



IMPACT OF SIX PROCREATIVE FACTORS ON SROTODUSTI OF GARBHA IN MANIFESTATION OF FOAD (FOETAL ORIGIN OF ADULT DISEASE)

Pooja Sabharwal*	Assistant Professor, PG department of Rachna Sharir, CBPACS, New Delhi *Corresponding Author
Rima Dada	Professor & Incharge Lab for Molecular Reproduction and Genetics, department of Anatomy, AIIMS, New Delhi
Chetan Prakash	PG Scholar, PG department of Rachna Sharir, CBPACS, New Delhi

ABSTRACT Holistic biology of *Ayurveda* is based on *Triguna, Tanmatra, Tridosha, Saptadhatu, Oja, Agni, Ama* and *Srotas*. Six procreative factors (*Shadgarbhkarabhavas*) are play a prime role in formation of embryo (*Garbha*) and organogenesis. It is very clear that maternal and paternal factors are mostly responsible for anatomical development, while other factors like *Atma, Satva* are responsible for psychological development. The conglomeration of these procreative factors is must for healthy offspring. *Ayurveda* scholars felt the importance of the concept of *Shadgarbhkarabhavas* and FOAD (foetal origin of adult diseases) has been attaining considerable attention as not only do unfavourable conditions during life in the womb and in childhood affect health in childhood, they also predispose to increased risk of diseases in adulthood. By applying these principles in our routine practice, we can ensure a natural delivery free from various complications, good maternal health, a healthy progeny with good immunity and ultimately good lactation which will help in proper growth of the baby.

KEYWORDS : Garbha, Srotodusti, Shadgarbhkarabhav, FOAD.

1. INTRODUCTION:

Holistic biology of *Ayurveda* is based on *Triguna, Tanmatra, Tridosha, Saptadhatu, Oja, Agni, Ama* and *Srotas*. *Srotas* are the inner transport system of the body which provide platform to carry out the structural, functional and psychological activities of other important bio factors like metabolism, *Oja, Agni, Dhatu* etc. *Ayurveda* - A complete and holistic health science, not only deal with preventive and curative aspects of health but also has a strong footing in the field of healthy progeny. *Shadgarbhakarabhava* (Six procreative factors of progeny) have been propounded in the *Ayurvedic* classics viz. *Matrija* (mother), *Pitrija* (father), *Atmaja* (soul), *Satmyaja* (wholesome practices by mother), *Rasaja* (diet of the mother) and *Satvaja* (psychological health of the parents). Healthy mother, father, proper diet of the mother, practice of wholesome living and dietary regimen and healthy mind psychological status of parents & good deeds of soul in previous incarnation play a prime role in achieving healthy offspring, thus structuring a healthy family, society and Nation². Six procreative factors (*Shadgarbhkarabhavas*) are play a prime role in formation of embryo (*Garbha*) and organogenesis. These *shadbhavas* are not only responsible for the structural growth of foetus but they play also important role in the development of psychological, spiritual and emotional factors. It is very clear that maternal and paternal factors are mostly responsible for anatomical development, while other factors like *Atma, Satva* are responsible for psychological development. The conglomeration of these procreative factors is must for healthy offspring. Any disturbance in the *Srotas* at the minute level (*Garbhaj Srotas*) and negligence towards six procreative factors either structurally, functionally and psychologically leads to the FOAD (foetal origin of adult diseases)³. Data reveals that 3 – 5% of all births result in congenital malformations⁴, 20 – 30% of all infant deaths are due to genetic disorders⁵, and 30 – 50% of post-neonatal deaths are due to congenital malformations⁶, 11.1% of paediatric hospital admissions are for children with genetic disorders, 18.5% are children with other congenital malformations⁷, 12% of adult hospital admissions are for genetic causes, and 50% of mental retardation has a genetic basis⁸. Fifteen percent of all cancers have an inherited susceptibility⁹. Ten percent of the chronic diseases (heart, diabetes, arthritis), which occur in the adult population have a significant genetic component¹⁰. Robert Brent estimated incidences of Genetic Disorders Recessive (0.1%)¹¹, AD and X-linked (1%)¹², Irregularly inherited (9%) and Chromosomal aberrations (0.6%)¹³. The **foetal origins hypothesis** (differentiated from the developmental origins of health and disease hypothesis, which emphasizes environmental conditions both before and immediately after birth) proposes that the period of gestation has significant impacts on the developmental health and wellbeing outcomes for an individual ranging from infancy to adulthood. The effects of foetal origin are marked by three characteristics: **latency**, wherein effects may not be apparent until much later in life; **persistence**, whereby conditions resulting from a foetal effect continue to exist for a given individual; and **genetic programming**,

which describes the 'switching on' of a specific gene due to prenatal environment¹⁴. Epidemiologist David Barker was the earliest proponent of the theory of foetal origins of adult disease, prompting the theory to be denoted as "Barker's hypothesis". In 1986, Barker published findings proposing a direct link between prenatal nutrition and late-onset coronary heart disease¹⁵. He had noticed that the poorest areas of England were the same areas with the highest rates of heart disease, unearthing the predictive relationship between low birth weight and adult disease. His findings were met with criticism, mainly because at the time heart disease was considered to be predominantly determined by lifestyle and genetic factors. Since Barker's initial findings, the results have been replicated in diverse populations of Europe, Asia, North American, Africa, and Australia¹⁶. *Ayurveda* scholars felt the importance of the concept of FOAD (foetal origin of adult diseases) has been attaining considerable attention as not only do unfavourable conditions during life in the womb and in childhood affect health in childhood, they also predispose to increased risk of diseases in adulthood. The essentialities for the healthy progeny and safe delivery includes proper preparation of parents, *Punsavanasamskara, Masanumasik Paricharya*, avoidance of *Garbhaupghatkarabhava*, proper use of *Kumaragara Sutikagara, Dhupana, Raksha karma, Seemantonayana, Jatkarmasamskara* etc. By applying these principles in our routine practice, we can ensure a natural delivery free from various complications, good maternal health, a healthy progeny with good immunity and ultimately good lactation which will help in proper growth of the baby¹⁷.

1. AIMS AND OBJECTIVES:

- To study and see the relation of *Shadgarbhakarabhava* (six procreative factors) with congenital, hereditary disorders and FOAD.
- To suggest a protocol for checking such birth defects and FOAD.
- To study the *Ayurvedic* principles and formulations for improving quality life of mother and foetus and role of epigenetics in foetal growth.
- To reduce the incidence of nosocomial infections by effective natural means of disinfection and fumigation.

2. MATERIAL AND METHODS:

Classical literature of *Ayurveda* as well as modern medical science on the subjects of Gynaecology, Embryology and genetics from the library of the CBPACS, New Delhi, India were explored for this study. The Internet services of the CBPACS, New Delhi, library IT centre were also used. The data obtained were critically analysed and presented. This was purely a literary study wherein the explored literature was analysed and interpreted.

3. Impact of *Shadgarbhkarabhavas* (six procreative factors) in genesis of *Garbha* (foetus):

"*Shukrashosheet jeevsanyoge tu khalu kukshigate Garbha ite*

abhidheeyate." Shukra & shonita are united in the womb of the mother than it is called as *Garbha* or Embryo¹⁸. "Shukrashosheet Garbhashayastha atamaprakrut vika-rasamudayatma samayogavahi Garbha itichutye". *Samayoga* means proper union of *shuksra*, *shonit*, *mana*, *atma* & *Panchma-habhoots*¹⁹. This includes union of sixteen *vikaras* and eight *prakruti* also. This union has happened according to *ati-indriyatwatvat*, *ati-sukshmatvat*, all minute structures mix with each other. As per the *Ayurvedic* concepts of *Shareer* (Embryogenesis), each procreative factor contributed in the physical and mental growth and development of certain structures as well as functions of the body, which are tabulated in Table 1. Perfection of all these procreative factors in turn of their assigned structures and functions leads to a healthy progeny [Table 1]. The above-mentioned *Matrija*, *Pitrija*, and *Atmaja* Bhavas cannot be changed as they come from the parents and *Poorvajanna Samskaras* (as a result of the code of conduct), respectively, but the other three Bhavas-factors, namely, *Satmyaja*, *Rasaja* and *Sattv aja Bhavas*, practiced properly can modify the intrauterine environment and psychosomatic health of the mother, producing a healthy impact on the foetus. It is a known fact now that environmental factors can influence the genome²⁰.

According to modern medical science, there are three phases of intrauterine growth. Zygote, embryo, and foetus. Genetic constitution of the foetus, nutritional status of the mother, placental status, uterine capacity, exposure to infections, and toxic factors (i.e., rubella, alcohol, narcotics) affect the intrauterine growth of the foetus. The first, that is, the zygote phase — Period-I (weeks 1 – 2 after fertilization) consists of cell division and implantation of this cell mass in the uterus. During the second, that is, the embryonic phase or Period II (weeks 3 – 8) most of the organ systems develop and in the third, that is, foetal phase / Period III (weeks 9 – 38) further growth and elaboration of the organ systems takes place. *Shadgarbhakarabhavas* (Six procreative factors) are play a prime role in formation of *Garbha* (embryo) and organogenesis. It is very clear that maternal and paternal factors are mostly responsible for anatomical development, while other factors like *Atma*, *Satva* are responsible for psychological development. The conglomeration of these procreative factors is must for healthy offspring. Any disturbance in the *Srotas* at the minute level (*Garbhaj Srotas*) and negligence towards six procreative factors either structurally, functionally and psychologically leads to the FOAD (foetal origin of adult diseases)²¹.

Table 1. Features developed from six procreative factors

Pro-creative factors	Features developed from six procreative factors
Matrija bhav (Maternal)	<i>twaka, rakta, mansa, meda, nabhi, hridaya, klom, yakrita, pleeha, vrikka, basti, pureeshadhan, aamashaya, pakwashaya, uttaguda, adharguda, Kshudrantra, sthulantra, vapa, vapavahan</i> ²² , Majja, Garbhashaya ²³ , Krishna mandal ²⁴ , etc.
Pitrija bhav (Paternal)	<i>kesha, smashru, nakha, loma, danta, asthi, sira, snayu, dhanni, shukra</i> ²⁵ , sukla mandal etc.
Atmaja (Soul)	<i>Ayu, atmagyana, Mana, indriyan, prana, apana, preran, dharan, aakriti vishesh, swara vishesh, varna vishesh, sukha, dukkha, ichchha, dwesh, chetna, dhriti, budhi, smriti, ahankara, prayatna</i> etc.
Satmyaja (Wholesomeness)	<i>Aarogya, analasya, aloluptwa, indriyaprasada, swara, sampat, varna sampat, beeja sampat, prahasha</i> etc.
Rasaja (Nutrition factor)	<i>Sharir abhinirvritti, sharir abhivridhi, pranandubandhi, tripti, pushti, utsaha</i> etc.
Satvaja (Mind)	<i>Bhakti, sheel, shaucha, dwesha, smriti, moha, tyaga, matsarya, shaurya, bhaya, krodha, tandra, utasaha, taikshana, mardava, gambhira, anavasthitva</i> etc ²⁶ .

1.1 Srotodusti of Garbha:

Srotas are the inner transport system of the body which provide platform to carry out the structural, functional and psychological activities of the human body like metabolism. There is no direct reference available in classical *Ayurvedic* literature about *srotas* in the aspect of *Garbha* (embryo). There are four types of *Srotodusti* available in *Ayurvedic* text. Those are *Atipravritta*, *Sanga*, *Siragranthi* and *Vimarg gaman*²⁷. Any disturbance in the *Srotas* at the minute level (*Garbha*) due to those four types of *Srotodusti* either structurally

functionally, and psychologically may lead to FOAD. For example, if there is *Atipravritti*, it may lead to cancer.

4. Concept of Genetics in Ayurveda:

The word genetics derived from ancient Greek word "Genetikos" mean to genesis or origin²⁸. **Genetics** is the study of genes, genetic variation, and heredity in living organisms²⁹. Science of genetics in *Ayurveda* may appear a new topic but ancient *Ayurvedic* scholars like *Charaka* and *Sushruta* understood very well the Principles of heredity and nature of traits or characters. They knew the fundamentals of Genetics i.e. the factors determining the sex of a child, genetic defect in a childlike lameness. *Acharya Charaka* has described the whole genetics in three genetic units in the form of *Beej* (Germinal cell), *Beejbhag* (Chromosome) and *Beejbhagavyava* (Gene). He has explained that due to *vikriti* of *bija*, *bijabhaga* and *bijabhagavyava* of the couple, there will be *vikriti* or *vyapada* in the child depending on gender³⁰. *Adibalapravritta*³¹ diseases, groups of illnesses which are attributed defects inherent in either the *Shukra* (the male reproductive element) or *Shonita* (female reproductive element) which form the primary factors of being. There are six factors which are taking part in the formation of embryo and various body parts. All the soft structures i.e. heart, spleen, intestine, rectum, muscles, blood, lipid, bone marrow, umbilicus etc. of the foetus are derived from the mother, called *Matrija bhava*. Likewise, all stable or hard parts i.e. hairs, vein, arteries, nails, bones, beard, sperm etc. Of foetus are derived from the father, called *Pitrija bhava*. Just like above *Atmaja*, *Satmyaja*, *Satvaja* & *Rasaja bhavas* are also taking part in the formation of a foetus in the uterus. *Ayurveda* Science had basic or fundamental knowledge on genetics since very early time period when there was no existence of concept like Chromosomes, genes, DNA, genome etc. Our classical Scholars have explained the facts that genetic disorders are not due to any defect in the mother or, the father but in the ovum or sperm of the parents (an accepted fact today), So they advised some ritualistic therapy and cleansing (*Shodhana*) of the male and female body before planning to have a child and to take rejuvenation therapy to restore health which prevents the appearance of genetic disorder. Whatever our *Acharyas* have told in our classics about genetics should be scientifically validated to give better explanations worldwide³².

5. Concept of FOAD (Foetal Origins of Adult Disease):

David Barker's keen observations have been popularized as the "Barker hypothesis," or "Foetal Origins of Adult Disease" (FOAD). It was his group that noted that low birth weight (LBW) serves as proxy not just for foetal, but also adult health. Today, LBW is associated with a host of chronic diseases ranging from coronary artery disease (CAD), Type II diabetes mellitus (T2DM), cancer, and osteoporosis to various psychiatric illnesses. FOAD is based on the premise of "developmental plasticity"- a single genotype, influenced by specific intrauterine events, has the capability to produce different phenotypes³³. In a study conducted in Uganda and Iraq on the levels of disability among those exposed to the fast while in utero they concluded that disability rates were much higher for those exposed when controlling for outside factors. Though the measure for disability differs by country the effect is still noticeable. For those born 9 months after Ramadan the likelihood of disability is higher than the surrounding population. The mean rate of disability in Uganda is 3.8% for the country but for those exposed the number is drastically higher at 22% mean disability rate. A similar effect can be observed in Iraq where the mean rate of disability is 1.5% but the disability rate of those exposed is 23%. In Uganda the recorded number of blind and deaf can be specifically recorded allowing one to see the effect on this specific disability to expose. Those born 9 months after Ramadan were 33% more likely to be blind and 64% more likely to be deaf than those not exposed in utero. The effects of exposure to the Ramadan fast can even be observed in mental disorders. In a study conducted in Uganda it was concluded that exposure to the fast, early in a pregnancy effectively doubles the likelihood of a person having a cognitive disorder of some kind. A similar discovery was made in Iraq where 63% higher likelihood of a cognitive disorder relative to the mean was discovered for all those exposed³⁴. Experiencing loss during pregnancy also influences postnatal outcomes. Women who experienced the death of a close family member, friend, or spouse, or were pregnant during a wartime conflict, were more likely to have children prematurely, and the children of these women were significantly more likely than the general population to suffer from schizophrenia in adulthood³⁵. Besides birth weight, mental health, and reduced cortisol levels, effects of stress during pregnancy have also been linked to impaired cognitive development in children as seen in the maternal population

exposed to a severe snowstorm in Canada. Women who experienced the most stressful storm related events had children with detriments in cognitive, language, behavioural, and attention outcomes. Shockingly, the poorer performance by these children has persisted until the age of ten³⁶. Chronic diseases attributed to "Developmental Origins": - e.g.- Diabetes Mellitus, Obesity, Dyslipidaemia, Hypertension, Coronary Artery Diseases (CAD), Kidney Failure-Glomerulosclerosis, Liver Failure-Cholestasis, Lung Abnormalities- BPD, reactive airway disease, Immune dysfunction, Reduced bone mass, Alzheimer's disease, depression, Anxiety, Bipolar disorders, Schizophrenia etc.

6. Role of Epigenetics in FOAD (Foetal origins of Adult Disease):

Epigenetics is the study of changes in the organisms caused by modification of gene expression. With this branch of science, we can describe anything other than DNA that is influencing the development of an organism. Genotype and Phenotype are two important and basic concepts in this context. Genotype is the genetic constitution of an individual whereas Phenotype is the set of observable characters of the individual resulting from the interaction of its genotype³⁷. The current concept of foetal origins of adult diseases describes *in utero* programming, or adaptation to a spectrum of adverse environmental conditions that ultimately leads to increased susceptibility to age-related diseases (e.g., type 2 diabetes and cardiovascular disease) later in life. Although the precise mechanism of this biological memory remains unclear, mounting evidence suggests an epigenetic basis. The increased susceptibility to chronic disease and involvement of multiple organ systems that is observed is analogous to the decline in resistance to disease that is typical of normal aging. Although the cumulative environment over the course of a lifetime can induce increasing epigenetic dysregulation, we propose that adverse events that occur during early development can induce significant additional dysregulation of the epigenome³⁸. **Epigenetics**, which means "**on top of genes**," describes how the environment interacts with the genome to produce heritable changes resulting in phenotypic variation without altering the DNA of the genome.

7. CONCLUSION:

At this particular juncture, the fruitful conclusions, which have automatically emerged through the discussion of the available concept are being presented as follows - "Pregnancy should be by choice not by chance". Preconception counselling can play a vital role not only in achieving the goal of a healthy progeny, but also in preventing congenital and genetic disorders. *Garbhakarabhavas* are not only the factors that bring the similar new one into this universe, but they are the carriers of the organogenesis and other traits to the foetus. These traits are similar to the traits carried by chromosomes/genes as per contemporary concepts, embryogenesis, foetal growth, and development. The essentialities for healthy progeny and safe delivery includes proper preparation of parents, *Punsvanasamskara*, *Masanumasik paricharya*, avoidance of *Garbhaupghatkarabhav*, proper use of *Kumaragara*, *Sutikagara*, *Dhupana*, *Raksha Karma*, *Seemantonayana*, *Jatakarmasamskara* etc. By applying these principles in our routine practice, we can ensure a natural delivery free from various complications, good maternal health, a healthy progeny with good immunity and ultimately good lactation which will help in proper growth of the baby.

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