, the word Dharmadharma-Nimitta (righteous and unrighteous conduct) used in Ayurveda can be interpreted as genetic information.

Sex determination is both a dependent and independent process. As stated in Pumsavana Sanskara, the desired sex of an offspring can be acquired with timely intervention. It may be an autonomous process depending on the preponderance of Shukra and Shonita at the moment of conception.

The development of an embryo is a dependent and independent process. Some dependent elements, such as Garbhapatadak Bhava, nutritional, and behavioral factors, are attributed to embryo development, which modifies individual features. Shadbhava’s Atmaja Bhava will be done independently. "Swabhava" or nature corresponds to genetic theory. During the construction of any body part during genesis, all information about its development is stored in the appropriate gene. This stored information directs the entire path of development for any organ.

**Garbhopaghatkara Bhava (Factors harmful to foetus)**

The multiple references available in the classics indicate that the Acharyas was well-versed in embryogenesis, teratogens, and the resulting congenital abnormalities, as well as maternal and fetal problems. The fetus’ development is mostly influenced by Vata and Agni. The majority of the causes mentioned previously disrupt the natural functioning of Vata Dosha and Agni, preventing the fetus’s appropriate growth and development. The current increase in the prevalence of IUGR, Habitual Abortions, and LSCS due to fetal distress or cord around neck could be attributed to the Garbhinī’s indulgence in one or more Garbhapatagatakara Bhavas and failure to observe the Garbhinī Paricharya. Vaidyas should study them and advise patients to avoid them when pregnant.

**Fetal Deformity:** is both a dependent and autonomous process. The Stein-Leventhal syndrome, which is characterized by mild hirsutism, a deep voice, secondary amenorrhea, and cystic enlargement of both ovaries, is a condition that can be correlated with Kalala (semisolid mass similar to sputum), as illustrated by Sushruta as follows: if a woman performs coitus in a dream after menstruation, Vayu takes the ovum and forms embryo in uterus. This causes pregnancy-like symptoms in the woman but results in a semisolid material similar to sputum that lacks maternal traits. It implies that both maternal and paternal components are required for the formation of normal children. Charak has also stated that due to genetic problems, past actions of the self, uterus, time, and mother’s food and conduct, vitiate Doshas, resulting in numerous anomalies in shape, complexion, and sensory organs. Some examples that correspond to Charak’s opinion include X and Y-linked illness, sickle cell anemia, Turner syndrome, and Down syndrome. Ayurveda explains the three causes of fetal anomalies: unrighteous deeds, vitiated Vata, and a lack of awareness of cravings throughout pregnancy.

**Prakruti**

Most authors associate Prakruti with the concept of Ayurvedic genetics. In brief, Prakruti is a homogeneous combination of maternal and paternal chromosomes that determine the morphological, functional, and mental characteristics of the offspring. Sushruta describes it in terms of Tridosha. A study on Prakruti found links between CYP2C19 genotypes and Prakruti, with rapid and slow metabolism being one of the most significant distinguishing features. It also indicated a major impact on phenotype-genotype association, medication development, pharmacogenomics, and personalised medicine. Manipal University’s Centre for Cellular and Molecular Biology (CCMB) discovered...
the gene PGM 1 as being related with Pitta dosha. The related gene PGM is known to be crucial in modulating the basal 1 metabolic rate (BMR), comparable to Pitta Dosha. It is an independent factor since the predominant dosha during fertilization is influenced by a variety of circumstances.[18]

CONCLUSION

The idea of embryology given in Ayurvedic Garbhasharir is founded on Ayurveda's philosophical and fundamental principles. Righteous and unjust deeds are given the most priority for the appearance of qualities in an individual. The majority of the genesis principles discussed in Ayurveda should be understood in light of modern genetic theory. Righteous and unrighteous behaviors can be considered the precursors of genetic code in the individual, whereas food and lifestyle changes recommended to parents can be compared to epigenetics. The notions of embryology in Ayurveda for individual genesis are founded only on its fundamentals, namely Tridosha, Triguna, and Pancha-Mahabhoota. The analytical assessment of Garbhasharir's literature reveals two sorts of processes associated to offspring genesis: independent and dependent. Ayurveda believes in a unique idea of the soul, which is responsible for the existence of life. As a result, understanding the embryology principles articulated by Ayurveda centuries ago necessitates a thorough comprehension of the concepts that remain relevant in today's modern world.

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