



## Review Article

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### CONCEPT OF GENETICS IN AYURVEDA: A REVIEW

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#### ABSTRACT

Genetics is the study of genes and pattern of inheritance. Genetic diseases are caused by error in the DNA in sequences called “genes “or sometimes in the much larger groups of genes called chromosomes. Gregor Mendel is the father of modern genetics. But the facts regarding genetics were very well dealt in Ayurvedic classics 3000 years ago. Ritu(ovulatory period), kshetra(Garbhashaya/Uterus), ambu(nourishment) and beeja(gametes) are the essential tools for the formation of garbha(conception). Male and female gametes (shukra and shonita) are known as beeja. Beejabhaga(chromosomes) and beejabhagavayava(Genes) are the components of beeja which are concerned with organogenesis similar to parents. Upataptata (mutation) of the components of beeja causes genetic disorders in concerned organs.

**Key words:** Genetics, Inheritance, Beeja, Beejabhaga, Beejabhagavayava.

#### INTRODUCTION

Genetics is the study of genes and pattern of inheritance. Genetic diseases are caused by error in the DNA in sequences called “genes “or sometimes in the much larger groups of genes called chromosomes. Gregor Mendel is the father of modern genetics. But the facts regarding genetics were very well dealt in Ayurvedic classics 3000 years ago. We come across various references such as guidelines to obtain a healthy progeny, parts of beeja as beejabhaga and beejabhagavayava, pattern of mutation of these genetic materials and pattern of inheritance, genetic susceptibility of an individual towards morbidity in terms of vikaravighata bhava and classification of diseases on the basis of inheritance, in the lexicons of Ayurveda.

In recent years there is an accelerating switch to non-communicable disorders. Congenital malformations and genetic disorders are becoming major cause of morbidity and mortality. Globally, at least 7.6 million children per annum are born with congenital and genetic disorders<sup>1</sup>.90% of this incidence is seen in mid and low economic countries. Prevalence of these disorders is 25 to 60 per 1000 births and it is the second most common cause of infant and childhood death<sup>2</sup>. According to W.H.O. 2005 report risk of chromosomal abnormalities is more when maternal age crosses 35 years. 50% of mental retardation cases have genetic basis<sup>3</sup> and 15% of cancer patients have inherited susceptibility<sup>4</sup>. Severity of genetic diseases may range from still birth to a permanent disability which lays down a great socio economic burden on parents as well as society. Hence, this forms the basis for the genetic concepts to understand from ayurvedic point of view.

#### Conception as sacred phenomena

Ayurveda considers conception as a most sacred opportunity to obtain a healthy progeny. Ritu (ovulatory period), kshetra (garbhashaya), ambu (Nourishment) and beeja (Gametes) are essential tools for formation of garbha. Presence of these tools in normal and adequate quantity contributes for the development of a healthy progeny<sup>5</sup>. So, the couple who are completely mature (sampoorna dhatu purusha and sad yauvanavati stree) are advised to engage in the act of sex<sup>6</sup>. Consanguineous marriages

(tulyagotreeyavivaha) are condemned by acharya Charaka as it is the most common cause of congenital abnormalities<sup>7</sup>. Expectant parents are advised to observe complete celibacy for one month, then to follow dietetics and conduits which promote the essence of shukra, shonita and satwa. Then only they are advised to indulge in the act of sex during pusphadarshankaal(ovulation)<sup>8</sup>. Once garbha is formed garbhini paricharya (ante natal care) is aimed at complete development of the fetus. During this period pregnant woman is advised to avoid garbhopaghatakar bhavas (dietetics and conduits which can harm fetus) such as, consuming food items which are hot and heavier for digestion and to avoid daruna chestas(unwholesome conduits) such as indulging in the act of sex<sup>9</sup>.

#### Prakruti/Constitution

Concept of prakruti deals with inheritance of phenotypic characters according to the predominance of doshas(three humors of body) at the time of conception<sup>10</sup>.Accordingly, constitution is classified into 7 types like ekdoshaja-3, dwidoshaja-3 and samaprakruti- 1<sup>11</sup>. All the physiological and psychological characters of an individual are designed according to the predominance of doshas in constitution. They remain permanent throughout the life span of an individual. Any change in terms of these characters leads to a morbidity<sup>12</sup>.

Presence of vitiated doshas at the time of conception will bring either a structural or functional defect, in one or other organ of the resultant foetus whose beejabhaga is pradustaha(mutant). Likewise, if beejabhaga responsible for vision is vitiated, resultant fetus will be Jaatyanadha (born blind)<sup>13</sup>. Acharya Charaka explains about shukrashonita prakruti, Kaalgarbhashaya prakruti, aturaahaarvihar prakruti and mahabhootavikara prakruti<sup>14</sup>.

#### Sex Determination

Sex determination in Ayurveda is explained as predominance of shukra causes male baby and predominance of artava causes female and equal predominance causes sterile.<sup>15, 16</sup>.Predominance is considered in terms of special potency by acharya Dalhana<sup>17</sup>. Acharya Chakrapani clarifies this as beejajanakabeejabhaga in

the context of Dwiretaska, the person with mixed gonadal dysgenesis<sup>18</sup>. Hence, we can consider shukrabahulya as shukrajanakabeejabhaga bahulya (predominance of Y chromosome) and artavabahulya as artavajanakabeejabhaga bahulya (predominance of X chromosome).

### Beeja, beeja bhaga and beeja bhagavayava

The male and female gametes (shukra and shonita) are known as beeja<sup>19</sup>. These beejas are concealed within with beejabhagas, which are responsible for the genesis of specific/ similar organs like that of parents<sup>20</sup>. If a beejabhaga which is responsible for the genesis of a specific organ gets upatapta (mutant) by vitiated doshas then vikruti (defect) will be seen in that particular organ of the foetus. On the contrary if the beejabhaga is not upatapta then the morbidity fails to pass on to next generation even if the parent is suffering from that morbidity<sup>21</sup>. Offspring born to parents who are suffering from Kustha (skin disease) will be born with same defect only if the beejabhaga responsible for the genesis of Twacha (skin) is pradushta otherwise the offspring will be normal. It is same with Jada (one who is unable to walk) and Minmina (anunasikoswarawahakah/one with nasal utterance)<sup>22, 23</sup>.

### Six procreative factors and their morbidities

Garbha is a resultant of conglomeration of six procreative factors<sup>24</sup>. They are Matrujabhavas, Pitrujabhavas, Atmajabhavas, Satmyajabhavas, Rasajabhavas and Satwajabhavas. Each of these is concerned with certain organogenesis/psychogenesis. Whenever the parents indulge in unwholesome food habits and conduits which can vitiate doshas, the vitiated doshas, while circulating in body can bring a change in genetic material which can be inherited. If conception takes place after this mutation, then the morbidity will be appreciated in the organs of fetus whose Matruja/ Pitruja avayavanaka beejabhaga are vitiated. Suppose Matruja avayavanaka beejabhagas/ beejabhagavayavas /ekdesha of beejabhaga (nucleotide sequence) are upatapta then organs derived from Matrujabhavas will be born with defect. This is very well explained in the context of Streevyapadas and morbidities due to mutation of these above said genetic material for shonitagarbhashaya are Vandhya (sterile woman), Pootipraja (one who delivers putrid offsprings) and Vaarta (whose physical appearance is like female but actually she is a Astree)<sup>25</sup>. Similarly it is understood same for Purushavyapadas as Vandhya (sterile man), Pootipraja and Tranaputrika<sup>26</sup> (whose physical appearance is like male but actually a apurusha).

### Vikara vighata bhava

We observe that animals are resistant to most of plant diseases and vice versa. How the disease causing factors exhibit this specificity. This concept is very well explained in Ayurveda in terms of Vikaravighatabhava. Manifestation and non manifestation of a morbidity depends upon prativisheshata (pratyankoolata/ mutual coping) of nidana, dosha and dooshyavisheshatas towards vikaravighatabhava and vikaravighata bhavabhava<sup>27</sup>. A factor which inhibits manifestation of morbidity in an individual is known as Vikaravighata bhava<sup>28</sup>. In the absence of vikaravighatabhava manifestation of disease is possible easily<sup>29</sup>. Like this individuals exhibit the inherited susceptibility towards the disorders.

### DISCUSSION

A permanent inheritable change in genetic material is known as mutation (Upataptata). Garbha is a conglomeration of six procreative factors. Among them change in genetic materials of Matrujabhavas and Pitrujabhavas can occur before conception. Even satwajabhavas play a major role in causing mutation before

conception. On the contrary Satmyajabhavas and Rasajabhavas can modify the intrauterine environment. Maternal habit of adopting Garbhopaghatakar bhavas may harm/ cause many congenital abnormalities. These Garbhopaghatakarbhavas are similar to teratogens such as chemicals and radiations. That is why acharyas mention to adopt proper dietetics/conduits during conception. This is reason for acharya Charaka to highlight aturahar vihar prakruti.

Concept of prakruti helps us to counsel the expectant parents and thereby to avoid possible inheritable and congenital disorders. By advising the tips to increase the essence of shukra and shonita one can guide parents to obtain a healthy progeny. Similarly persons born in Hemant and shishir ritu are much healthier. This explains the importance of kaalgarbhashayaprakruti told by acharya Charaka<sup>30</sup>.

Beejabhaga (chromosomes), beejabhagavayava (genes) and ekdesha of beejabhaga (nucleotide sequence) are the components of beeja which carry the genetic code for the genesis of different organs. Study of streevyapadas and purushavyapadas yields us knowledge regarding cause for mutation, pattern of inheritance and their prevention.

Parental habit of consuming unwholesome foods and conduits may not harm the parents because of presence of strong vikaravighatabhava. But a change in genetic material will definitely be passed on to next generation which renders those offspring susceptible for such morbidities. This explains better, the reason for an accelerating switch to non communicable disorders in recent years and why there is an individual variation in terms of vyadhikshamatwa<sup>31</sup>.

### CONCLUSION

One can obtain a healthy progeny by maintaining optimum purity of tools required for conception told by acharya Sushruta. Burden of genetic disorders may range from a permanent disability to still births. The impact of this will bring much grievance. So, as Ayurveda's prime goal is prevention, one can adopt better preventive measures to avoid/ minimize these genetic disorders and congenital malformations by understanding and adopting the facts explained by our acharyas.

### SCOPE FOR FURTHER STUDY

Acharya Sushruta advises for expectant parents to indulge in sex during even days after the cessation of menstrual flow/days nearer to ovulation to get a male baby and odd days for those who are in expectation of female. According to Acharya Dalhana on even days there is less predominance of Rajah (X chromosome/ Rajotpadakabeejabhaga) and on odd days rajah is predominant. Hence, we obtain male baby on engaging in sex during even days of menstruation and female baby on odd days. One can conduct research work why and how Rajah varies in terms of predominance during these days.

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