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Conceptual Review on *Atulyagotriya Sharir* as the Concept of Genetics in Ayurveda and its Significance in Present Contemporary Science

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Abstract

The concept of genetics/heredity evolved from here and he says in the context of *Vajikarana, Su Bahu Praja* it indicates that the couple should have the best numerous progeny and social mode of conduct also plays a crucial role in genetics. Now in present scenario modern genetics also accepted that the couple who has good intellect can have more than one child. This increases the growth of country and literacy. The incidence of gene related disorders and developmental fetal defects are growing day by day due to various changes in the lifestyle of individuals, environmental changes and due to various other factors. Genetics plays an important role in human life it states that every individual is different in physical characteristics and mental behaviour; all these are based on the genes which carry them. Even the gene influences the person from susceptibility to various disorders. The importance of such individual variations in health and disease is an important basic principle of *Ayurveda* which is explained by *Acharya Charaka.* In this present study the concept of genetics given by *Acharya Charaka* in *Atulyagotriya Sharir Adhyaya* will be interpreted with the present concept of genetics, detail consequences of above said factors and to educate the families because most of who are practicing these marriages are illiterate hence the proper guidance related to hazards of consanguineous marriages on health of the progeny has to be explained to them. This study would help to bring to light the concepts related to various branches of genetics described in *Charaka Samhita* and may bring newer concepts which can be useful in the prevention of such cases to reduce the burden of genetic and developmental diseases in the society.

Keywords: *Atulyagotriya;* Genetics; Progeny; Consanguineous marriage congenital anomalies.

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Introduction

The sages of ancient India gave the vision of many scientific facts about human body such discoveries are the fundamental aspects for the basis of other sciences in present scenario. Purpose of human life /entities is to protect them but death is a natural phenomenon, hence this protection is restored in the form of genes, by which the genetic material is transferred to generation to generation this satisfies the main motive. Genetics plays an important role in human life it states that every

individual is different in physical characteristics and mental behaviour; all these are based on the genes which carry them. Even the gene influences the person from susceptibility to various disorders. The importance of such individual variations in health and disease is an important basic principle of *Ayurveda* and explained by *Acharya Charaka* in the form of *Purusham Purusham Vikshey*- this states that sages were well versed with the principles of heredity and nature of chararcters.

Ayurveda is an ancient system of life science. It not only deals with treatment of the diseases, also describes the rule and regulation for human beings for being free from diseases, i.e. state of physical, psychological and social well-being. *Acharya* mentioned concept of *Dinchary, Ritucharya, Sadhvrita Palana and Atulyagotriya etc* for maintaining the healthy status of the body. These literatures are great source of knowledge regarding rituals, lifestyles, health related information etc. These literatures have given many rules and regulation or *Samskara's* regarding human beings. These are not only for spirituality, but also have scientific reason like *Atulyagotriyavivaha*. Right from *Vedic* period Indian ancient scholars told that a person should marry in different clan for a healthy offspring. This is a very scientific concept, recent researches also proving connection between consanguinity and their hazardous effect on progeny. *Acharyas* were very well aware of genes or concepts of genetics along with genetic disorders in ancient times as well. *Acharya Sushruta* while classifying diseases described *Aadibala Pravruta Vyadhi* which means the diseases grouped under any abnormalities in genes and said as *Asadhya*. There are so many references regarding individual's genetic potential and different genetic disorders.[1]

All the concepts of genetics came into existence in 18th century to the modern system of medicine by the work of Mendel regarding inheritance which he experimented on pisum sativum meanwhile when we have a gross overlook on the history of indian system of medicine specifically in Ayurveda the concepts of genetics were well known to *Acharyas*.

Consanguineous marriages are in practice as a part and parcel of tradition in various areas of nation. The opinions and practice vary widely across the world in few communities it is considered as ideal. It has been chosen to keep the cultural values of the clan intact, family wealth preservation as in ancient days property has given specific importance by which one can attain respect of being rich, maintain geographical proximity, strengthen the ties between families. All these are the reasons for practice of consanguineous marriages mean while *Acharya Charaka* in *Atulyagotriya Sharira Adhyaya* states that the marriage should be practiced in a different clan because marrying in the same clan is considered as *Adharma* which must be avoided. As per modern science, genetics states that this system of marrying in same clan has to be prohibited to maintain the social order uphold religious morality and last but not the least to safeguard the creation of fit offspring. Many studies have been conducted on the outcome of consanguineous marriages and outcome of these states that it ends up in various genetic abnormalities like mental retardation, diabetes, deafness, blindness etc., which decreases the social and economic state of nation. The present work on concept of genetics given by *Acharya Charaka* will be interpreted with the present concept of genetics, detail consequences of above said factors and to educate the families because most of who are practicing these marriages are illiterate hence the proper guidance related to hazards of consanguineous marriages on health of the progeny has to be explained to them.[2]

The word consanguinity is formed by two words, i.e. con means same and sanguineous means blood so the word consanguinity represents the blood relation. The degree of consanguinity can be illustrated with a table. The issue of consanguinity and consanguineous marriages is very important because of the associated health problems. While such marriages used to be more or less confined to Middle Eastern and North African countries and parts of Asia – notably India – nowadays, with widespread migration of citizens of those countries to the "Western" world– i.e. Europe, North America and Australia in particular – the problems associated with these marriages have also been "exported". This means that health care workers in Western countries need to become acquainted with these issues in order to be able to offer optimum care to their clients. *Atulyagotriya Sharir* this word here clearly signifies that the marriage must be followed in a different clan now days the modern system of medicine describes this concept as consanguinity.[3] A healthy child is the wealth of the nation and for the procreation of a healthy child apart from mentally and physically healthy parent, it is important that the couple should be mutually of a different clan. Consanguinity describes a relationship between two people who share a common ancestor: a 'shared blood' relationship. The most common form of a consanguineous relationship or marriage is between first cousins and in some societies, can account for a large proportion of relationships.

Traditionally, some cultures have practiced and continue to practice marriage between relatives such as cousins as a means of strengthening family ties and retaining property within the family. We all carry several harmful faulty gene copies on our chromosomes but have a working copy on the other partner chromosome to provide the information for our bodies. Usually two unrelated people will not carry the same faulty gene copy. In order to avoid wastage of pregnancy and related reproductive health problems, it is imperative to initiate awareness creation measures regarding the adverse effect of consanguineous marriages, particularly in those regions where it is still dominantly prevalent.[4]

Modern science also explains about the concept of consanguineous marriages which is the same as explained in our classics. In present scenario, where everything is facts and evidenced based led to the development of genetics. Modern science says that Individuals whose parents are consanguineous are expected to have an increased proportion of their genome that is homozygous. The more closely the parents are related, the greater this effect is expected to be. The amount of genetic material shared by first cousins is four times higher than that shared by second cousins. First cousins once removed have half the amount of shared DNA as full first cousins, whereas half fourth cousins cannot be detected at the DNA level. Unions between individuals biologically related as second cousins or closer are categorized as consanguineous. Couples related to a lesser degree would usually be expected to differ only slightly from what is observed in the general population; however, in some populations, more distant biological relationships may be clinically significant and cause an increase in the frequency of autosomal recessive diseases due to founder effect, genetic drift and high levels of random inbreeding. The chance of there being a significant medical problem in the offspring of a consanguineous couple depends on two additive risks: the background population risk and the additional risk due to consanguinity.[5]

Within consanguineous populations, a specific recessively inherited disease is often transmitted as a result of just one founder mutation. Interms of explanation of Molecular Genetics, every person has a total of 46 chromosomes, arranged as 23 pairs. Of these, 22 pairs control most of the body characteristics and diseases and one pair is responsible for determining sex. The genes are situated on the chromosomes, and each chromosome of a pair contains one copy of each gene, so that everybody has two copies of each gene, one inherited from the father and the other from the mother. These corresponding genes are called alleles. Even though both alleles determine the same body characteristic or disease, they are not necessarily identical and may in fact differ from each other in certain ways. A change in a gene is known as a mutation. Mutations in genes may affect the normal function of the gene and the proteins that it encodes and this may cause problems in certain situations. When a person is a carrier of one of the inherited diseases, he has one normal gene and one abnormal gene for the condition. In autosomal recessive diseases, the action of the healthy gene predominates over that of the abnormal gene, meaning that only people who inherit two copies of an abnormal gene, one from each parent, will develop the disease. Because of the increased chance that closely related individuals carry the same abnormal gene, the likelihood that their offspring will inherit an abnormal copy of the gene from each parent, and therefore affected by the disease is higher. When both the parents are known to be carriers of autosomal recessive disease the risk that the child will be affected is 1:4(25%). If such marriages are encouraged, which results in congenital anomalies this has an impact over the economic growth the country.

To standardize genetic services, guidelines for screening consanguineous couples and their offspring are needed. Consideration could be given to screening based on common autosomal recessive conditions in the populations and communities. In both high and low income countries, there is a capacity to provide health education for consanguinity at individual, family and community levels delivered by primary health care personnel with preconception and premarital genetic counseling, and diagnosis. Rather than discouraging consanguineous marriages in populations with long-held such tradition, ensuring access to preconception and premarital counseling services is the logical way to proceed and more likely both to receive community acceptance and be successful in maintaining and improving health (Alwan and Modell 1997; Bittles 2009). Increasing public literacy on consanguinity could be achieved by providing proper education and training to primary health care workers on all health and social issues related to consanguinity. Along with this the measures mentioned in our for healthy progeny can be adapted for the betterment of the society. Although we do not find any direct references regarding the concepts of eugenics and epigenetics but from the analysis of the review we comes to

know some concepts, references which gives some evidences regarding prevelances of concepts of eugenics and epigenetics during those days.

Eugenics deals with the application of the laws of genetics for the improvement of human race. We find two types of classifications of eugenics, one is negative eugenics and the other is positive eugenics. Under negative eugenics, people with inferior and undesirable trait are prevented from reproducing. Under positive eugenics, people with better & desirable traits are encouraged. To achieve its goal certain measures are employed under negative eugenics like segregation, sterilization, birth control, avoiding consanguineous marriages. In our classics also it is said that individuals desiring of healthy progeny must marry a female who belongs to a different *Gotra* (clan). As *Acharya Chakrapani* in his commentary states that when the person get married in the same *Kula* or *Gotra* it will be considered as *Adharma* because their children will be effected with genetic deformities. The following popular measures are mentioned in our classics in order to conceive the healthiest and most intelligent children. The couple should be treated with *Snehana* and *Swedana* therapies and thereafter *Doshas* from their body should be eliminated by the administration of *Vamana* and *Virechana* therapies. Then the patient should be brought into normalcy by administering prescribed diet viz. *Peya* or thick gruel etc. After the elimination of *Doshas*, the couple should be administered *Asthapan* and *Anuvasana* types of *Vasti* (enema). Male partner should also be taken ghee and milk boiled with drugs having sweet taste. *Tila Taila* and *Masha* (phaseolus radiatus Linn) should be administered to the female partner; from the above references we can infer that principles of eugenics were present in the ancient times also. Epigenetics the term has evolved to include any process that alters gene activity without changing the DNA sequence, and leads to modifications that can be transmitted to daughter cells (although experiments show that some epigenetic changes can be reversed). Many things can cause epigenetic and developmental epigenetic changes like Exercise, Diet, Nicotine, Alcohol, and Chemicals in the living space or workplace, Medications etc. These environmental factors are only a few examples of things that can cause epigenetic changes.[6]

According to *Ayurveda* fertilization of *Shukra* (sperm) and *Shonita* (ovum) into *Garbhashay* (uterus) along with *Aatma* (soul) is called as *Garbha* (embryo). Abnormality in these factors can land up in congenital anomalies. Factors like diet, exercise, alcohol, stress, exertion etc can affect mother and fetus. *Garbha* is also said to be formed by six factors like *Matruja*, *Pitruja*, *Rasaja*, *Satvaja*, *Saatmyaja* and *Aatmaj*[7]. These are combination of genetic, psychological and nutritional factors. Many of these factors can cause congenital anomalies taking into account the epigenetic impact of nutrition and the character of the incarnating soul. This makes sixteen factors, as each of the four sources has their particular four elemental make up of which any of the sixteen parts can dominate and express them. It is interesting to note that Mendel worked with a chart of four parts, though it took only the mother and father's genetics into account.[8] Ayurveda says the 'distinguishing strength' of *Karma* chooses which genes will express them. This is similar to Augustin Sageret's concept of 'dominance', which explains how certain characteristics of a parent are more likely to appear in the offspring and ancestral characteristics not found in the parents can appear in the offspring. In direct and subtle ways, children are moulded by the family culture into which they are born, certain cultural attitudes and responses are so ingrained in family members that they continue to affect their thinking and behaviour, whether or not those individuals are aware of such influence. To say that families have identifiable cultures, however, is not to suggest that they are static. Families are in a constant state of transition as each member moves through the cycles of life and the family itself moves from one stage of development to the next. The values of the family set the basic tone for the family foundation. They inspire the choice of mission as well as the foundation's policies and practices.[9]

Typically, the values of the individuals who have created the family's wealth predominate. Rate of consanguineous marriage in different countries are dependent on different factors like education level, religion, local tradition, and socio-economic status. One of the major factors contributing to the increased risk of congenital malformation and infant mortality is consanguineous marriage. As mentioned in historical concept of consanguineous marriages it is practiced as a part of tradition and prevalent in different dynasty to maintain the social relationships and to avoid the deviation of wealth among others. To such communities in which it is practised has to be counselled regarding the pros and cons of such marriages which totally negotiates the concept of *Bahu Su Praja,* i.e the healthy progeny and ends up in several diseases for example cancer, mental diseases, heart diseases, hypertension, hearing deficit, diabetes mellitus. From historical review we can say that this concept

was practised in different dynasty and religion except Aryan hindu religion who followed the concepts of *Ayurveda*. Both systems prohibit this concept as Ayurveda say it is *Adharma*, because during those days utmost importance was given to *Dharma*. But in present scenario everything is fact & evidenced based hence we get brief description of it. *Acharya Charaka* gave much importance to *Gotra,* i.e. clan and said that one must marry in a different *Gotra* to get healthy progeny. The 2nd Chapter of *Sharir Sthana* of *Charaka Samhita* (*Atulyagotriya Sharir*) explains about the criteria for a healthy progeny based on the principles of genetics. The main motive of the present study is to enlighten the concepts of genetics and well developed sociology in India which is explained by *Acharya Charaka* in *Atulyagotriya Adhyaaya*.[10] The concept of *Gotra* represents the well-developed clan system in ancient India, the other classification during those days was based on the profession of the society like *Brahmin, Kshtriya,Vaishya, Shudra. In our* classics we found classification of *Gotra* into 24 categories. For e.g. *Guru Dronacharya* was a *Brahmin*, but professionally was a *Kshtriya.* The commencement of this chapter begins with the concept based on prevention of consanguineous marriage, as we have emphasized in the study of genetics, most harmful traits are recessive and are therefore, most likely to appear in the children of parents who are related to similar bloodline. *Acharya Chakrapani* in his commentary states that when the person get married in the same *Kula* or *Gotra* it will be considered as *Adharma* because their children will be effected with genetical deformities.[11]

In ancient days there was *Gotra* system based on *Rishi* there are 24 *Gotra*, each of them were well versed in different subjects like military science, geography, economics, traditions etc. under the guidance of them there were many students specifically belonging to each gotra, hence each student of specific gotra used to join the guru under which they have particular interest, so like this they developed and progressed the subjects in which they were having keen interest. As the days developed, later on this *Gotra* system has changed into the system based on professions like who were well versed in military science fall under the category *Kshtriya*, who are well versed in *Vedas* fall under the category of *Brahmins*, rest of them comes under *Vaishya* and *Shudra*. In the system of *Kshtriya* the person who is well versed in military science when attends the *Swamvara* in which the bride selects the groom by interest of self. Now it is declared that in ancient days in the system based on professions marriages use to happen based on interest in the same field by which the progeny born to them will be aware of all the techniques of that particular field and procedures to be healthy.[12] But in present scenario everything is based on caste in that to specifically various divisions have been made like upper class (rich), middle class, poor, i.e. lowest. All these resulted in a backforth of the principles of ancient science.[13]

The concept of inheritance came to existence from the work of Gregor Mendel but in ancient days this concept is known to our *Acharyas*. Unlike simple Mendelian characteristics, genetic variance for behavioural dimensions and disorders rarely accounts for more than half of the phenotypic variance, and multiple genes with small effects appear to be involved rather than one or two major genes. Genetic research on behaviour will be transformed by techniques of molecular biology that can be used to identify DNA sequences responsible for behavioural variation. However, the importance of nongenetic factors and the multigenetic control of behaviour require new strategies to detect DNA markers that account for small amounts of behavioural variation. In molecular terms, we suggest that human disease is characterized by marked genetic heterogeneity, far greater than previously appreciated. Purpose of human life/entities is to protect them but death is a natural phenomenon, hence this protection is restored in the form of genes, by which the genetic material is transferred to generation to generation this satisfies the main motive. In our classics *Putra Eshaana* is mentioned, this *Putra Eshaana* is nothing but desire to have child. Meanwhile concentrating on the wealth of our nation it is necessary to educate the people the child whom they desire must be healthy for life time for which certain factors mentioned in the classics has to be followed.

Conclusion

The present research work has been into consideration to establish some facts regarding the knowledge of genetics basically evolved from the eastern world specially from India that enlighten the whole world. The following aims were also focused, i.e. the possibility of incorporating the various techniques, procedures or rituals described in this chapter into the current lifestyle to produce physically, mentally, healthy and disease free progeny and to reduce the possibilities of genetic abnormalities in children to minimize the liability of the society in future. By collecting the various examples and facts regarding the process of

upbringing of both male & female child, various regulations, meant for marriage practised in ancient India were not merely the ceremony or rituals. They were very socially and scientifically architected tools and methodology developed by the ancient seer's. This scientific knowledge was collected and distributed by the *Ayurveda.* The principles of genetics were not only in text but they were practised personally and socially in a stern disciplined sociological order. At that time society was classified in to 24 clans (*Gotra*). Marriage in the same clan was strictly restricted even they connected this thought with the religion and called it *Adharma*. It clearly indicates that when in the other parts of the world were practising consanguineous marriage frequently either to protect their property or knowledge. Ancient sages were well equinted with the genetical concept of consanguineous marriage and its hazardous effect on family, society and nation. They point this concept of genetics as *Atulyagotra.* In the series of this knowledge *Acharyas* said that one must have child who is fit in physical, mental, social, spiritual health by means of *Su Bahu Praja.* By this concept we can say that they were very well known to the techniques or ways by which the genetic material of the child can be altered. The methodology for attaining the same various behavioural, dietary drugs, procedures were defined and depicted to have healthy *Shukra* and *Artava* (male & female genetic material). In the next step it is stated that even after many restrictions, legalities and penalties if two persons of the same clan get involved in sexual act either the female will not be able to conceive, get abort or the progeny will suffer from incurable genetic and congenital anomalies. They named these conditions as *Adibala Pravrutta* this *is* further categorised on the basis of defect in *Shukra* (*Pitruja*) and *Shonita* (*Matruja*) which are incurable. They followed the above mentioned concept of *Atulyagotriya Vivah* for thousands of years to avoid consanguineous progeny to the maximum degree. This indicates that the public administration system, social engineering, political ethics were based on the profound scientific knowledge. In former times *Gotra* system was genetically very efficient, later on this changed into system based on caste status etc., due to which social, economic problems started in all norms by leaving behind the principles of ancient system everything changed into a ridiculous manner like on the basis of reservation hence so many people are suffering from dreadful conditions.[14] Ayurveda strongly recommended non consanguineous marriages but till today maximum population were unaware of the facts that children of consanguineous couples may be diseased, possessed with genetic or congenital anomalies as compared to non-consanguineous couples therefore it is essential to spread the concept of *Atulyagotriya Sharir* in society to minimize the prevelances of congenital/genetic disorders by increasing awareness to avoid those.

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