



ISSN 2456-3110

Vol 9 · Issue 1

January 2024

Journal of  
**Ayurveda and Integrated  
Medical Sciences**

*www.jaims.in*

**JAIMS**

An International Journal for Researches in Ayurveda and Allied Sciences



**Maharshi Charaka**  
Ayurveda

**Indexed**

# 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:** *Brihatrayee* 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, Brihatrayee, 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 *Garbha 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

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Submission Date: 15/11/2023 Accepted Date: 21/12/2023

### Access this article online

Quick Response Code



Website: [www.jaims.in](http://www.jaims.in)

DOI: 10.21760/jaims.9.1.29

science. There are several references to *Garbhasharir* in *Brihatrayee* (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 *Rutumacharya*, 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.<sup>[1]</sup> The embryo's traits are directly influenced by the parents' diet and lifestyle before conception.<sup>[2]</sup>

**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 weightness)<sup>[3]</sup>

**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 *Vatashruna* (*Ficus bengalensis* Linn) with milk, should be placed in the right nostril (without spitting) of the woman.<sup>[4-6]</sup>

### 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.<sup>[7]</sup> *Garbha* (embryo) is developed by the six *Garbha Sambhav Bhava*: *Matrutaha* (mother), *Pitrutaha* (father), *Aatmataha* (self), *Satmyataha* (suitability), *Rasataha* (nutrition), and *Satvataha* (psyche).<sup>[8]</sup>

### *Masanumasika-Vridhhi* (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 *Khetabhut* (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.<sup>[9]</sup>

**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.<sup>[10]</sup>

e) **Garbhopoghatkara 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), *Apriya Matra Shravana* (listening to unpleasant words), *Uttana Shayana* (excessive sleeping in supine position), *Nabhyashraya 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)<sup>[11]</sup>

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.<sup>[12]</sup> 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.<sup>[13]</sup>

*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.<sup>[14]</sup>

g) **Prakruti (natural constitution of the body):** is determined by the *Dosha* 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.<sup>[15]</sup>

## DISCUSSION

Preconception Factors are a dependent process. Parents have control over the various aspects stated in *Garbhasharir*, which can change their children's physical and mental characteristics throughout their lives. In the case of *Rutumatcharya*, 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 Garbhasharir* requires menstrual women to be cared for, there must be a link between oocyte maturation and *Rutumatcharya*. 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 dependent 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 *Dharmadharm-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 *Garbhotpadak 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.

#### **Garbhopaghata Kara Bhava (Factors harmful to foetus)**

The multiple references available in the classics indicate that the Acharyas were 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' 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 *Garbhini's* indulgence in one or more *Garbhopaghata Kara Bhavas* and failure to observe the *Garbhini 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,<sup>[16]</sup> 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 paternal 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.<sup>[17]</sup> 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.<sup>[18]</sup>

## 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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**How to cite this article:** Varsha, Himanshu Chouhan. Ayurvedic approach to Embryogenesis: Exploring Fetal Development. J Ayurveda Integr Med Sci 2024;1:195-200.  
<http://dx.doi.org/10.21760/jaims.9.1.29>  
**Source of Support:** Nil, **Conflict of Interest:** None declared.

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