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Review Article

Shad Garbhakara Bhavas vis-a-vis congenital and genetic disorders

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Abstract

Despite the advancements in diagnostic techniques and therapeutic interventions, medical science has failed to keep the incidence of congenital malformations under control. *Ayurveda*, the ancient Indian medical system has given due emphasis on this and postulated various measures to minimize the risks. These measures start well before conception. According to Ayurvedic principles, proper preparation of the parents is an essential prerequisite for a healthy progeny. Pre-conception care is a set of interventions that identifies biomedical behavioral and social risks to the health of the mother and the baby. It includes both-prevention and management, emphasizing health issues that require action before conception, very early in pregnancy, for maximal impact. For meeting the objective of healthy progeny, *Ayurveda* scholars felt the importance of six procreative factors (*Shadgarbhkarabhavas*) such as *Matrija*, *Pitrija*, *Aatmaja*, *Rasaja*, *Satmyaja*, and *Sattvaja*. The conglomeration of these procreative factors is must for healthy progeny. The physical, mental, social, and spiritual well-being of the person, proper nutrition of the mother during pregnancy, and practice of a wholesome regimen, play a prime role in achieving a healthy offspring, thus structuring a healthy family, society, and nation. Negligence toward any of these factors becomes a cause for unhealthy and defective child birth. The present literary / conceptual study, thus focuses mainly on interpreting these observations, on the basis of modern scientific knowledge.

Key words: *Atmaja, Matrija, Pitrija,* procreative factors, *Rasaja, Sattmyaja, Sattvaja, shad-garbhakarbhavas.*

Introduction

The health of the nation depends on the health of its citizens. Throughout history, the birth of malformed fetuses has been well-documented and the attitude toward the infants and their parents varied according to the cultural state of the people and ranged from admiration to rejection and hostility. Advanced modern medical science has no doubt extended the life span of the human, but the new upcoming health problems are also awaiting their solution. The medical world is really worried about the increasing rate of inborn defects in the new born, which is posing a challenge to the aim of a healthy society. These inborn defects are seen as minor, major, anatomical, physiological, and even latent in nature.

Data reveals that 3 – 5% of all births result in congenital malformations,[1] 20 – 30% of all infant deaths are due to genetic disorders,[2] and 30 – 50% of post-neonatal deaths are due to congenital malformations;[3] 11.1% of pediatric hospital admissions are for children with genetic disorders, 18.5% are children with other congenital malformations,[4] 12% of adult hospital admissions are for genetic causes, and 50% of mental retardation has a genetic basis.[5] Fifteen percent of all cancers have an inherited susceptibility.[6] Ten percent of the chronic diseases (heart, diabetes, arthritis), which occur in the adult population have a significant genetic component.[7] Robert Brent estimated incidences of Genetic Disorders Recessive (0.1%),[8] AD and X-linked (1%), Irregularly inherited (9%), and Chromosomal aberrations (0.6%).[9]

These data are sufficient to awaken our conscience, to introspect and find out how and where, despite developing very fast in the field of medical technology, did we fail to reduce high infant mortality. It is frustrating for the parents of a child with one or more abnormalities. No factual explanation can be given to parents, except to reduce the risk of siblings suffering from such disorders. The prevalent health vision of the modern medical system and adverse drug reactions have attracted the population worldwide toward the holistic health approach of *Ayurveda*, which has a ray of hope. This important aspect was visualized and developed in India thousands of years ago. *Ayurveda* not only lays more emphasis

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on preventive and promotional health, but also has strong footings in the field of healthy progeny.

For meeting the objective of a healthy progeny, *Ayurveda* scholars felt the importance of Six Procreative Factors *(Shadgarbhakarabhavas)* such as *Matrija* (maternal), *Pitrija* (paternal), *Atmaja* (Soul), *Rasaja* (Nutritional), *Satmyaja* (Wholesomeness), and *Sattvaja* (Psych / Mind). The conglomarance of these procreative factors is a must for healthy progeny.[10] Healthy mother, father (good code of conduct), practice of a wholesome regimen, and a healthy mind (Psychological status of parents) play a prime role in achieving a healthy offspring, thus structuring a healthy family, society, and nation.

Each procreative factor is assigned with a certain organogenesis / functional / psychological phenomenon, to develop in the forthcoming baby, during its intrauterine life.[11] A lag on the part of any of these procreative factors will lead to physical, functional or psychological defects, which can be contributed by the respective factor.

With this background of the gravity of congenital and hereditary defects, as well as, the knowhow of the birth defects from the ancient scholars of *Ayurveda*; a study was planned as follows:

Aims and Objectives

1. To study and see the relation of Shad Garbhakar *Bhavas* with congenital and hereditary disorders.
2. To suggest a protocol for checking such birth defects.

Materials

Classical literature of *Ayurveda* as well as modern medical science on the subjects of Gynecology / Obstretics and genetics from the library of the RG Government PG Ayurvedic. College, Paprola and National Institute of Ayurveda, Jaipur, India were explored for this study. The Internet services of the RGGPG Ayu. College Paprola library IT center were also used. The data obtained were critically analyzed and presented.

Methods

This was purely a literary study wherein the explored literature was analyzed and interpreted.

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 AA*tmaja Bhavas* cannot be changed as they come from the parents and *Poorvajanma Samskaras (as a result of the code of conduct)*, respectively, but the other three *Bhavas-factors*, *namely*, *Satmyaja*, *Rasaja* and *Sattvaja Bhavas*, *practiced properly* can modify the intrauterine environment and psychosomatic health of the mother, producing a healthy impact on the fetus. It is a known fact now that environmental factors can influence the genome.

According to modern medical science, there are three phases of intrauterine growth. Zygote, embryo, and fetus. Genetic constitution of the fetus, nutritional status of the mother, placental status, uterine capacity, exposure to infections, and toxic factors (i.e., rubella, alcohol, narcotics) affect the *in utero* growth of the fetus.

The first, that is, the zygot 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

Table 1: Features developed from six procreative factors[14]

Pro-creative factor	Features
Matrija-maternal	Soft structures are inherited by *Matrija Bhava*[12] *Twak, Rakta, Mamsa, Meda, Majja; Nabhi, Hridayam, Kloma, Yakrit, Pleeha, Vrikka, Vasti, Purishadhanam, Amashaya, Pakvashaya, Antra, Uttara Guda, Adhara Guda, Kshudrantra, Sthulantra, Vapa, Vapavahanam Garbhashaya*
Pitrija-paternal	Hard structures by *Pitrija Bhava*[13] *Sukra, Kesha, Smasru, Nakha, Loma, Danta, Asthi, Sira, Snayu, Dhamani* and all *Sthira Angas*
*Atma*ja-soul	*Buddhi* / intellect / sensory / Psychological development by *Atmaja Bhava*[13] *Taasu Taasu, Yonishu Utpatti (Birth in specific species), Ayu (life span), Atmagnanam, Vignanam, Prerana of Prana and Apana, Swara, Sukha, Duhkha, Ichcha, Dvesha, Chetana, Dhriti, Buddhi, Smriti, Ahankara, Prayatna, Kama, Krodha, Lobha, Bhaya, Harsha, Dharmadharmaseelata, Upachaya; Mana, Indriyas, Akriti, Varna*
Satmyaja –whole someness	Development of acquired immunity through congenial (favorable) diet consumed by mother. *Arogyam, Analasyam, Alolupatvam, Indriya Prasadanam, Svara Varna Beeja Sampat, Praharsha, Veeryam, Balam, Medha, Ayu, Ojas, Prabha, Uthanam, Santosham*
Rasaja- nutrition factor	*Ahara Rasa*, which helps in the proper formation of *Sapta Dhatus* / physical growth mainly. *Sharirasya Abhinivritti Sharirasya Abhivriddhi, Prananubandhata, Tripti, Pushti, Utsaham, Balam, Varnam, Sthiti Hani, Aloulyam, Buddhi, Vritti*
Sattvaja-mind	Psychological makeup and development. *Bhakti, Sheelam, Saucham, Dvesham, Smriti, Moham, Tyagam, Matsaryam, Souryam, Bhayam, Krodham, Tandra, Utsaham, Taikshnyam, Mardavam, Gambhiryam, Anavasthitatvam*

systems develop and in the third, that is, fetal phase / Period III (weeks 9 – 38) further growth and elaboration of the organ systems takes place. It is pertinent to note that during period I teratogen would cause loss of the conceptus. Period II is the most vulnerable for major congenital malformations to develop and in period III various factors can result in minor or not so severe defects. Hence, essentially birth defects occur due to three main reasons, that is, abnormal formation of tissues, abnormal forces on normal tissues or destruction of normal tissues. Some of these defects may have a cascade effect and result in a group of related anomalies or multiple anomalies (syndromes).

A congenital disorder is any medical condition that is present at birth. A congenital disorder can be recognized before birth (prenatally), at birth, or many years later. Congenital disorders can be a result of genetic abnormalities, the intrauterine environment or unknown factors. Hereditary abnormalities are genetically determined and inheritable. Therefore, these two terms are not synonymous. Congenital abnormality can be hereditary, while hereditary abnormalities need not necessarily be congenital.

A congenital malformation is a deleterious physical anomaly, a structural defect perceived as a problem. A recognizable combination of malformations or problems affecting more than one body part is referred to as a malformation syndrome.

Genetic diseases or disorders are all congenital, although they may not be expressed or recognized until later in life. Genetic diseases may be divided into single-gene defects, multiple-gene disorders or chromosomal defects. Single-gene defects may arise from abnormalities of both copies of an autosomal gene (a recessive disorder) or from only one of the two copies (a dominant disorder). Some conditions result from deletions or abnormalities of a few genes located contiguously on a chromosome. Chromosomal disorders involve the loss or duplication of larger portions / total chromosome containing hundreds of genes. Large chromosomal abnormalities always affect many different body parts and organ systems.

A mutation is a permanent change in the DNA sequence of a gene. Sometimes mutations in DNA can cause changes in the way a cell behaves. Mutations can be inherited; this means that if a parent has a mutation in his or her DNA, then the mutation is passed on to his or her children. This type of mutation is called germline mutation. Mutations can be acquired; can occur when environmental agents damage DNA or when mistakes occur when a cell copies its DNA prior to cell division. Mutations can occur in every cell of the body; when they occur in somatic cells there is a risk of cancer development, when they occur in the germline there is a risk of the offspring inheriting a structural or functional disability. Many mutations are benign or silent; others explain variation in the severity of a genetic disease (polymorphisms), and there are others that produce serious consequences. The following three variables are present in this phenomenon:

1. There may be no change in the amino acid specified, due to the redundancy of the genetic code (a silent mutation).
2. A different amino acid may be specified (a missense mutation).
3. A stop cordon may be specified, which terminates the polypeptide change prematurely (a nonsense mutation).

Novel germline mutation is a combination of a somatic and an inherited mutation. The novel germline mutation arises in a parent's germ cell — either the father's sperm cell or the mother's egg cell. The child conceived through the union of sperm and egg carries the novel germline mutation.

Other than these mutations, epigenetics is also responsible for the congenital and genetic abnormalities. Epigenetics refers to changes in phenotype (appearance) or gene expression caused by mechanisms other than changes in the underlying DNA sequence, hence, the name epi- (Greek: over; above) genetics. These changes may remain through cell divisions for the remainder of the cell's life and may also last for multiple generations. However, there is no change in the underlying DNA sequence of the organism; instead, non-genetic factors cause the organism's genes to behave (or 'express themselves') differently.

Epigenetic mechanisms are influenced by several factors and processes including development *in utero* and in childhood, environmental chemicals, drugs and pharmaceuticals, aging, and diet. DNA methylation is what occurs when methyl groups, an epigenetic factor found in some dietary sources, can tag DNA and activate or repress genes. (http://nihroadmap.nih.gov/epigenomics /epigeneticmechanisms.asp & http://www.epigenome-noe.net - Heriditary and Genetics and possibly Epigenetic). Six procreative factors have an important role as causative factors of congenital, hereditary, and genetic anomalies (by mutation and epigenetics) — before conception, at the time of conception, and after conception, that is, during pregnancy. Concepts and details of congenital anomalies have been described by almost all the scholars of *Ayurveda*. With the opinion that congenital anomalies can occur due to the diet and lifestyle of the mother, deeds in the previous life of the fetus, vitiation of *vayu*, *bija* (ovum and sperm) and *bijabhaga* (chromosome), and *beejabhagavyava* (genes) in parents, a detailed view point in the light of the present knowledge is discussed herewith.

Discussion

1. *Matrija Bhavas*: *Kula* or *Gotra* of parents, maternal age at the time of conception, health of the reproductive organs of the female, time of conception, *bija* of mother, maternal diet during pregnancy, drugs-medicines taken by a woman during her pregnancy, and any disease in the mother during her pregnancy, can affect the health and normalcy of a fetus. Almost any maternal infection with severe systemic consequences may result in abortion. Certain maternal diseases are directly correlated to the congenital abnormalities in the fetus, for example, if a mother is affected by rubella during organogenesis of the fetus the new born may have a congenital abnormality, that is, CRS triad-PDA, Blindness or Sensorinural deafness.

In *Atulyagotriya Adhyaya* it has been clearly mentioned that marriages in two similar '*Gotras*' should be avoided,[15] otherwise it leads to congenital deformities in children. Today in the field of Genetics this fact is identified and given due importance, to avoid genetic disorders. It has been observed that some diseases are seen most frequently in children resulting from marriages between close relatives. The reason

for this is that in families transmitting a recessive disease, a majority of normal persons are likely to be heterozygous rather than normal homozygotes. Therefore, if one of them marries a close relative he is likely to marry another heterozygote, and it becomes possible for the children to manifest the disorder. It is therefore desirable that marriages between close relatives be avoided.

- High rate of traditional consanguineous marriages (in certain tribes, races and religions) increase the frequency of autosomal recessive disorders. In Al-Ain, UAE, autosomal recessive disorders have been reported to account for 80% of single gene disorders and 22% of congenital malformations among 16 419 births.[16] Early age or very late age conception may lead to unhealthy or defective child birth. It has been clearly mentioned that very young or old women should not be impregnated. If a woman below 16 years is impregnated by a man below the age of 25, either she will not conceive, or if at all she conceives, she will have intrauterine death of the fetus; if the child is born it will not live long or will have weak organs, ill health, deformed body parts, and so on.[17] Younger women give birth to a majority (80%) of children with Down Syndrome.[18]
- Advanced maternal age, more than 35 years, is associated with the presence of abnormal chromosome number such as trisomy 21, 13, and 18. 45, X is not associated with advanced maternal age.[19]
  The majority of cases of Down syndrome involve non-disjunction at meiosis I in the mother. This may be related to the lengthy stage of meiotic arrest between the oocyte development in the fetus until ovulation, which may occur as much as 40 years later.
- Maternal age-related fetal risks stem from iatrogenic pre-term delivery required for some maternal complications that include hypertension and diabetes, from spontaneous pre-term delivery and from an increased incidence of aneuploidy.[19,20]
- Hollier and colleagues, in 2000, studied 3885 infants with congenital malformations in nearly 103,000 pregnancies at Parkland Hospital, the risk for all non-chromosomal abnormalities increased significantly with maternal age. Club foot was increased significantly after 35 and heart disease after 40.[20]

Diseases that occur due to mutation in the mitochondrial genome are inherited only from the mother, as only the ovum contains mitochondrial genetic material. Sperms are devoid of it when fertilizing the ovum. Therefore, these diseases get carried by the mother who transmits the mutation to all her children, while a male cannot transmit it to any of his children.

Due to the abnormalities of *bija* (ovum and sperms), *Atmakarma* (deeds of previous life), *ashaya* (uterus), *kala* (time factor or abnormality of *ritukala*), and dietetics, along with the mode of life of the mother, the vitiated *doshas* produce abnormalities in the fetus, affecting its appearance, complexion, and *indriyas*.[21] These factors create an environment for mutation and epegenetic changes in the ovum, leading to abnormalities in the fetus.

2. *Pitrija Bhavas*: Ayurvedic scholars, who centuries ago, without the aid of instruments, had detailed the importance of male and female *beeja* (*shukra*/sperm and shonit / ovum, respectively) in conception. Acharya *Kashyapa*, in the Shareersthan section of the text, has clearly mentioned the entry of male *beeja* (sperm) into the female *beeja* (ovum) for fertilization.[22] It is only in 1677, Homen discovered spermatozoa, Spallanzorin in 1786 highlighted its role in fertilization, and Oscar Hertwing in 1836, showed the entry of the spermatozoa in the ovum.

If a *beeja (Sperm)* coming from a male is afflicted, a progeny may have congenital or genetic anomalies. Abnormalities of *shukra* and *vayu*, as well as vitiated *vayu* located in the *shukra* are also believed to produce congenital anomalies.[23] *Acharya Bhavamishra* has also mentioned the abnormality of *Shukra* as a cause of congenital blindness, and so on.[24]

If the father has the abnormal X-linked gene (and thus the disorder) and the mother has two normal genes, all their daughters receive one abnormal gene and one normal gene, making them carriers. None of their sons receive the abnormal gene because they receive the father's Y chromosome.

Advanced paternal age is well-documented to be associated with new dominant mutations. The assumption is that the increased mutation rate is due to the accumulation of new mutation from many cell divisions. The more the cell divisions the more chances of an error (mutation) occuring. The mutation rate in fathers over 50 is five times higher than the mutation rate in fathers less than 20 years of age. The four most common new autosomal dominant mutations are, achondroplasia, Aper's syndrome (acrocephalosyndactyly), myositis ossificans, and Marfan syndrome. Advanced paternal age logarithmically increases the risk of a new mutation, causing autosomal dominant diseases.[25]

It is possible that paternal exposures to drugs may increase the risk of adverse fetal outcome.[26] Several mechanisms have been postulated. In humans, paternal environmental exposures to mercury, lead, solvents, pesticides, anesthetic gases or hydrocarbons has been associated with early pregnancy loss, although the data is of varying quality.[27]

Professional hazards exposure of the father also adversely affects the offspring of men employed in the art of textile industries. They have been reported to be at an increased risk for still birth, preterm delivery, and growth restriction. Others who may have an increased risk of congenital fetal anomalies include janitors, woodworkers, firemen, printers, and painters[28] In one study, in 1999, Trasler and Doeksen found that male germ cell exposure to drugs or environmental agents may alter genomic imprinting or cause other changes in gene expression.[29]

3. *Atmaja Bhavas*: The soul undergoes a series of births and deaths depending upon his own good or bad actions. The effects of the actions of the previous life are carried by the soul to his next life,[30] which are the results of good or bad actions. He has to get rid of these afflictions by following a proper code of conduct in his given life, otherwise he goes into the cycle of births and deaths. This life and death cycle is achieved instantaneously at the time of the union of *shukra* — male reproductive element vis-a-vis the

spermatozoon contained in the semen and the *Artava* — female reproductive element, vis-a-vis the ovum produced by the ovary. *Lingashareera* is the carrier of these deeds.

Why do the same initial pathological features produce different diseases in different people; why do they manifests quickly in some, whereas in others there is a long latent period required before the disease manifests itself. Such unexplained or idiopathic factors are due to the *Atmaja bhava*.

The effect of what is done during the previous life is known as *daiva*. The effect of what is done during the present life is known as *purushakara*. If the *daiva* is unrighteous sufferings are shared in the present life; if however, they are righteous then the individual enjoys a happy and healthy life.[31] On the contrary sinful or unrighteous *purushartha* is due to the sufferings of the present and future life. Indian mythology further explains and believes that righteous *Purushartha* also acts as an remedy for the unrighteous *daiva*.

This is likely the law of probability, for example, if there is an autosomal dominant trait running in the family and only one partner is affected, 50% of the offsprings are expected be affected. The remaining 50% may escape unaffected.

Even if it had been considered a mythological concept, it is a guiding path toward the righteous path for a happy and healthy present and future life if any.

4. *Satmyaja Bhavas*: S*atmya* (habituation, accustomization) is the use of such things which do not cause harm to the body even though they are opposite of / different from (qualities of) one's own constitution, habitat, time, caste (family), season, disease, exercise (physical activities), water (foods and drinks), day sleep, tastes (substances of different tastes), and the like.[32]

Kalasatmya: *Ayurveda* believes that in the course of the union of parents for progeny, they present an opportunity for the soul to attain a body; therefore the Vedic studies consider the time of conception eminent. That is why due consideration is given to proper time of *gharbhadhana sanskara* for achieving a healthy baby. Improper time, season, age of conception; all these periodical factors can influence the health of the fetus by creating a mutogenic or epigenetic influence, probably.

Deshasatmya: Sickle-cell disease has been reported to occur in 2.1% of the neonates in Bahrain,[33] 1.7% of the women in southern Iraq,[34] and 1.37% of neonates in Saudi Arabia.[35] Intra-country differences are evident in Saudi Arabia where carrier frequencies range between 2and 27%, being the highest in the eastern region and lowest in the central region.[36]

The mild form of thalassemia is common in the Arabian peninsula. A report from Oman suggests that 45% of the population are affected.[37] The reported figure from Bahrain is 24%,[38] while in Saudi Arabia, it ranges from 2 to 50%, being the highest in the eastern region.[39] The existence of thalassemia is generally high but in variable frequencies.

- These are the reasons for equal importance to be given to *Satmyaja bhava* along with maternal, paternal, and other factors. Modern genetics also believe that maternal and paternal chromosomes are not responsible for the phenotype, but epigenetic factors are also involved.
- An expectant mother might well question why what she eats will affect her unborn child. However, the evidence is mounting that not only her children, but her grandchildren and subsequent generations will be affected by her nutrition. What she eats may not only affect her descendants as they develop, but potentially affect them throughout their adult lives.
- The early environment of a developing child can talk to its genome by epigenetic means. Environmental cues trigger changes to epigenetic tags on our genome, which shape the way genes are expressed. These tags on the genome can be carried through from cell to cell as we replace damaged body tissue. When such changes occur inside the egg or sperm cells, they can pass through to the next generation. Therefore, we do not just inherit our genes, but potentially also their modes of expression.
- *Karmaj/Sahaja*: Tribal groups of India have their distinctive genetic makeup. They serve as a unique gene pool, which has evolved in the natural setting over thousands of years. Therefore, they have special health problems and genetic abnormalities like Sickle cell anemia, Thalassemia, G-6 PD, red cell enzyme deficiencies, and so on. The practice of endogamy and consanguinity among tribals is likely to be one of the influencing factors for the high prevalence of genetic disorders among tribals.

It can be enumerated that the *Satmyaja* (wholesome) procreative factor is responsible for conception, normal inheritance, and growth and development of the fetus leading to the birth of healthy, happy, active, and productive citizen of generations to come.

5. *Rasaja Bhavas*: *Rasa* is the substance that flows continuously and is tasted by the tongue , nourishes the body, and gives pleasure to the mind. In this context, *Rasa* refers to balanced *Ahara rasa (diet)*. The balanced *Ahara rasa* that is taken by the pregnant woman helps in the formation of *Sapta Dhatus*, in the required amount, in the fetus. Ancient scholars have described specific month-wise dietetic regimens for a pregnant woman, to compensate the requirements of a mother as well as the growing fetus at the particular time period of intrauterine life.[40]

A great amount of emphasis has been given by the Ayurvedists on the diet of the pregnant women, to avoid any untoward effects on the growing fetus.[41]

- If the couple consumes *ruksha* (dry) and the like, *vata* vitiating diet during *ritukala* and suppresses the natural urges, then the aggravated *vayu* vitiates *Rakta* and the other *dhatus* of the fetus and produces hoarse or nasal voice, deafness, and other disorders of *vata*.[42] Also, *vata* produces baldness, premature graying of hair, absence of hair on face, tawny color of skin, nail, and hair and other abnormalities of *vata*.[43]
- When a pregnant woman continuously consumes a diet capable of aggravating *Kapha*, it produces *kustha* (leprosy), *kilasa* (a type of skin disorder), and congenital presence of teeth.[44] *switra* (Leucoderma) and p*andu* (anemia) arise due to consumption of a diet capable of vitiating *kapha*.[45]
- Due to consumption of diet capable of vitiating all

the three *dosha*s the aggravated tri*dosha*s produce abnormalities described under all the three *dosha*s.[46]

- The mother has been advised to follow the dietetics of the people of the region of type which she is desirous of having a child.[47]
- Whatever diet and regimen the pregnant woman adopts, the child will develop the same qualities [Table 2].[48]

These can be explained as follows- Alcohol consumption by pregnant women would lead to short memory span (*Alpasmriti*) and loss of concentration (*Anavasthitachitta*) in the child.[49] Daily use of wine results in Fetal Alcohol Syndrome. It is claimed nowadays that using fish daily harms the babies. Some large long-lived fish contain high levels of methyl mercury that may harm an unborn baby's developing nervous system. Due to ongoing concerns that high mercury intake via fish can cause adverse neurologic effects in the developing fetus, the US, FDA recommends that expectant mothers should limit their consumption of fish to two or fewer meals per week. The fetus is said to grow from the essence of the diet that the mother takes through the processes of *Upasweda and Upasneha*[50] Therefore, whatever diet the mother takes affects the fetus directly. This fact is well supported by contemporary science that exposure to toxins, alcohol etc. during the antenatal period may show teratogenic effects on embryo.

6. *Sattvaja Bhavas*: Human birth is a very rare privilege, for only man has the possibility of living a conscious, wide-awake, controlled life. Human being possess instinct and intelligence. All these things may not happen without the presence of *Manasa* (psyche) The factors that determine the different psychological endowments of children (in other words the state of the mental faculty of the child) are:[52]

i) The mental faculty/psychosomatic temperaments of the parents — the various traits of the parents.
ii) Milieu in which the pregnant woman lives and the impressions received by the pregnant woman during pregnancy.
iii) The influence of one's own previous birth actions / deeds
iv) Frequent desires for a particular type of mental faculty by the progeny in his previous life — special mental habits / psychological health in the previous life.

Thus the *Sattva* of the fetus is moulded by three factors, *namely*:

1. *Sattva* of parents - Genetic derivatives
2. *Garbhini Uparjita Karma* - Gestation derivatives
3. *Janmantara Vishesha Abhyasa* - Environmental derivatives

Among these three, the one that is stronger, affects the psychology of the child more.[53] Although it has been stressed that the psychic factors remain present from the pre-embryonic life and are associated in the embryo since the process of fertilization, yet apparently the psychic tendencies of the fetus manifest when the *indriyas* (special sensory faculties) develop in the fetus. Therefore, with the emergence of the *indriyas*, the *manas* of the fetus begins to feel *Vedana* (perception) and yearns for the things experienced in the previous life and this phenomenon is called *Dou-hridya*.[54] That is why the second factor, that is, *Garbhini Uparjita Karma* has a very practical significance in relation to our context. In ancient Ayurvedic classics, special preference has been given to the *Saumanasya of Mana (calm psycho-status)* during the antenatal period. They have even stressed the negative results in the fetus, if followed otherwise. The activity of the mother during the gestation period up to the delivery will result in the same *Manobhavas(psycho-makeup)* in the fetus as well.

Dauhrida Avastha of *Garbhini* (special desires of a pregnant woman) is a very evident manifestation of the *Sattvaja Bhava*. Acharyas have clearly specified that the suppression of desires of the *Dauhridi (pregnant woman)* may influence the psychology of both the mother and fetus [Table 3].

- Role of Parental Psycho-temprament: While describing the variations in the psychic temperaments from individual to individual, *Charakacharya* has mentioned *Sattva Vaisheshyakara Bhavas'*. One of them is the *Matrija* and *Pitrija Sattva* — the various mental traits of the parents — which is responsible for the psychological endowment of the children.[56] Recent research suggests that antenatal stress and anxiety as early as in 18 weeks of pregnancy has a programming effect on the fetus, which lasts at least until middle childhood, and may show up as behavioral problems, such as, dyslexia, hyperactivity, and attention

Table 2: Effects of various dietetics and mode of life upon the fetus[51]

Dietetics or mode of life	Effects on the fetus or child
Using wine daily	Over thirsty, short memory, and fickle mind
Using meat of iguana often	Suffers from bladder stone, gravel or dysuria (Shanairmeha)
Using hog's meat (pork) often	Red eyes, rough body hair, and obstructed breathing and snoring
Daily use of fish	Fixed eyes or delayed dropping of eyelids
Daily (excessive) use of sweet articles except milk	Suffers from *prameha* (urinary disorders) obese and dumb
Daily use of (excessively) sour articles.	Suffers from *raktavata* (bleeding diathesis), and skin and eye disorders.
Daily (excessive) use of salty articles.	Early wrinkling, graying of hair, and baldness
Excessive use of hot (*Katu*) articles daily	Weak, possess less quantity of *shukra*, and infertile.
Excessive use of pungent or bitter (*tikta*) articles daily	Suffers from emaciation (*Shosha*) or edema (*Shopha*), weak, scraggy and less digestive powers
Excessive use of astringent (*kashaya*) articles daily	Blackish (of dark complexion), suffers from *anaha* (flatulence), and *udavarta* (eructation)
Use of articles likely to produce diseases.	Disease according to cause

Table 3: Dauhridi's desires denoting the characters of child[55]

Desires of dauhridi (Pregnant)	Probable characters of Child
To look at king	Rich, Very lucky child
To wear very fine, silk garments and ornaments	Fond of ornaments and handsome
To live in *Ashrama*	Capable of controlling *Indriyas* and religious
To look at the statue of God	Extremely courteous like *parsada*
To look at snake, wild creatures, and so on	Ferocious or ruthless
To eat meat of *Godha*	Sleepiness and that whose nature consists in bearing itself or does not express his desires
To drink cow's milk	Mighty and with endurance
To eat buffalo's meat	Red eyes and excessive body hair and bold
To eat meat of *Varaha*	Sleepy, brave, and bold
To eat meat of *Mriga*	Industrious, swift runner, and always moves in forest
To eat meat of *Srimara*	Terrified and anxious
To eat meat of *Taittiri*	Paltroon

deficit disorder.[57]

- Gitau *et al.* (2001) found that maternal and fetal levels of the stress hormone cortisol were correlated ($r = 0.58$), suggesting that sufficient maternal cortisol can cross the placenta to significantly alter the fetal exposure. Other research indicated that elevated maternal anxiety in late (but not early) pregnancy is associated with impaired blood flow or raised resistance index to the fetus, through the maternal uterine arteries.[58]

Certain Preventive measures: In all countries, certain public health measures capable of reducing the burden of genetic and congenital disorders can be feasibly implemented. For example:

1. Reducing genetic disorders related to advanced parental age, such as Down syndrome and autosomal dominant conditions due to new mutations.
2. Reducing mortality and chronic handicap due to rhesus hemolytic disease through routine prenatal screening.
3. Reducing the risk of miscarriage, congenital abnormality, and fetal growth retardation through avoidance of smoking and alcohol intake during pregnancy.
4. Avoiding congenital abnormalities caused by certain infections such as syphilis, by prevention, early detection, and prompt treatment.
5. Reducing the occurrence of hereditary disorders in high-risk families through genetic counseling.
6. Secondary prevention entails either the prevention of the birth of affected babies through prenatal diagnosis and selective abortion, or prevention of the full expression of the condition by proper early management aimed at minimizing the clinical features of the disease.
7. It is estimated that congenital malformations account for approximately 20% of neonatal deaths, the incidence of minor malformations being 15%, and major malformations being 5%. It is thus imperative that protocols for prenatal screening and diagnosis of malformations should be well established, so that the treatment of these conditions, whether *in utero* or after delivery, can be facilitated and more newborns can be saved.

The interventions that need to be integrated can be applied:
a) Before and during pregnancy
b) After delivery of the neonate

Before and during pregnancy

1. Preconception information and services for family planning can help reduce the number of high-risk pregnancies related to increased parental age. Advice should be given to couples, to complete their intended family size preferably before the age of 35 years, for women. The incidence of chromosomal disorders and spontaneous abortion rises rapidly with maternal age after the age of 35 years. Disorders due to new dominant mutations increase with advanced paternal age. Families should be informed of these risks. When family planning is generally available and couples are aware of the genetic risks associated with advanced parental age, they tend to curtail reproduction once they have reached the desired number of children. This leads to a selective fall in births to older parents. It is also worth noting that a reduction in the proportion of older fathers reduces the rate at which new mutations enter the population, and this initiates a gradual long-term decrease in the frequency of inherited disease. Family planning, when widely available, is used preferentially by older couples and can reduce the prevalence of genetic problems related to parental age.
2. In the presence of a hereditary disorder in the family, taking a good family history will help to detect high-risk couples who can then be offered genetic counseling and referral to specialized centers, if indicated.
   When the couple is informed of the possibility that they are at an increased risk of having a genetically abnormal child, they can choose to plan the conceptions according to medical advice and can make use of the genetic services available. Since primary prevention of genetic disorders depends largely on preconception information, screening, and counseling, and there is a strong case for including these approaches in primary health care services.
4. The high rate of traditional consanguineous marriages, which increase the frequency of autosomal recessive disorders, can be avoided by imparting this knowledge to people.
5. Treatment of existing conditions, for example, women

with insulin-dependent diabetes mellitus have about a 6% risk of having a seriously malformed child in each pregnancy. They can greatly reduce the risk by meticulous glycemic control, which must be started before pregnancy, because major malformations are determined very early during embryonic development.

6. Advice regarding nutrition: Throughout the reproductive years, and particularly preconception, there is strong evidence that an optimal diet reduces the frequency of unsuccessful pregnancy outcomes and severe congenital malformations. Supplementing the woman's diet as advised in '*Garbhini Paricharya*' properties, with *madhura*, *sheeta*, *drava* prior to and in the first months after conception, reduces the risk of fetal neural tube defect and also of some other congenital malformations. [59] When fertility is high, as in most countries of the region, it is not easy to identify a preconception period and it may be preferable to supplement the womens' diet throughout their reproductive span.
7. Advice regarding the do's and dont's: Environment and psychology of a woman should be favorable and health promotive. She should avoid things contrary to the *Indriyas*, suppression of natural urges, thoughts likely to promote anger and fear, and use of articles likely to produce diseases during pregnancy. She should avoid daily and excessive use of Sweet / Sour / Salty / Hot / Pungent / Astringent articles.
8. Information regarding the deleterious effects on the developing embryo of smoking, alcohol intake, unsupervised medication, exposure to X-rays, and certain mutagens at the workplace should be made available to women prior to pregnancy.
9. Information on the availability and implications of carrier testing for specific genetic disorders common in the society, such as hemoglobin disorders and G6PD deficiency, should be provided to families at risk.

After delivery for the neonate: Neonatal screening programs for some genetic disorders, where early diagnosis and management could ameliorate the clinical picture, are being implemented in several countries. These may include neonatal screening for phenylketonuria and other inborn errors of metabolism, for sickle-cell anemia and G6PD deficiency, and for congenital hypothyroidism.

Conclusion

At this particular juncture, the fruitful conclusions, which have automatically emerged through the discussion of the available concept are being presented as follows:-

1. "Pregnancy should be by choice not by chance"; preconception counseling can play a vital role not only in achieving the goal of a healthy progeny, but also in preventing congenital and genetic disorders.
2. *Garbhakara Bhavas* 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 fetus.
3. These traits are similar to the traits carried by chromosomes/genes as per contemporary concepts, embryogenesis, fetal growth, and development.
4. These genetic/chromosomal abnormalities required certain other conditions / environments (interior / exterior) to be dominant or recessive. The normal transmitted traits through any of the *Garbhakara Bhavas* can be modified by the preventive / curative measures, if they are not permanent / serious / major.
5. This concept is very similar to the mutation phase and genetic abnormal condition, respectively, in the light of the above critical study of the subject.
6. Antenatal care, right from the preconception to full-term delivery will certainly play a key role in the prevention of such congenital and genetic disorders.
7. The area or race prone to particular congenital / genetic defects will prove this hypothesis, if the defective child birth rate is even reduced to a certain extent, by following the possible wholesome and righteous concepts of the six procreative factors.

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हिंदी सारांश

षडगर्भकर भावों का सहज/जन्मबल प्रवृत्त जिनेटिक विकृतियों के परिपेक्ष्य में एक अध्ययन

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आधुनिक चिकित्सा विज्ञान के अत्याधुनिक निदान व चिकित्सा विधियों के विकास के बावजूद भी जन्मबल/प्रवृत्त/सहज विकारों पर नियंत्रण नही हो पाया है। गर्भोत्पत्ति व पूर्ण स्वस्थ व अविकृत सन्तान षडगर्भकर भावों यथा मातृज, पितृज, रसज, सत्वज, आत्मज, सात्म्यज की श्रेष्ठता पर निर्भर करती है। इन में विकृति वास्तव में जन्मबल प्रवृत्त/सहज व जिनेटिक विकारों को उत्पन्न करती है। इन विकृतियों की उत्पत्ति के लिए कतिपय वातावरण/स्थितियों का असर होना अनिवार्य है, जो कि षडभावों के माध्यम से गर्भ को प्रभावित करती है। सात्मय व अनुकूल अवस्थाएं/आंतरिक वातावरण म्यूटोजैनिक प्रभावों से बचाती हैं। अत: इन भावों का महत्त्व समझते हुए गर्भधारण अनायास न हो कर योजनाबद्ध रूप से होना चाहिए।