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Evaluation of Teratological Concept in Ayurveda

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Abstract

Teratology is the scientific study of congenital abnormalities and abnormal formation. It includes the studies of causes, mechanisms and patterns of abnormal developments, which may be due to genetic or environmental factors like physical, chemical, nutritional etc. Ayurveda is enriched with scattered references regarding this concept, commencing from abnormalities of chromosome, genetic materials as well as abnormality due to environmental causes. Specific factors like *Beeja* (ovum and sperm), *Atmakarma* (deeds of previous life), *Ashaya* (Uterus), *Kala* (time factor or abnormality of *ritukala*), *Matuaharvihar* (dietetics along with mod of life of mother) are mentioned, that influence fetal growth, affecting its appearance, complexion and sense organs and impart abnormalities of fetus in morbid conditions. Various congenital abnormalities due to morbid condition of *Beeja*, *Beejabhaga and Beejabhagavayava* are highlights of abnormalities caused by genetics and chromosomal factors. Among the various causative factors mentioned by Susruta, *Adibala* and *Janmabala* come under this platform. The present study wants to analyze the teratological concept in Ayurveda emphasizing on morphological and physiological alteration exhibiting as birth defects.

Keywords

Teratology, *Beeja, Atmakarma, Kala, Ashaya, Matuaharavihara*

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INTRODUCTION

Congenital abnormality also known as congenital disorder or birth defect is a condition existing at or before birth regardless of cause. Birth defect varies widely in causes and symptoms. Any substance that causes birth defect is Teratogenic. The term teratology emphasizes pathology of unborn which is also defined as Embryopathy. The abnormality extends from gross structural defects to anomalies at cellular and molecular level. Teratology hence understood with congenital abnormality and mostly is influenced by two factors viz. genetic and environmental. Genetic causes include disorders due to chromosomal abnormality, mutation of gene while Environmental factors include abnormality due to physical agents like radiation, x-ray, and chemical substances like drugs, toxin etc. nutritional, hormonal and some specific maternal infection.

AIMS AND OBJECTIVES

- Analysis of concept of teratology in Ayurveda.
- Assessment of congenital abnormalities along with their causative factors emphasizing on genetic and environmental causes.

MATERIALS AND METHODS

1. Present study designed to analyze the basic concept of hereditary defects from available classical references.
2. Congenital abnormalities available in classics will be elucidated from the modern point of view.
3. Influences of *Beeja, Atmakarma, Kala, Ashaya* and *Matuaharavihara* in congenital abnormalities will be observed.

RESULTS AND DISCUSSION

Charakas view of congenital abnormality are due to specific morbid condition of *Beeja* (sperm and ovum), *Atmakarma* (deeds of previous life),*Ashaya* (uterus),*kala* (time factors), and *Matuaharvihar*[1](diet and regimen of mother)(Fig-1). *Beeja* is further elaborated as *Beeja bhaga* and *Beeja bhagabayava.* Their abnormalities collectively indicate abnormality of chromosome, gene, and DNA materiel which causes morbidity in different ways[2].*Atmakarma*is included in this category which exhibit vulnerability of one's unknown chance for susceptibility of

SCHEMATIC PRESENTATION OF CONCEPT OF TERATOLOGY

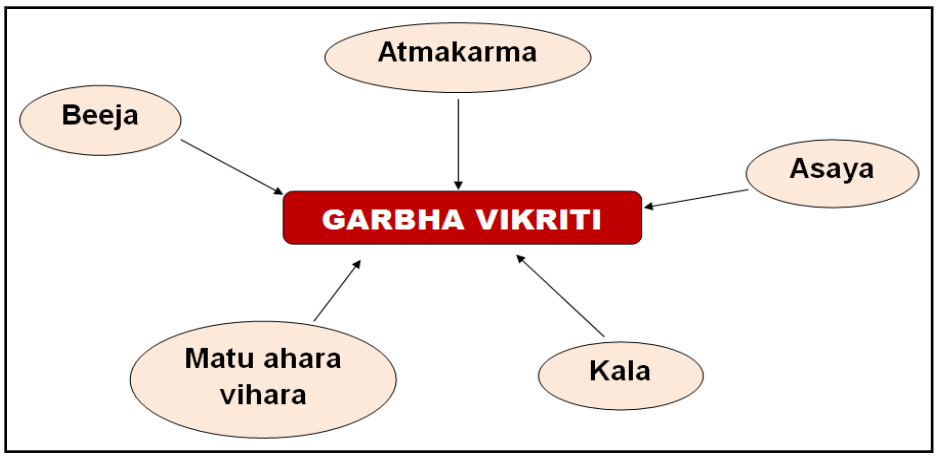

Fig 1Specific factors of teratology

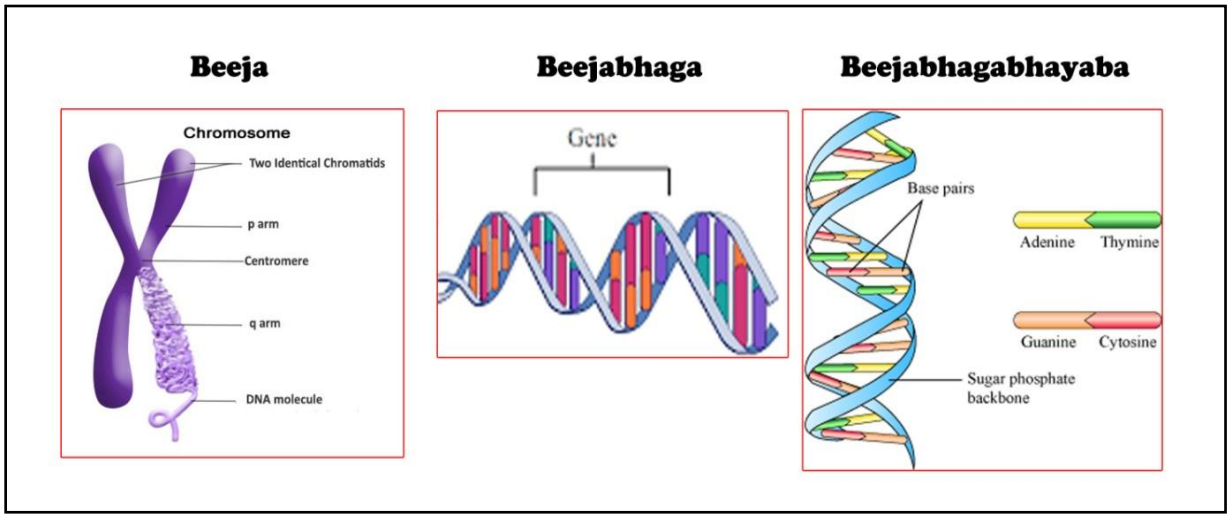

Fig 2 Specific influencing factors of teratology

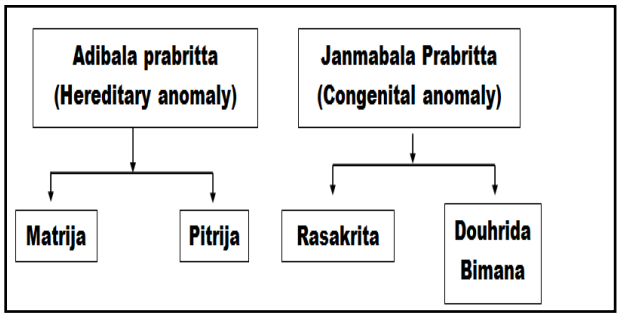

Fig 3 (According to Susrut)

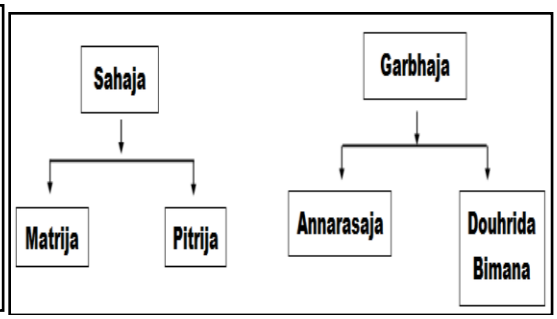

Fig4 (According to Vagbhata)

Fig -3 & 4 Types of Congenital Diseases

inheritance, leading to hereditary defect. The remaining factors like *Ashaya*, *Kala*, *Matuaharvihara* may influence the

environmental factors. According to Susruta birth defects are due to *Adibala* and *Janmabala.Adibala* is due to *matrija* (maternal) and *pitrija* (paternal), and *Janmabala* is due to *rasakrita*(dietary indiscretion) and dauhrida bimanan[3](Fig-3). Vagbhata mentioned *Sahaja* and *Garbhaja* in this context[4] (Fig-4). The *Adibala* and *Sahaja* exhibit genetic abnormality due to autosomal dominant, auotosomal recessive and sex link dominant while abnormalities cause by *Janmabala* and *Garbhaja* are due to morbid nature of diet and regiments of mother during gestational period. Abnormalities due to excessive unrighteous behavior of the mother[5] causes congenital malformation, where fetus exhibit characterslike-*Sarpa* (snake), *Vrischika* (scorpion), *kusmanda* (field of pumpkin) etc. which indicate monster, found in conjoined twin (specifically in monozygotic monochorionic monoamniotic) and parasite twin. Associating parasite limbs are also can be understood under this heading.

A. Abnormality in relation with *Beeja*& in its component:

Morbidity of *Beeja, Beejabhaga, Beejabhagabayava* indicate abnormalities in chromosome, gene and DNA material which cause various sexual anomalies (Fig-2), among them ***Varta*** indicate congenital abnormality of uterus due to involvement of *Beejabhagabayava.* While involvement of *Beejabhaga* highlights absence of *streekarabhava*, this can be understood with primary and secondary infertility involving chromosomal aberration[6]. Caraka mentioned ***Sandi yoni vyapat*** which occurs due to *Beejadosa*. Here, influencing the uterus of female fetus and characterizing improper developments of breast, where *vayu* plays a key role[7]. Absence of *artava* and *stanya* is mentioned by Susruta in this regard. According to charaka's view it can be understood as secondary infertility while Susruta's view imparts primary infertility as he emphasized about absence of artava[8].***Vandhyaa***occurs due to abnormality in *Beejabhaga*. Susruta however mentioned it as *yoni vyapat* which indicates female infertility caused primary amenorrhea due to congenital absence or distinct anomalies in uterus as well as ovary.***Vandhya*** indicate primary male infertility due to defect in *Beejabhaga*. ***Trinaputrika*** occur due to abnormality in *Beejabhagabayava* and *Beejabhaga*[9]. This can be understood with chromosomal trisomy namely Klinefelter syndrome (47, XXY) and androgen insensitivity syndrome where mutation of

AR gene occur leading to clinical feature of abnormality in masculine character and dominance of feminine character[14,15]. *Sahaja Prameha* occurs due to *Beejadosa* which is mentioned as *kulajavikara* by charaka[10]. Research shows that children born with the HLAD3/4-DQ8 genotype make up 50% of all children who developed type 1 diabetes within 5 years of age. Gene associated with developing type 2 diabetes include TCF7L2, PPARG, FTO, KCNJ11,NOTCH2, WFS1, IGF2BP2, SLC30A8, JAZF1, HHEX[18,19].***Kustha,*** mentioned under *adibalaprabritta* is a diseases which is due to abnormality in *sukra* and *sonita,* indicates skin diseases. For example Albinism is a hereditary disease that occurs by absence of tyrosine influence through autosomal recessive trait[3].

Some psychosexualdisorders along with abnormality in reproductive tissue are also mentioned in classics. These include both autosomal and sex chromosome abnormalities and exhibit morbidity in reproduction, impotency and infertility. Among them *klaibya, sanda, asekya, dviretas, vakri, pavanendriya* can be mentioned here. *Sahaja**klaibya*** and *Asekya* indicate congenital impotency or erectile dysfunction. Genetic inheritances are seen in impotency where natural variation of DNA sequences is observed[11,13].***Dviretas***occurs due to *upatapta Beeja* can be understood as Hermaphrodismwhereoffspring will have characteristics of both the sexes. It is a multi factorial clinical condition which can be understood with abnormal chromosomal keriotype47XXY, 46XX/46XY or 46XX/47XXY and various degree of mosaicism[12].

B. *Atmakarma:*

Atmakarma means the deeds of previous life of both parents and child. The soul undergoes a series of births and deaths depending upon once own good or bad actions. The effects of the action of previous life are carried by the soul to his next life, which are the results of good or bad actions. Vulnerability of one's unknown chance for susceptibility of inheritance abnormalities are understood with the concept of *Atmakarma.* For example in autosomal dominant inheritance 50% of offspring will suffer from the affected gene and 50% will remains normal, similarly in autosomal recessive inheritance 25% of offspring will suffer from affected gene and rest are free.

C. Abnormality due to *Ashaya:*

Abnormality due to asaya can be understood with congenital abnormalities of fetus due to

defects in female reproductive organs specially the uterus. Infection like virus involved endometrium, crosses utero-placental barrier, resulting abnormality in offspring. For example Rubella viruses cause language impairment in child. Some other factors like HIV, herpes simplex, and chicken pox also come into consideration under this heading. Anomaly of amount of liquor amniotic fluid influences fetal growth. Amniotic fluid index (AFI) less than 2 causes reduction in intra uterine fetal development. Diabetes induces placental insufficiency which occurs due to thickening of villi and this hamper in nourishment of fetus and ultimately influences intra uterine growth retardation (IUGR).

D. Abnormality due to *Kala:*

The word *Kala* can be understood in three ways viz. *Kala* as reproductive age of parents, *Bijakala* (ovulation period), *Garbhavasthakala* (gestational period). However here we are considering specifically the reproductive periods of parents. Research shows that advanced age of both parents can be associated with congenital anomalies of the child. For example in majority case of Down syndrome non-disjunction at meiosis-I observed specifically in baby of mother's above 40 years[15]. Anuploidy observed in hypertension and diabetic mother especially in late age[15]. Clubfoot and Congenital heart diseases increased significantly 35 and 40 years of maternal age respectively. Advance paternal age increased with risk of new dominant mutation, influencing autosomal dominant diseases[16]. Gene mutation rate over 50 years is significantly high.

E. *MatuAharavihara:*

Due to abnormal diet and regimen of parents, various abnormalities will occur in offspring. Maternal intact of certain diets mentioned in classics said to propagate fetal abnormalities. These types of diet aggravated *dosic* status of mother and thereby influences subsequent abnormality. For example- excess intake of *vata*predominant diet influences premature graying of hair, baldness, tawny color of skin, nail, and hair etc. Excess intake of *kapha* predominant diet influences different type of skin disorder, for example- *kilasa* and *switra* (Leucoderma). Alcohol consumption of pregnant mother causes limb deformity, mental retardation, hypoplasia of maxilla etc. Different vitamin deficiency like vitamin B2 and vitamin B3 induce CHD (coronary heart diseases), low protein and zinc along with low BMI of

mother induce the infant with gastroschisis. Low of folic acid and vitamin A in mother diet associated with cleft palate[17].

Some other birth defects specially mentioned in Susrutsamhita:

Pangu and Kuni indicates limb deformity or limb deficiency caused by both genetic and environmental factors, where environmental factors include drug like Thalidomide causes Amelia and Meromelia, alcohol abuse during pregnancy, certain specific infection of mother, exposure to certain chemicals which are lead to congenital limb defect. ***Janmandha*** indicates congenital blindness **i**nfluence by genetic abnormality. For example- Choriodermia is an X-link disease responsible for degeneration of retina and choroid. Leber hereditary optic neuropathy (LHON) occurs due to mutation in ND1, ND4 and ND6 in complex I of the mitochondrial chain[20]. ***Badhirya*** which can be understood as congenital deafness, found in autosomal recessive and autosomal dominant due to mutation in gene COL11A2 (DFNA13).Alport Syndrome is caused by mutations in COL4A3, COL4A4 or COL4A5 influence progressive sensory neural deafness[21].***Muka*** indicate dumb or speech impairment since birth which is influence by both genetic and environmental factors like infection during prenatal period, exposure to toxins radiation etc. Fetal Alcohol Syndrome (FAS) cause a variety of difficulties, including speech and language disorders. ***Minmina***indicatesnasal twang in voice. Apart from the normal causes genetic variation also influence the nasal twang. ***Vamana*** indicates various types of Dwarfism influenced through growth hormone deficiency which may caused by mutation of specific gene damage to pituitary gland. ***Kubja*** indicate congenital Humpback, occur due to various causes like hereditary defect in bone growth, weaken bone and spina bifida.

CONCLUSION

Teratology can also be understood as embryopathy revealed abnormality in fetal life which however may extend after birth too. Morphological alteration and functional abnormality emphasized on genetic and environmental factors. This basic of hereditary and congenital disorder are highlighted in Ayurveda with specific factors like Beeja, *Atmakarma, Asaya, Kala, Matuaharavihara.* Some clinical manifestations are emphasized under *Adibala and Janmabala*. Here three genetic

materials namely beeja, beejabhaga and bejabhagavayaba also come into consideration which showing autosomal and sex chromosomal alteration in offspring. Maternal diet and regimen during gestational period also triggers virulence of dosha in zygote, affecting the form of genotype of offspring. This is observed subsequently in phenotype characters which accelerated through influence of environmental factors.

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