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Review Article

REVISITING GENETICS: THE NEGLECTED PART IN VAJIKARANA

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ABSTRACT

Fertilization is a very complex and fascinating process in which the genetic material of the mother and father unite. It is because of this union of genetic material the children resemble their parents and inherit traits passed down from both parents. For the union of sperm and ovum, a plethora of factors play an important role. But does the union of sperm and ovum guarantee normal development of zygote? Acharyas of Ayurveda have mentioned many factors which play an important role in the formation of fetus with Samparipurna deha. One among such important factors is the sampad of Shukra and Shonita. Acharyas have also mentioned different conditions which may arise due to abnormalities of Bija, Bija-bhaga or Bija-bhaga avayava. And due consideration should be given to them while evaluating the patient. But the modern day practice of Vajikarana has got limited to just improving the amount or quantity of Shukra. In the present literary/conceptual study, the points related to Genetics – in Ayurveda and Modern Science – will be discussed.

Keywords: Fertilization, Genetics, Bija, Bija-bhaga, Bija-bhaga avayava, Vajikarana.

INTRODUCTION

A man with children has been praised in Ayurveda as bahushakha i.e. having many branches; whereas a childless man has been compared to chitradeep which is lit but does not give out any light[1]. In begetting a healthy progeny, bija – Shukra and shonita – play a very important role. Dalhana says that avikrita vatadi doshas along with the help of Shukra and shonita give rise to deha[2]. Also, Shukra and shonita, along with the predominance of dosha at the time of their union, determine the prakriti of an individual[3]. Any vikriti in the bija will naturally be transmitted to the offspring and willlead to a defective or deformed progeny. Thus, Shukra and shonita affect our lives in many ways.

DISCUSSION

On carefully scrutinizing the Ayurvedic classical texts, we find a large number of references regarding a clear, deep and rational understanding of the Acharyas on the subject of genetics. Acharya Charaka states that the marriages between those males and females should be permitted who are of separate kula or gotra[4]. Chakrapani commenting on the above verse says that marriage between male and females of same gotra is considered as adharma and such a practice is prohibited by the dharma shastras[5]. The concept of Genetics mentioned in Ayurveda can be well described and understood under the headings of Bija, Bija-bhaga and Bija-bhaga avayava.

Bija

Charaka says that by the proper combination of Shukra, shonita and the Jiva in the kukshi, Garbha is formed[6]. Chakrapani states that Shukra and shonita are the bija[7].

"Bija iti kritsana eva arambhake bije" – bija is that entity which has the ability to start the cascade of processes leading to the formation of Garbha with samparipurna deha[8]. Due to the defects in bija, garbhashaya, atma karma, time and food as well as the regimen of the mother, doshas get vitiated and this results in impairment of shape, color and sensory as well as motor organs of the offspring[9].

Because of kushtha dosha, the Shukra and shonita of the male and female also get vitiated and the child thus born to them will be kushthita i.e. either having kushtha or prone to develop kushtha[10]. Dalhana states that if the bija of the male and female are completely upahata i.e. affected by the kushtha dosha, then they will not be able to bear any child as such a bija is unable to result in a progeny. It is only when the bijas of such parents are upatapta matra i.e. just vitiated by the doshas (which cause kushtha) that the couple will bear a child, but the progeny will be having kushtha[11]. Chakrapani states that if the father of a child has kushtha but his bija is unaffected by the dosha causing kushtha, in such a case the progeny will not be having any disease of the skin[12]. Thus it is by the bija only that the various traits and dushti of parents are passed on to the progeny; otherwise how is it possible that the kushtha of the parents be inherited by the progeny?

A healthy progeny is only possible when the bija of male and female are shuddha. Such a shuddha bija only will be able to form a Garbha devoid of any abnormalities. Chakrapani states that the manushya bija is a samudaya i.e. conglomeration of information regarding the pratyanga i.e. different body parts of a human being; and thus with the help of this information, the bija is able to produce another purusha or human being with all the pratyanga and who is similar to another manushya or human being in its outlook[13].

Bija-bhaga

"Bijasya anga pratyanga nirvatako bhago bija bhaga" i.e. that part of bija which brings about / causes / accomplishes /sets in motion the formation and development of anga and pratyanga of a Garbha is called as bija-bhaga[14].

Charaka states that if a particular part of bija which is responsible for the formation of a particular anga or avayava gets vitiated, then that particular organ will get vitiated and as a result of this vitiation there may be vikriti of that particular organ. If the bija-bhaga responsible for the formation of that anga-avayava is not vitiated, then there would be no vitiation or malformation of the respective organ. Thus both the possibilities are there[15].

In Charaka Samhita, following description regarding the formation of deformities in different parts of a Garbha is found:
if the woman indulges in those diets and regimens which lead to aggravation of dosha, then these aggravated dosha, circulating in the whole body, reach the shonita and garbhashaya and vitiate these partially. If the lady conceives or gets pregnant at this time, then one or many of the matrija avayava get vikrita in the Garbha. These vitiated dosha may afflict the bija or bija-bhaga by which the corresponding organs derived from this bija-bhaga get abnormally formed. When the bija-bhaga in the shonita of the mother responsible for the formation of a healthy garbhashaya is vitiated, then she gives birth to a vandhya child[16].

Chakrapani commenting on the above verse says that the bija is only partially vitiated by dosha and not completely vitiated, because if complete vitiation of bija occurs then there will be no Garbha formation. The term garbhashaya bija-bhaga can be explained in two ways: first, it may mean that portion of bija which is responsible for the production of garbhashaya; or second, it may signify that portion of bija which is responsible for the formation of both the garbhashaya and artava rupi bija in the Garbha. By the upaghata of garbhashaya and artava, the female thus born will be vandhya only[17].

Charaka says that because of bija dosha, the maruta in the Garbha vitiates its ashaya / garbhashaya and thus it leads to the birth of a child who has small breasts and has no desire for men. Such a yoni vyapatha is called as shandhi yoni vyapatha. This condition is said to be incurable[18]. Chakrapani commenting on this says that by bija dosha, artava rupi bija dosha has to be taken, as it is mentioned in sharira 4th chapter that if the bija-bhaga responsible for the formation of garbhashaya in the shonita of the mother is vitiated then it leads to the birth of a vandhya child[19].

Similarly, in the male, the bija dosha leads to vikriti in the organs which are derived from the father. When, in the bija, the bija-bhaga is completely vitiated, it gives birth to a child who is unable to father children[20]. Chakrapani commenting on this says that here bija is Shukra and bija-bhaga is that part which is responsible for the formation of Shukra rupi bija in the male[21].

Bija-bhaga avayava

"Bija bhaganam ekadesha" – it refers to 'a fraction' of the bija-bhaga[22]. Charaka says that when, in the shonita of the mother, the bija-bhaga avayava responsible for the formation of garbhashaya gets excessively vitiated then she gives rise to putipraja. When the bija-bhaga avayava responsible for the production of garbhashaya and also the portions of the bijabhaga which are responsible for the production of organs that characterize a female, get excessively vitiated, then the lady gives birth to a child who is not a complete female but only having feminine characteristics. Such a child is known as Varta[23].

Chakrapani commenting on the above says that by 'strikaranam sharira bhaganam' that portion of the biha-bhaga is meant which brings forth the formation of distinctive female characters like breasts, genital organs, hairs etc. Also, the term putipraja implies a woman who delivers only dead fetuses. The term puti also implies a child having deformed / not well developed limbs and organs[24]. As these deformities are caused by the vitiation of artava [ovum] and are thus related to a stri, these are called as stri vyapada.

Similarly, in a male, when the bija-bhaga avayava in the bija gets vitiated then this gives birth to Putipraja. When the bija-bhaga avayava responsible for the formation of organs that characterize a male are excessively vitiated, then such a bija gives birth to a child who is not complete male, but having only masculine characteristics. Such a type of child is called as Trina putrika[25]. Chakrapani states that both the varta and trina putrika are known to have desire for sexual intercourse but they are incapable to do so[26]. The above deformities are called as purusha-vyapada.

Thus, from the above description, one can observe that how beautifully the diseases occurring due to defects of and in the male and female bija, bija-bhaga and bija-bhaga avayava have been described. Acharya Sushruta has put the diseases occurring due to defects of Shukra and Shonita into the category of Adibala pravtitta vyadhis. He further classifies Adibala pravritta vyadhis into two categories as: matrija and pitraja[27]. Dalhana commenting on the above says that matrija are the ones occurring due to the vitiation of shonita of the mother and pitraja are the ones occurring due to defects in the Shukra of the father[28]. Such diseases occurring due to defects in the sperm and ovum are called hereditary diseases and are genetically inherited by the children from either of the parents.

Ayurvedic scholars have mentioned six garbhakara bhava viz Matrija, Pitraja, Atmaja, Rasaja, Satmyaja, and Sattvaja; and the combination of all these is a must for healthy progeny. These bhavas have been associated with the formation and development of various organs as well as the development of mental qualities in Garbha. Mridu organs are said to be derived from mother and sthira body parts are said to be derived from father[29,30]. Conception from healthy mother and father will lead to healthy organogenesis in the Garbha; but if any abnormalities are present in the matrija and pitraja bhava, they will be carried on to the Garbha as well. Aruna datta says that such kulodbhava roga are asadhya because in these diseases the bija has got upatapta[31].

The description of eight types of Vikriti Prakara (Napumsaka) by Charaka also signifies the effect of bija on the Garbha. Defects in the bija when associated with wrong actions of the past, lead to malformations in the Garbha; and the child thus born may have defects like Dvireta, Pavanendriya, Nara or Nari shandha, Vatika shandha etc[32].

Thus we see that the knowledge regarding bija, bija-bhaga and bija-bhaga avayava is necessary to understand the various conditions which originate due to their dushti. Also, vitiation of these leads to various diseases in the progeny; the progeny itself may be vandhya and hence unable to reproduce. The

understanding of this concept helps a physician to understand the prognosis of a patient and then to plan the proper treatment.

Modern views

The combination of genetic material is brought about by the fusion of sperm and ovum. Any morphologic defects in the sperm like two heads, pin head compromise the fertility of a male, thus posing problems in begetting a child[33]. Data reveals that nearly half of all major disability and deaths in childhood has a genetic cause[34].

Genotype is the genetic composition of an individual and phenotype is the expression of the genes. Any defects in the genetic composition of an individual may result in various disease states affecting the individual and later may affect the progeny also. Genetic disorders can be due to either chromosomal abnormalities or mutations in the genes[35]. Chromosomal abnormalities indicate major shuffling in the DNA structure affecting many genes. A popular textbook of medicine quotes "approximately 50% of spontaneous miscarriages are due to chromosomal abnormalities." These abnormalities can be either numerical or structural. In numerical abnormality, there may be an incorrect number of chromosomes; whereas in structural abnormality, there may be changes in the structure of chromosomes[36].

The addition or subtraction of a chromosome results in early pregnancy loss. But certain combinations which lead to presence of extra chromosome may not result in pregnancy loss and so may give birth to children with distinct clinical syndromes[37]. Trisomy of chromosome 21 leads to Down's syndrome and trisomy of sex chromosome – 47, XXY combination – leads to Klinefelter's syndrome. Absence or loss of a chromosome may or may not be compatible with survival. Monosomy – 45, XO – leads to Turner syndrome[38]; while monosomy – 45, YO – may be lethal[39].

The structural abnormalities of chromosomes may be due to translocation, duplication, deletion and inversion[40]. The exchange of genetic material between two chromosomes – homologous or non-homologous – is called translocation. There may or may not be loss of genetic material during translocation and the effect produced depends upon the genetic material lost. In unbalanced reciprocal translocation, there are repeated abortions and malformed children. The Robertsonian translocation is associated with phenotypically normal male, suffering from infertility and such males are at high risk to produce malformed children in next progeny[41]. Deletions involve loss of genetic material from chromosome. Various disorders due to deletions include cri du chat syndrome – deletion of short arm of chromosome 5 – and several cancers with hereditary basis[42]. Loss of DNA from telomere is being recognized as a cause of mental handicap[43].

The differentiation of sex in a fetus depends on the presence of Y chromosome. The Sex Determining Region of Y chromosome [SRY] provides the impetus for the testicular differentiation and also includes the genes for secretion of Mullerian Inhibiting Substance. The embryo is bipotential till the 7th week of gestation. In genetic males, owing to the presence of Y chromosome, testes, Leydig and Sertoli cells appear in the 8th month. These secrete testosterone and MIS which leads to the regression of mullerian duct; and wolffian duct, thus, develops into male genitalia. In the absence of Y chromosome – as in genetic females – the wolffian duct regresses and mullerian duct system develops into uterine tubes and uterus[44].

Micro deletion of the SRY region may produce female with karyotype XY[45]. Genes controlling sperm production are located on the Y chromosome. Any deletions or mutations in Y chromosome can cause problems with fertility; and are likely to cause sperm count in the region of 2million/ml. Submicroscopic deletions of Y chromosome are found in 10-13 % of men with absent sperm count. If individuals with such deletions are able to father children, then the male offspring from these pregnancies will also inherit the similar Y chromosome deletion from father. In individuals with idiopathic, non-obstructive azoospermia or oligospermia, the diagnosis is confirmed only after the investigation shows deletion of Azoospermia Factor [AZF] in the Y chromosome[46].

Condition like 'True Hermaphroditism', in which affected individuals have both ovaries and testes, is possible due to XX/XY mosaicism; which is a result of faulty mitosis in early zygote[47]. 'Male Pseudohermaphroditism' is another familial disorder where the affected individual has gametes of one sex but the overall physical characters of the opposite sex. It is due to micro deletions in the genes which code instructions for secreting androgens, which in turn direct male sexual development[48].

Mutations are permanent changes in the DNA of a cell[49]. Body has a family of DNA repair enzymes which repair any error in DNA replication or somatic mutation[50]. But if these repair enzymes go faulty, then mutations in gametes are transmitted to the children (thus, inheriting it) and the somatic mutations give rise to cancers and congenital malformations. Currently, 5000 single gene defects are known with major and minor consequences[51].

Investigations in Genetic disease

The investigations in genetic disease are no different from the other disease conditions and include a thorough history, clinical examination, various tests like hematology, immunology, and radiology. Certain advanced techniques like DNA and Chromosome analysis are being used by many clinicians to confirm or exclude a diagnosis. Investigations like Fluorescent in situ Hybridization [FISH] and use of whole genome assays [DNA 'chips'] have enabled the clinician to detect the missing copies or sequences of genes and thus have revolutionized disease detection. Various predictive tests and Genetic 'screening tests' are done in the 'risk' groups[52].

Molecular therapeutics

Genetic counseling is an essential part of treating individuals and families with genetic disorders. It helps them to make informed personal choices like taking treatment or planning a family[53].

The field of Pharmacogenomics is gaining popularity and in not too distant future it will be a great tool in individualizing the medicine. Also, researches in the field of Gene Therapy have made it possible to replace the defective genes in affected individuals. Other research fields like Stem Cell Therapy have opened exciting new domains in the treatment of genetic disorders[54]. But, some of these treatments have ethical issues attached to them.

All this said and discussed, the real question is "how much of the population in the world can afford these costly investigations and treatments?" Only a very few is the answer. So what should the rest do?

WHAT AYURVEDA HAS TO OFFER?

Ayurveda has an established position in the field of healthy progeny. Ayurveda advocates that planning for a healthy progeny should start from the time a couple either gets married or is about to get married. Ayurveda has advocated "Atulyagotriya vivaha"[4]. The idea behind this concept was to avoid consanguineous marriages. Such a type of practice lessens the chances of any genetic abnormality or disease being inherited by the fetus, which may manifest later in life; and also lessens the chances of the fetus being born with any abnormalities.

Appropriate age for marriage should be taken into notice. Ayurveda advocates that a male having achieved 25 years of age should marry a girl who has reached 16 years of age. If a girl, less than 16 years of age becomes pregnant, then the Garbha dies in the garbhashaya; even if such Garbha is born, it will be having many deformities. Similarly, if a lady who is old, suffering from chronic illness bears a child, then the child will be suffering from abnormalities. Same rule of age applies to males also[55].

For achieving a healthy progeny, Shukra and Shonita shuddhi is very important. The abnormalities of the Shukra and shonita are same and Shukra and shonita affected by such abnormalities are devoid of bija and thus unable to beget any progeny[56]. Various methods for the purification of Shukra and shonita are described in ayurveda[57]. Such a shuddha bija will aid in achieving a healthy progeny.

Ayurveda has described "shad garbhakara bhava". The matrija and pitraja bhava are responsible for organogenesis and transmitting traits to the garbha. These should be taken care of by undergoing various purificatory methods and by use of various Vajikarana yogas. The rasaja bhava is responsible for proper nutrition to the Garbha. By the proper nourishment only a Garbha is able to survive. So a mother should take due care to provide good nutrition to Garbha. The sattvaja and satmyaja bhava are responsible for development of manasika prakriti of the Garbha[30]. The mental state of the garbhini can have good or bad effect on the Garbha. So she should remain happy and unattached to things that bring misery.

The concept of "Prakriti" is a very unique contribution of Ayurveda. Various factors have been described which help to determine the prakriti [phenotype] of an individual. Factors like Shukra shonita prakriti, Maturahara vihara prakriti, Kala garbhashaya prakriti and Mahabhuta vikara prakriti aid in the formation of prakriti[58]. A shuddha Shukra and shonita will lead to the start of a healthy prakriti, which will have to be sustained by following a proper dietary regimen by the pregnant lady. It will further strengthen the healthy progeny. Also, the time should be proper for conception and both the partners should be willing for child. Specific garbhini charya for each month has been described[59] and it should be followed with utmost care for it aids in the growth and development of a healthy Garbha. If dietary factors are not taken care of, then the Garbha will develop various deformities[60].

CONCLUSION

From the above discussion we see that our lives are affected in many ways by genes. The genetic composition of an individual plays a dominant role in determining the phenotype of that person. This concept was known to ancient scientists and so, in spite of not having the technology of today's era, they have described elaborate methods to beget a healthy progeny. The concepts like shadgarbhakara bhava, formation of prakriti, month wise garbhini paricharya, atulya gotriya marriage, various purificatory methods for Shukra and shonita might have been aimed at reducing the effect of teratogens, so that a healthy progeny without abnormalities is born; and these might also have helped to modify the bija-bhaga or bija-bhaga avayava which, otherwise, may have produced abnormalities in the Garbha. Thus, by minimizing the effect of various genetic and environmental factors on Garbha, the goal of begetting a healthy progeny was achieved. The practice of Vajikarana in today's era should incorporate all these concepts. Public should be made aware of the broad domain that Ayurveda has to offer in the field of Vajikarana. Only then the goal of begetting a progeny with "healthy mind and healthy body" will be achieved. "Let Pregnancy be by Choice and not by Chance".

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