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A Conceptual Study of *Beej*, *Beejbhag*, *Beejbhagavayav* (Genetics) in Ayurveda.

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Abstract:

In *Ayurveda*, the science of genetics was in existence since the time of ancient *Acharyas*. The genetic entities such as chromosomes, genes, nucleotide sequence are referred to in our *samhitas* in different similar concepts. *Acharya Charaka* has described the whole genetics in three functional units in the form of *Beej* (Germinal cell), *Beejbhag* (Chromosome) & *Beejbhagavyaa* (Gene). *Beej*, *Beejbhag* & *Beejbhagavayav* are important terms described by Ayurveda to explain defects in sperm & ovum. Due to this deformity in the progeny occurs. *Acharya Charaka*, *Sushruta*, *Vagbhatta* all have described many genetic deformities in *Sharir sthana*. He has explained that due to *vikriti* of *beej*, *beejbhag* & *beejbhagavayav* of the couple, there will be *vikriti* or *vyapada* in the child depending on gender. This vitiation is also responsible for hereditary / congenital diseases. All three *Acharyas* of our *Brihatraye* have brief description about formation of foetus, growth of foetus, foetal deformity, disorders of pregnancy, *Adibalpravritta* diseases, etc. This paper aims to compare this *siddhant* in ancient *Ayurvedic* texts to their possible comparative correlation to modern genetics.

Keywords: *Beej*, *Beejbhag*, *Beejbhagavayav*, Genetics.

Introduction:

In *Ayurveda* Genetics is best described by *Acharya Sushruta* & *Acharya Charaka* in *Sharir Sthana*. The study of genes, heredity & variation in living organisms which is strongly linked with the study of information systems is called genetics.¹ *Ayurveda* encompasses that the variation in *prakriti* is due to variation in genetic component. *Ayurveda* emphasize that the physical and mental health of progeny, depends on ovum (*Artava*) & sperm (*Shukra*) which undergo union to form embryo.² Determining the sex of child, various physical & mental deformities, transmission of traits in progeny are the subjects of molecular genetics and have well described in various texts of *Ayurveda*. *Acharya Charaka* described three genetic units *Beej*, *Beejbhag* & *Beejbhagavayav* in *Sharir sthan*. *Beeja* resembles with germinal cell like *Shonita* (ovum) in females & *Shukra* (sperm) in male. *Beejbhag* is part of the *Beej* & is compared to the chromosomes. These are responsible to carry out the trait from one generation to another. *Beejbhagavayav* is the most fundamental entity carrying hereditary characters & compared with the genes & DNA material. If any of these gets *uptapt* (vitiated) that may result in defective organ or progeny.³ *Charaka Samhita* also manifests that vitiating *Beej*, *Beejbhag*, *Beejbhagavayava* results in sexual & reproductive dysfunction in offspring, *Putipraja* & *Varta* under *streevyapad*. Similarly sterile child, *Putipraja* & *Trinputrika* under *Purusthyapad*.⁴ Genetic disorders occur when a 4 mutation affects your genes. There are three types of genetic disorders 1) single - gene disorder 2) Chromosomal disorder (3) Complex disorder. Genetic disorders is a category of diseases that includes certain

types of birth defects, chronic diseases, developmental problems, & sensory deficits that are inherited from one or both parents.

Aim:

To study the concept of *beej*, *Beejbhag* and *beejbhagavayav* from *Ayurveda* and its comparison with modern genetics.

Objectives:

- 1) To review the concept of *beej*, *beejbhag* & *beejbhagavayav* according to *ayurveda*.
- 2) To review the concept of *Garbhavyapad* according to *Ayurveda*.
- 3) To study the genetical disorders according to modern aspect.

Materials & Methodology:

Materials:

Various Ayurvedic texts, mainly from *Bruhatrayees*. Supportive texts of contemporary science. References from internet & journals were also considered in this study. Web search & peer reviewed journals.

Methodology:

1. An overview of concept of *beej*, *beejbhas* & *beejbhagavayav*.
2. Various opinions regarding *Pradoshyukt Beej*, *Beejbhag* & *beejbhagavayav*.
3. Compare the concept of *beej*, *beejbhag* & *beejbhagavayav* in modern science.
4. To study the genetical & chromosomal disorders in modern science & compare it with *garbhavyapad*.

Discussion:

The concept of *Ayurveda* genetic theory is beautifully described in various chapters of *Sharirsthana* of *Samhitas*. The concept of *beeja*, *beejbhag*, *beejbhagavyav* is a highly evolved concept of genetics representing even the minutest entity of modern genetics.⁵ *Ayurveda* has explained many years ago the phenomenon of inheritance. *Beeja*, *beejbhag*, *beejbhagavayav* are considered responsible factors for hereditary diseases along with other factors.

Beej - Smallest unit of *shukra* (spermatozoa) which is *pitruj beej* and *shonita* (ova) which is *matruj beej*, which are responsible for conception are known as *beej*. Each cell of body inherits from fertilized ovum. *Dushti* of either *matruj* or *pitruj beej* due to vitiated *dosha*, causes formation of defects in the fetus. In *shukra-shonit shuddhi adhyay*, *Acharya Susrut* has described 11 *Shukra & Shonita doshas*.⁶ *Acharya Charak* has brief description about 8 *Shukra dushti*.⁷ When *beej* is completely vitiated there is gross defects in *Garbha* & may be spontaneous abortion of *Garbha* i.e. *Garbhastrava* or *Garbhapata*. Four *mahabhutas* which are present in *Shukra* are derived from past deeds which having merged with the self enters into the fetus because the self with seed like character (*Beejdharma*)⁸ always transmigrates himself from one body to the other. Sperm cell nucleus interact with the egg cell nucleus to produce a zygote. It occurs in the ampulla of uterine tubes within 24 hours after ovulation and this fusion process is called fertilization. Various hormones are involved in this process. Further cell division and cellular differentiation takes place to develop a multicellular, multiorgan foetus.

Beejbhag - A *beej* consist of small units, *Beejbhag*. *Beejbhag* is responsible for the various organs of the body. According to *Charak* distortion occurs in those organs whose responsible *beej* & *beejbhag* are contaminated. Ex. blindness, limpness, etc. *Beejbhag* is compared to the chromosomes. Chromosome is a long DNA molecule with part or all of the genetic material of an organism. These are passed on as units from generation to generation one from each of the parents. Chromosomal disorders are due to alteration in the structure or number of chromosomes. Changes may be in autosomes or sex chromosomes. Most common disorder is aneuploidy in which the person has abnormal no. of chromosomes due to extra or missing chromosomes.⁹

Beejbhagavayav - More subtle stage of *beejbhag* carrying hereditary characters. Each chromosome bears on itself a very large number of structures called genes which guide the performance of particular cellular functions and in turn may lead to the development of particular features of a species or of individual. The transmission of genes to an organism's offspring is the basis of the inheritance. Different DNA sequences called genotype. A genotypes along with environmental factors determine what phenotype will be obtained. A gene can acquire mutations in their sequences, leading to different phenotypical traits.

Beeja, Beejbhag and Beejbhagavayav Vikruti and its Relation with modern aspects:

Beej play important role towards the formation & development of normal or malformed offspring. The impaired *beej*, if succeed in producing offspring that will be *Bandhya santati* (sterile child). In modern aspect, it is clear that any deformity in ovum leads to a sterile women, similarly deformity in number of quality of sperms leads to sterile male.

If *beejbhag* is affected of either male or female then the resulting progeny will be *Putipraja*.¹⁰ In modern aspects chromosomal abnormalities may be Numerical like monosomy, trisomy, etc. or structural disorders like deletion, inversion, ring chromosome, Isochromosome, translocation, etc. Produced children will have anomalies like Down's syndrome, Turner's syndrome, Klinefelter's syndrome, Edward syndrome, Patau's syndrome, Rett syndrome, Cri du chat syndrome, etc. Many children have mental or physical defects. or both. Some chromosomal abnormalities result in miscarriage and still birth.

If abnormality occur in *beejbhagavayav* of female portion of the genes, the progeny will be predominantly female shaped but not female actually named as "*Varta*".¹⁰ Likewise genetic defects in male *beejbhagavayav* will produce offspring predominantly male shaped but not male actually & named as "*Trunputrika*".¹⁰ In modern aspects X-linked disease refers to genetic conditions associated with mutation in the genes on X-chromosome. X-linked disorders are colour blindness, haemophilia A, Duchenne muscular dystrophy. Likewise Y- linked disorders are hypertrichosis of the ears, webbed toes, porcupine man.

Bhavas Involved in the Formation of Embryo:

There are six factors which are taking part in the formation of embryo & various body parts. These are called *Shadbhava Samudaya* which are hereditary factors.

1. *Matrija* - Maternal factors
2. *Pitrija* - Paternal factors
3. *Atmaja* - Atma (soul)
4. *Satmyaja* - (Wholesomeness)
5. *Rasaja* - (Nutritional factors)
6. *Satvaja* - (Psych. / Mind)

Conclusion:

Ayurveda provide basic or fundamental knowledge on genetics from thousands of year ago when there was no existance of concepts like chromosomes, genes, DNA, genome, etc. Genetical disorders does not occur due to any defect in mother or father but they occur primarily due to vitiated *beej*, *beejbhag*, and *beejbhagavayav*. So it can be concluded that *Beej*, *Beejbhag*, & *Beejbhagavayav* can be compared with male/female gametes, chromosomes, and genes respectively and *Shadgarbhakarbhavas* are responsible for a healthy growing life and heredity.

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