

## Review Article - Ayurveda

# Critical Appraisal of Embryological Concepts (*Garbhasharir*) Delineated in Ayurveda

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### Abstract

**Background:** Ayurveda mainly accords with healthy and diseased conditions of human being starting from conception till death. The foremost objective of *Garbhasharir* (embryology) described by Ayurvedic compendia is *Suprajanan* (Healthy Progeny). Modern embryology describes the aspect about formation of embryo, development of foetus & structural teratogenesis of bodily organs in detail, whereas Ayurveda affirms about structural, physical and mental status of the foetus. There are numerous references of *Garbhasharir* which are quoted in *Brihatrayee* (Three major compendia of Ayurved) and their commentaries that need to be construed in an appropriate way so as to make them applicable for current era. **Aims:** The present critical appraisal is based on concepts of *Garbhasharir* described in Ayurvedic lexicons with relation to embryological concepts, to interpret the processes related to genesis of progeny and analyse them with the help of current scientific knowledge. **Materials Methods:** *Brihatrayee* and other relevant literature were critically reviewed to find out the hidden core of embryology described in chapters related to *Garbhasharir*. **Results:** The concepts of Ayurvedic embryology are truly based on its fundamentals i.e. '*Tridosha*' (three bodily humours), '*Triguna*' (three psychological humours) & '*Panchamahabhoota*' (five basic elements of life) etc. Ayurvedic compendia roughly shows two types of processes (dependent & independent) related to genesis of progeny. Dependent processes are those that can be modified & independent are those which cannot be modified by the endeavor of the parents. **Conclusions:** Even though the concepts of embryology described in Ayurveda dates back to centuries, they are still relevant in the current scientific world provided proper insight is applied to interpret them.

**Keywords:** *Ayurveda, Embryology, Garbhasharir*

### Introduction

Ayurveda is based on its everlasting and consistent principles like *Tridosha*, *Triguna* & *Panchamahabhuta* etc. Similarly the principles of *Garbhasharir* are also based on same basics. The study of genes, hereditary and variation in living organisms which is strongly linked with the study of information systems is called as genetics.<sup>[1]</sup> Critical study of *Garbhasharir* delineated in Ayurvedic compendia roughly shows two types of processes related to genesis of progeny Viz. dependent and independent. Dependent processes imply that which can be modified & independent means that which cannot be modified by endeavor of parents. The behavioral and dietetic measures suggested to parents for formation of healthy foetus i.e. *Suprajanan*

can be measured as dependent factors for genesis. The aspects which are beyond the perimeter of parents in present birth and cannot be controlled by precautions or righteous deeds may be labeled as independent factors for facsimile. Most of the features appearing in infant are largely contributed by these two factors. The perception of *Atma* (soul) is exclusive mentioned in Ayurveda for creation of *Garbha*. Other factors like sex determination, foetal anomaly, *Prakruti* etc. are also explicated in *Garbhasharir*.

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The numerous concepts of genetics detailed in Ayurveda needs to be expounded on the basis of present knowledge. The present study is directed towards critical analysis of the concepts of *Garbhasharir* detailed in the various lexicons of Ayurveda in relation to embryology.

**Materials & Methods:**

*Brihat-trayee* with their commentaries, particularly from Sushruta Samhita *Sharirsthana* as it was perceived that undisclosed concepts of Genetics are exemplified in it, supportive texts of contemporary science, references from internet and journals were appraised for this study.

**Observations & Results:**

Thorough review of Ayurveda literature on *Garbhasharir* reveals following processes which can be grouped into dependent, independent and both (Table-1).

***Shrushtiutpatti (Evolution):*** The concept of embryology in Ayurved instigate right from the evolution. The independent factors for genesis of foetus are classically illustrated in evolution of Universe. The luminous description of Abiogenesis given by Sushruta is as follows.

The *Avyakta* (unmanifest) is contributory source of all beings, causeless itself, portrayed by *Satva* (purity), *Raja* (motion) and *Tama* (inertia) having eight forms and manifesting cause of the whole universe. The eight forms as per *Sankhya* philosophy are *Avyakta*, *Mahat* (principle of intelligence), *Ahankara* (egoistic tendency) and five *Mahabhutas* (apparent elements). From this *Avyakta*, *Mahat* having the alike element originates, from which *Ahankara* having the same attributes is developed which is of three kinds *Vaikarika*, *Taijasa* and *Bhutadi*.<sup>[2]</sup>

*Manas-prakruti* (psychic constitution) such as *Satvika*, *Rajasika* & *Tamasika* are evolved based on the combination of *Ahankara*.<sup>[3]</sup> *Bhutadi Ahankara* with collaboration of *Taijasa*, give rise to five *Tanmatras* (subtle elements), having the same trait arise with their perceptible emanations being sound, touch,

vision, taste and smell; from these *Tanmatras*, *Mahabhutas- Akash* (space), *Vayu* (air), *Tejas* (fire), *Aap* (water) and *Pṛithivi* (earth) are derived.<sup>[4]</sup>

**Preconception Factors:** Ayurveda emphasizes on pre-conceptual care so as to achieve its goal of healthy progeny. For which instructions to *Rutumati* (menstruating woman) which is known as *Rutumaticarya* has been recommended. During menstrual period from the very first day, the woman, observing celibacy should abstain from day-sleep and many other things. The lifestyle and behavior of mother in the phase of *Rutumati* acts a crucial role for the characters of upcoming foetus.<sup>[5]</sup> Diet and Lifestyle of parents prior conception plays a vital role and has a direct influence on the qualities endowed by the embryo.<sup>[6][7]</sup>

**Formation of Embryo & Soul:** As sprout comes out by the aggregate of season, soil, water and seed, similarly conception takes place positively if these four factors [*Rutukal* (proliferative phase of menstrual cycle), *Garbhashaya* (uterus), *Aahar-ras* (nutrition) and *Shukra-artav* (sperm & ovum)] are combined properly. Thus born worthy sons are said to be handsome, having predominance of *Satva* and long life span, free (father) from three debts and thus prove benefactors to their father.<sup>[8]</sup>

The engagement of soul in the formation of embryo has been mentioned in Ayurveda. *Sushruta* has revealed involvement of soul, *Ashtaprakruti* (eight primordial nature) and *Shodas-vikar* (sixteen products) in the creation of embryo.<sup>[9]</sup> While clearing up the cause for certain soul to enter in specific combination of ovum and sperm, it is affirmed that it depends on righteous and unrighteous acts performed by soul in its earlier birth.

In a combination of *Agni* (ovum) and *soma* (sperm) the psyche which is though imperishable, immutable and impenetrable, under the impulse of prior deeds along with subtle body gets associated with *Satva*, *Rajas*, *Tamas* and other Godly demonical or other impelled qualities, the soul reaches the uterus with *Vayu* to stay therein.<sup>[10]</sup>

**Table-1: Processes involved in genesis of progeny**

Independent Process	Dependent Process	Both
<i>Srushtiutpatti</i> (evolution)	Preconception process	Development of embryo
Formation of body parts		Foetal Deformity
Formation of Embryo & Soul		Sex determination
<i>Prakruti</i>		

The analogous quotation in first chapter of Sushruta *Sharirsthana* pronounces that in Ayurvedic scriptures, souls are not omnipresent but endless which transmigrate in animals, men and gods according to righteous and unrighteous work. These are inferable because of too subtlety, conscious and eternal manifesting in fusion of ovum and sperm.<sup>[11]</sup>

**Sex Determination:** The predominance of *Shukra* (semen) produces male child and that of *Aartava* (ovum) the female, while equality of both give rise to hermaphrodite.<sup>[12]</sup> Sexual contact on even days may result in conception of male child and female on odd days.<sup>[13]</sup> If conceived in these days three or four drops of one of the plants - *Lakshmana* (*Ipomoea sepiaria* Roxb), *Vatashruna* (*Ficus bengalensis* Linn), *Sahadeva* (*Sida humilis* Wild) and *Vishvadeva* (*Grewia populifolia*) pounded with milk should be put into the right nostril (without spitting) of the woman desiring male child.<sup>[14]</sup>

**Evolution & Body Parts:** The elements facilitated in an individual with the assistance of *Panchamahabhuta* includes the traits those of *Akash* (sound, auditory organ, all orifices and distinctness); *Vayu* (touch, tactile organ, all activities (nervous system), actions in all body parts and lightness); *Tejas* (vision, visual organ, complexion, heat, brilliance, digestion, intolerance, sharpness and valor); *Aap* (taste, gustatory organ, all liquidity, immensity, coldness, unctuousness and semen) & similarly those of *Prithvi* (smell, olfactory organ, hardness and weightiness).<sup>[15]</sup>

**Development of Embryo:** Development of parts and subparts of embryo takes place by nature. The merits or defects arise therein should be known as those caused by the soul entering in the embryo.<sup>[16]</sup> When zygote is bifurcated by internal *Vayu* two souls, prompted by unrighteousness occupy them reaching uterus. They are known as twins.<sup>[17]</sup>

The role of *Panchamahabhuta* in the formation of complexion of foetus and *Shadbhava* (six factors influencing the growth of foetus) which are also known as *Garbhot-Padak* (supporting for formation of *Garbha*) factors is elucidated in Ayurveda. *Tejas* element is the causative factor of complexion. When at the time of conception, if predominantly associated with *Aap* element, it makes the foetus fair-complexioned; that in *Prithvi* element causes black one. If *Tejas* does not reach the visual organ, it makes the child blind; the same associated with blood makes red-eyed; that associated with *Pitta* and *Kapha* makes

yellow-eyed and white-eyed respectively, if associated with *Vata* it causes deformity in eye.<sup>[18]</sup> The parts of the foetal body originating from father, mother, *Rasa* (nutrition), *Atma* (soul), *Satva* (psyche) and *Satyama* (suitability) are described as *Shadbhava*. The hard parts like bone, nail, teeth etc originate from father; the soft parts like heart, liver, spleen etc are of maternal origin; physical development, strength, complexion originate from *Rasa*; sensory and motor organs, knowledge, wisdom life-span, pleasure, pain etc originate from *Atma*; energy, health, strength, complexion and intelligence are *Satyamaj* in origin.<sup>[19]</sup> Structural arrangement of body parts, falling and reappearing of teeth and absence of hair on palm and soles these are due to nature.<sup>[20]</sup> The person attains the same act in rebirth by which he was impelled in previous life. He also acquires the same qualities which were frequently used in the previous life.<sup>[21]</sup>

**Foetal Deformity:** Charak in view of foetal anomaly explains that, during fertilization in the seed (sperm or ovum), the part of the body which is damaged in its genetic source gets abnormality or else not.<sup>[22]</sup> Unrighteous acts performed by parents may result in foetus of shape like snake, scorpion and pumpkin etc. On the contrary *Kubja* (humped), *Kuni* (deformed hand), *Pangu* (lame), *Mook* (dumb) and *Minmin* (muffled voice) neonates are formed either by vitiated *Vata* or ignoring craving of pregnant woman.<sup>[23]</sup> As in the rainy season wood, stone pieces and water current cause derangement in a tree situated in the river stream, *Doshas* (Bodily humour) cause abnormalities in foetus situated in the womb.<sup>[24]</sup>

**Prakruti** (natural constitution of the body): is designed by the *Dosha* which is predominant during fertilization. It is of seven types - Three due to individual *Doshas*, three by combination of two *Doshas* and one by aggregate of all.<sup>[25]</sup>

#### Discussion:

**Shrushtiutpatti (Evolution):** is an Independent process which cannot be influenced. *Avyakta* which is a manifesting cause of whole universe consists of *Triguna* but these are in equal proportion and inactive stage before abiogenesis. As *Mahat* appears, the differentiation in *Triguna* takes place and process of structural, physiological and mental variation begins in the processing of an individual. If this theory of manifestation of universe is compared with atomic theory, some inferences can be drawn. Let's consider *Satva*, *Raja* and *Tama* as proton, electron and neutron respectively. It is known that the construction of each



atom is depends upon variations in numbers of its proton, electron & neutron. This entire universe is composed of atoms. Ayurveda proposes unmanifest as a manifesting cause of the entire universe. So this atomic speculation is comparable with our ancient concept of Abiogenesis.

Depending upon the combination of *Trigunas* the *Manas-Prakruti* (psychic constitution) of an individual is determined. So the variations caused in *Mahat* and *Ahankara* determines the psychic attributes in individuals. As there is no control of individual over this process, it can be considered as independent process.

**Preconception Factors:** are dependent process. The several factors described in *Garbhasharir* are under control of parents and may alter the physical and mental attributes of offspring in its entire life. In case of *Rutumatcharya*, it is observed in contemporary science that the ovum which is developed from primary oocyte is in the prophase of the first meiotic division before its maturation. Since Ayurveda *Garbhasharir* coerce for precautions to menstruating woman, there must be some relation between maturation of oocyte and *Rutumatcharya*. The researches in epigenetics had proved role of dietary and other lifestyle behavior on the progeny.

**Formation of embryo, body parts & soul:** are also independent processes which cannot be influenced directly. The four factors *Rutukal*, *Garbhashaya*, *Aahar-Rasa* and *Shukra-Artava* are prime important process of conception. Unless all the above four factors are normal, the healthy progeny will not be born. In violation of one of these factors conception may be or may not be possible. If conception takes place in such condition there is always possibility of any defect. This process is almost dependent because most of these entities can be planned and corrected for sake of healthy foetus.

The properties of *Panchamahabhuta* are professed from respective *Mahat* and *Ahankara* of the person concerned. So the efficiency of structural attributes formed and developed in the progeny will vary in every individual. This makes the biodiversity among the individuals. Then what makes the difference between them? Ayurveda believes in soul without which there is no existence of life. The soul is different in every individual and depending upon its qualities characters differs therein.

The righteous and unrighteous acts related to genesis are the type of stored information which is helpful for rebirth of an individual. This stored information regulates soul to enter in the combination of ovum and sperm. The stored information is comparable with genetic code. The number of chromosomes is unique for any species and takes part in process of reproduction and along with genes they are responsible for overall development of individual. In this regard it can be said that the previous birth can be considered of parents which is the root source of genetic information providing to their offspring for his formation and development. So the term *Dharmadharm-nimitta* (righteous and unrighteous acts) expressed in Ayurveda may be grasped as Genetic information.

**Sex Determination:** is both dependent as well as independent process. With intervention at right time desired sex of child can be obtained as mentioned in *Pumsavana Sanskara* (Sacrament of getting child of desired sex). It can be an independent process based on the predominance of *Shukra* and *Shonita* at the time of conception.

**Development of Embryo:** is a dependent as well as independent process. Some dependent factors like *Garbhotpadak Bhava*, dietary and behavioral factors are explained for development of embryo which alters the characteristics of individuals. Among *Shadbhava* the '*Atmaja Bhava*' executed will be independent. "*Swabhava*" or nature corresponds to the genetic theory. For the formation of any body part during genesis the entire information regarding its development is stored in concerned GENE. This stored information guides the complete course of development for any organ.

**Foetal Deformity:** is a dependent as well as independent process. The Stein-Leventhal syndrome characterized by mild hirsutism, deep voice, secondary amenorrhea and cystic enlargement of both the ovaries,<sup>[26]</sup> is a condition which can be correlated with *Kalala* (semisolid mass like sputum), illustrated by Sushruta as, if a woman after menstruation performs coitus in dream, *Vayu* taking the ovum forms embryo in uterus. This produces features of pregnancy in the woman but remains as semisolid mass like sputum, only devoid of paternal qualities. It suggests that both maternal and paternal factors are mandatory for derivation of normal progeny.

Charak has also quoted that due to defects of genes, the past deeds of self, uterus, time and mothers food and behavior, vitiate *Doshas* which produces various abnormalities in shape, complexion and sense organs. The X, Y-linked disease, sickle cell anaemia etc. are some examples which correspond with opinion of Charak. The three causative factors for foetal anomalies i.e. unrighteous deeds, vitiated *Vata* and ignorance of craving in pregnancy are elucidated in Ayurveda.

**Prakruti:** Most of the authors have focused *Prakruti* with concept of Ayurveda genetics. In short *Prakruti* is a homogenous combination of maternal and paternal chromosomes which decides the structural, functional and mental attributes of the offspring. The same is described by Sushruta on the basis of *Tridosha*.

A study on *Prakruti* showed correlations between CYP2C19 genotypes and *Prakruti* with fast and slow metabolism being one of the major distinguishing characteristics. It also suggested significant impact on phenotype-genotype correlation, drug discovery, pharmacogenomics and personalized medicine.<sup>[27]</sup>

Centre for cellular and molecular biology (CCMB), Manipal University had identified the gene PGM<sub>1</sub> associated with *Pitta Dosh*. The associated gene PGM<sub>1</sub> is known to be central for controlling the basal metabolic rate (BMR) similar to *Pitta Dosh*. It is independent factor as the predominance of *Dosha* during fertilization is having influence of many factors.

It can be stated that the concept of embryology described in Ayurvedic *Garbhasharir* is based on philosophical and fundamentals of *Ayurveda*. The righteous and unrighteous deeds are given utmost importance for appearance of attributes in individual. Most of such genesis concepts mentioned in Ayurveda should be understood in terms of genetic theory of contemporary science. The righteous and unrighteous deeds can be considered as the precursor of genetic code in the individual, while dietary and lifestyle modifications suggested to parents may be compared with epigenetics.

#### Conclusion:

The concepts of embryology in Ayurveda for genesis of individual are purely based on its fundamentals i.e. *Tridosha*, *Triguna* & *Pancha-mahabhoota* etc. The critical appraisal of literature of *Garbhasharir* broadly shows two types of processes related to genesis of offspring

viz. Independent and Dependent. Ayurveda believes in the unique concept of soul which is responsible for existence of life. Hence understanding the concepts of embryology described by Ayurveda centuries ago requires proper insight to the concepts which still holds relevance in the current scientific world.

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