



Review Article

CONCEPT OF GENETICS IN AYURVED

Biswas Partha^{1*}, Biswas Sonali¹, Pal Sushil Chandra²

¹Lecturer, Department of Basic Principle, Institute of Post Graduate Ayurvedic Education and Research, Shyamdas Vaidya Shastra Pith, Kolkata, India.

²Professor & HOD, Dept of Genetics, Vivekananda Institute of Medical Science, Kolkata, India.

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ABSTRACT

Ayurved is accepted as an oldest written medical system and it came into existence at least three thousand years before Christ. Though the present understanding of human genetics owes much to the work of Gregor Mendel but the first scientific theme on genetics had been emphasized in ancient Indian literatures. Although the technical term Genetics does not feature in *Ayurved* but the theme of genetics is vibrant repeatedly all classical text of *Ayurved* especially in *Samhitas*. It is an outstanding contribution of *Ayurved* on genetics is being described on the following heads i.e., concept of basic unit of genetics like *Beeja – Beejabhag – Beejabhagavayab*, concept of mutation, inheriting factors, concept of fertilization and sex determination, description of congenital diseases like *Madhumeha, Arsha, Kustha* etc. *Prakriti* and its clinical applications, therapy applied for *Pumsavan kriya*, how to prevent birth of a physically and mentally handicapped child. The review focuses on the various literary concept and clinical applications of genetics in *Ayurved*. The literary portion and clinical part of the work was done during post graduate study to established the Genetic concept in *Ayurved* in concordance with modern phenomena and to know the prevalence of chromosomal anomalies both autosomal and sex chromosome in patients presenting with congenital malformation. The work has been published as dissertation of post graduate study.

KEYWORDS: *Ayurved, Genetics, Prakriti, Charak Samhita, Susruta Samhita.*

INTRODUCTION

The human mind was engaged with fundamental questions on the nature of heredity long before the study of genetics became a scientific discipline. Genetic is the science of inheritance it came into existence at least 2500 B.C. The blossom of scientific revolution in human genetics has been started since ancient period. Recent genetic research confirms that all humans on the earth descended from a group of African ancestor who started their journey around 60000 years ago. Spencer Wells said that every drop of human blood contains a history book written in the language of genes. Many traits such as height, eye color, complexion, disease susceptibility had been known to run in families although the chromosome, DNA structure, the genes or combination of gene that underlies these observable characteristic were unknown.

The Ayurvedic scholar had a fundamental knowledge of genetics much before the modern genetic scientist. Though *Ayurveda* does not implicated the pure and literally aspect of genetics in much details but has taken up its applied aspect scientifically under the following heads i.e. the theory of evolution, the role of *Panchamahabhuta* in the formation of different organs in human body, manifestation of different genetically determined congenital disorders. The genetic factors

which are responsible for procreation of human being, concept of *Beeja* (germ cells), *Beejabhag* (chromosome) and *Beejabhagabayab* (gene) *Upotapta*, (mutation) determination of sex, concept of eugenic principle etc

Evolution theory in Ayurved

From the very ancient period the question was raised by everybody that when, how, why and where the evolution of the universe has been started. The various Indian philosophies have been provided their opinion regarding the theory of evolution. According to Jainism and *Nyaya, Vaisesik*, all the objects are produced by the combination of atoms. The *Samkhya darsan* stated that there must be some finest and subtle elements or principle underline under all physical existence. *Prakriti* is the principle factor which is the first and ultimate cause of all gross and subtle objects. The word *Prakriti* is derived from the Sanskrit root "*Dukrin-karane*" meaning "*Prakrishtena kriyate*" which signifies the progression on dynamicity. The evolution theory depicted in Ayurveda which has been adopted from *Sankhya darsan*. In this theory first and foremost factor is *Avyakta* (unmanifestation). *Avyakta* itself remain in unmanifested form and the causative factor of all the creatures of universe, *Mahan* is derived from *Avyakta*, *Mahan* is the dimension of consciousness enveloping the entire universe i.e. knowledge by which

speciation could occur. Then *Ahamkara* is developed from *Mahat* i.e. Self identity and the biological mechanism which has enable billions of species to survive in the universe. The *Ahamkar* interact with three prime qualities like *Satwa*, *Raja* and *Tama* and by several permutation and combination of these three primal qualities manifests infinite numbers of living and non- living substances chronologically by *Panchatanmatra* and *Panchamahabhuta*.^[1] DNA is the key factor of genome and DNA is also the regulating factor of life is driven by intelligence (*Mahan*). It creates all the molecule, cells, tissues and organs in the human body. Each of the cells in the body has its own intelligence by which they can take part in the manifestation of living substance.

Fertilization and Sex Determination

Many factors mentioned in *Ayurved* towards the study of developmental genetics including fertilization and sex determination, Ayurveda considered two basic factors in the development of human beings i.e. *Sukra* and *Sonita* to resemble that of sperm and ovum in modern medical science and which are responsible for the fertilization in the human beings. In these contexts *Charak* clearly stated that dominance of *Sonita* during conception resulting procreation of female child and dominance of *Sukra* (sperm) leads to male child. The sex of an individual is determined by the X and Y chromosome. Presence of Y chromosome leads to maleness regardless of the number of X chromosome present, absence of Y chromosome results in female development.^[2]

Concept of Genome in Ayurveda

Prakriti is one of the outstanding contributions in Ayurveda in the field of genetics. *Prakriti* is the basic factor which is determined at the very time of the conjugation of *Sukranu* and *Andanu* in the presence of *Beeja*, *Kshetra*. The concept of the *Prakriti* plays a central role in understanding health and disease in Ayurveda. *Prakriti* has a genetic connotation that can provide knowledge for classifying human population based on phenotype characteristics. *Ayurvedic* literature classifies all individuals into different *Prakriti* types based on relative proportion of each *Dosa*. The human phenotype can provide a genetic basis for the three major constitutions. The concept of *Prakriti* in Ayurveda should be considered from genomic perspective. Permutation and combination of *Vayu*, *Pitta* and *Kapha* attributes characters along with other factors like different types of *Purusa*. Involvement of *Manas Dosa*, *Desa*, *Kala*, *Vayas*, and *Pratatmaniyata* which gives sufficient variant for a unique constitution for every individual. *Prakriti* constitute the bodily constitution, mental status on the fundamental form specific for every individual. *Prakriti* remain unaltered during the lifetime determined at conception with contribution of environmental factors like *Dosaja*, *Kalaja*, *Garbhasaya* etc. Thus Ayurveda determined the *Prakriti* on the basis of the individual variation and it is

proven to have strong genetic component^[3]. *Prakriti* assessment evaluates each *Dosas* degree of dominance. It gives an important idea for diagnosis, prognosis and therapeutics. In *Ayurved* Individuals can be categorized into one of the three basic humors. Even Ayurvedic literature classifies all individuals into different *Prakriti* types based on relative proportion of each *Dosa* like *Vata-Pitta*, *Kapha-Pitta* and *Vata-Kapha*. *Prakriti* constitute the bodily constitution, mental status and fundamental form specific for every individual. It is remain unaltered during the lifetime and determined at conception, with contribution from environmental factors, *Prakriti* types *Vata*, *Pitta* and *Kapha*. Almost every individual has one *Dosa* dominant with one or both the others subdominant. Subtle combination of the three *Vata*, *Pitta*, *Kapha* *Prakriti* types are specific and individualized as the DNA sequence based genetic background.

Vayu is the cause of pleasure or happiness and enthusiasm, controller and activator of mind, primarily *vayu* gives shape and form to the embryo.^[4] *Pitta* is responsible for all metabolic functions of the cells, production of various enzymes, and other biochemical in the body.^[5] *Kapha* contributes in stability of all functional activities of human body and capacity to produce progeny, promotion of strength and resistance to disease.^[6] *Prakriti* specific treatment including medicine, diet & lifestyle is a distinctive feature of *Ayurveda*. *Prakriti* has a genetic connotation that can provide a pool for classifying human population based on broad phenotype clusters. The human phenomena based on Ayurveda can provide a genetic basis for the three major constitutions or *Prakriti*.

Prakriti of the foetus is also determined by the following factors^[7]

1. Sperm and ovum (*Sukrasonita prakriti*).
2. Season and condition of uterus (*Kal garbhasaya prakriti*).
3. Food and regimen of the mother (*Matur ahar-vihar prakriti*).
4. Nature of the *Mahabhutas* comprising the foetus (*Mahabhuta vikar prakriti*).

Caste e.g.- purity among *Brahmanas* (*Prakriti jati prasakta*), Family e.g., purity with regard to character and conduct in a good family (*Kula prasakta*), Locality among people of *Antarvedi* region (*Desanupatini*), Time e.g.- purity in *Satyayuga* (*Kalanupatini*), Age of the patients e.g., impurity in childhood (*Vayanupatini*) and the individual e.g. purity rarely found in some individual (*Pratatmaniyata*).^[8]

Concept of Inheritance Pattern in Ayurveda

The factors responsible for the procreation of foetus or human being derived from the following sources like one is mother (*Matrijabhav*), father (*Pitrijabhav*), soul (*Atmaja*), wholesomeness (*Satmaja*), proceeding from chyle (*Rasaja*) and mind (*Satmaja*). The factors derived from mother – the most of the soft organs like skin, blood, flesh, fat, heart, liver, kidney,

stomach. The factors derived from father are as follows scalp, hair, nail, teeth, bones (most of the hard structures) veins, ligaments, arteries etc. Some functional factors which derived from *Atma* like desire for happiness, courage, intellect, memory and voice. Other factors derived from *Satmya* are growth, strength, satisfaction, enthusiasm etc. The emotional factors derived from *Sattva* - fear, anger, softness, vigor and memory.^[9]

Concept of Chromosome, Gene and Chromosomal Abnormality

Sex chromosomal abnormality one of the congenital abnormality having strong genetic susceptibility. In this context *Charak* described regarding sex abnormality like *Dwireta* such type of abnormality may considered as true hermaphrodites, most patient of true hermaphroditism having 46XX Karyotype. In this extremely rare condition an individual has both testicular and ovarian tissue. The other like *Pavanendriya* it may consider as Klinefelter's syndrome (47 chromosome 44XXY) having unexplained involuntary infertility and evidence of azoospermia in the male partner causing several mechanical disruption in meiosis that complete failure of gametogenesis occurs. Other one is *Narashanda* having normal male karyotype (XY) but the external phenotype is essentially that of a normal female, it may consider as male pseudohermaphroditism, *Narishanda* having karyotype is female (XX) but the external genitalia is virilized so that they resemble those of a normal male. The others are *Samskarvahi* (anaphrodisia), *Vakri* (hypospadias), *Irsyabhirati* (mixosopia) and *Vatikshanda* (eviration).^[10]

Genetic Diseases in Ayurveda

Due to defects in seed (sperm, ovum) and associated with the soul, uterus, time and food as well as regimen of the mother, *Dosas* gets variously vitiated and leads to the impairment of the shape, colour, sensory as well as motor organs of the offspring. ^[11]In *Susruta samhita* the seven fold of disease consider on the *Trividha dukha*. Among these *Adibala pravritta vyadhi* indicates the diseases which are congenital in origin and genetically determined like *Dusta arswa*, *Prameha* (diabetes mellitus) etc., are manifested due to vitiation of *Sukra* and *Sonita* of father and mother respectively. *Susruta* mentioned two types of *Prameha*, one is *Sahaja* (hereditary/congenital) which is inherited from mother and father due to vitiation of *Sukra* and *Sonitsa* (defects of seed) respectively. Patients who are diabetic right from time of the birth and those are who born from diabetic parents are not curable because of the morbidity in their respective gene.^[12] Patients who are diabetic right from the time of birth (congenital) and those who are borne of diabetic parents (hereditary) are not curable because of the morbidity in their genes. Piles are of two types- one hereditary (congenital). Hereditary piles are caused by the vitiation of seeds (sperm & ovum), specially the part of the seed responsible for the

formation of anal sphincter. Vitiation of seed is caused by two groups -1. Wrong diet and regimen of father and mother, 2. sinful acts of past life.^[13] According to *Madhavidan*, *Sukragata kustha* is one of the hereditary causative factor which is responsible for inherent the disease condition to their next progeny.

Concept of Personalized medicine

In the perspective of *Prakriti*, the concept of personalized medicine has been recognized in *Ayurved*. It is a traditional approach using the genetic information to understand, to prevent or to treat the more specifically some chronic diseases. The personal genomic information carrying types of *Prakriti* identifying the health risk, drug response in order to personalize own medical care, take preventive measure to improve the health. Personalized medicine also provides to avoid hazards based on family history, environmental factors and genetic information. The three major constitutional types described in Ayurvedic literature have unique, putative metabolic activities in which *Kapha* signify the slow metabolic activity; *Pitta* indicates the fast metabolic activity while *Vata* consider having variable metabolism. Poor metabolizers have high plasma concentration of drug for longer period and so retained drugs in the body for longer time. Intermediate metabolizers retained drugs in the body for normal time period. Extensive metabolizers retained drugs in the body for least time and plasma concentration being high for shorter period.^[14]

Prakriti specific treatment including medicine, diet & lifestyle is a distinctive feature of *Ayurveda*. *Vatala*, *Pittala* and *Slesmala* these are the three morbid statuses in individual and more susceptible to *Vatika*, *Paittika* and *Slesmaja* disease respectively. If the *Vatala* types of individual resorts of such thing as an aggravators of *Vata*. Then the *Vatika dosa* gets aggravated immediately. This does not happen in case of remaining two *Dosas*. Therefore the treatment of individual or patients having different types of *Prakriti* should be determined accordingly.^[15]

Eugenic Principles in Ayurveda

The suitable age of conception of mother, father and physical condition of the mother has been recommended by *Susruta*. In this regard *Susruta* mentioned that the mother below the age of 16 and in case of father below the age of 25 does not allow conceiving to avoid birth of a undesirable quality of children^[16] and also advised that a lady who is very old or who has been seeking for a long time should not be allowed to conceive.^[17] Recent study has shown that maternal age plays a key role in various genetic abnormalities. This concept was established in clinical medicine by Dr. Langdon Down, as named Down's syndrome, now it is well established that there is a strong association between the incidence of Down's syndrome and advancing maternal age.^[18]

Charaka advised for procreation of a healthy child, it is necessary that the male and female should be mutually of a different clan^[19] and to avoid consanguineous marriage, a consanguineous marriage is the conglomerate between the blood relations who have at least one common ancestor. Several extensive studies have shown that among the offspring of consanguineous marriage there is an increase in both morbidity and mortality with an increase incidence of congenital structural abnormalities.^[18]

The Ayurvedic scholar has emphasized specific daily routine of the mother during menstrual, period, before coitus to give birth of a desirable quality of child. All the factors are derived under the heading of Eugenic principle stated by different Ayurvedic classics two types of Eugenic principle categorically described in Ayurvedic compendium one is the positive Eugenic principles are. *Pumsavan prakriya*, Regimen from pregnant woman, regimen for achieving excellent progeny and measure before cohabitation. Negative Eugenic principles are. Consanguineous marriage and age of conception etc.

CONCLUSION

Ayurvedic scholars had a fundamental knowledge on genetics much before modern geneticists. Though *Ayurved* does not implicate the pure and literary aspect of genetics in much details but has taken up its applied aspect scientifically under the following heads i.e. concept of *Prakriti* and its utility in clinical medicine, genomic concept in perspective of *Tridosha*, evolution theory and outstanding work on eugenic principles. In order to create acceptable scientific evidence on genetics described in *Ayurved*, a scientific and systemized approach is needed for scientific validation on the subject.

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*Address for correspondence

Dr. Partha Biswas

Institute of Post Graduate Ayurvedic Education and Research at Shyamdas Vaidya Shastra Pith, 294/3/1, A.P.C Road, Kolkata - 700009
Mobile: 09433725917
Ph: 033 23504159
Email: drpartha264@gmail.com