Review Article

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AYURGENOMICS: A NOVEL APPROACH IN PREVENTING CONGENITAL ANOMALIES: A REVIEW

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ABSTRACT

Ayurveda states that congenital disorders can be due to defect in germ cells or somatic cells in the intra-uterine environment. The interaction of germ cell genotype, geo-climatic & uterine factors, mother's diet & activities as well as the nature of Panchamahabhoota in the environment at the time of fertilization, determine the Prakriti (phenotype). The unhealthy state of either factor can affect the prakriti of the fetus & even result in congenital diseases. Ayurveda supports different clan (Atulya gotra) marriage, as consanguinity increases the risk of congenital anomalies. It is mentioned that a seed cultivated in a healthy field only can yield supreme variety of crop; the procedures to make the reproductive system healthy may prevent the occurrence of congenital disorders. Ayurgenomicsis is a phenomenon where, by personalized health care approach before conception may help to prevent the congenital anomalies to some extent. The present review aims to highlight Ayurgenomics in predictive, preventive and personalized aspects of congenital anomalies. Thus, Ayurgenomics may be a new facet for the preventive aspect of congenital disorders.

Keywords: Ayurgenomics, congenital anomalies, Prakriti, Phenotype

INTRODUCTION

Ayurveda, the ancient Indian system of medicine was considered to be originated about 5000 years ago and is highly related to the Indian philosophy. According to Ayurveda, human body is made and maintained by 'Dosha, Dhatu and Mala'. Among them, 'Dosha' have a premier role because they control and maintain the bodily functions. The concept of Tridosha involving the three Dosha namely Vata, Pitta, and Kapha is the central doctrine of Ayurveda. In clinical practice patients are diagnosed and treated well on the basis of 'Tridosha' theory[1]. According to Ayurveda, predisposition to a disease as well as selection of a preventive and curative regime is primarily based on phenotype (Prakriti)[2]. Prakriti is a consequence of the relative proportion of three entities (Tri-Dosha), Vata (V), Pitta (P) and Kapha (K), which are not only genetically determined (Shukra [sperm] & Shonita [ovum]), but also influenced by the geo-climatic factors of the environment, the nature of Panchamahabhoota that operates at the time of fertilization (Mahabhuta Vikara), maternal diet and lifestyle (Matur Ahara Vihara), and age of the transmitting parents (Kala-Garbhashaya) at the time of fertilization. Thus, based on the state & nature of Dosha at the time of fertilization, one's Prakriti is formed[3]. If it is vitiated at the time of fertilization then it results in congenital anomalies[4]. Thus, the Prakriti by means of its concerned Dosha, determines inter individual variability in response to diet, disease and medicine. These concepts allow us to implement it in various ways, therapeutically in personalized medicine and treatment also in personalized prevention. In concern to modern science, evidence has to be explored to connect these concepts of Tridosha and Prakriti with metabolic disorder, chronic diseases, and different genotypes[5]. Such insights may lay down evidence about the universal acceptance of the central concepts of Ayurveda, and a new bridge between current science and ancient literature. Ayurgenomics is the project by CSIR, aims at the establishment of high correlation of Prakriti with genomic signatures, thus the screening of predisposed individuals in the population.

Congenital anomalies can be defined as structural or functional anomalies that occur during intrauterine life and can be identified prenatally, at birth or later in life. It contributes an estimated 276000 neonatal death per-anum, worldwide[6]. Some of the common congenital anomalies are heart defects, neural tube defects and Down syndrome etc. Those may be due to genetic, infectious, nutritional or environmental factors but often it is difficult to identify the exact cause. Vaccination, adequate intake of folic acid or iodine through fortification of staple foods or provision of supplements, and adequate antenatal care are keys for prevention in modern medicine[7]. The objective of present review article is to highlight Ayurgenomics in predictive, preventive & personalized aspects of congenital anomalies.

The following methodology was adopted for this review article: The search was limited to only English literature including those studies which were published from 1980 to 2016 with priority given to the recent and most relevant to the topic of interest. The following are the databases followed- PubMed, Science direct, Google Scholar, DHARA, and AYUSH Portal. A search was undertaken in the PubMed database, using keywords Ayurgenomics, congenital anomalies, Prakriti, phenotype as the mesh term. There were 2692 articles available. Nine articles available in Google scholar and four articles from DHARA were also shortlisted. After using various filters only five articles were found most relevant and were considered as the reference

for the present review. Textual references considered are the classics Charaka Samhita, Susruta Samhita, Ashtanga Samgraha and Ashtanga Hridaya with special attention to Shareera Sthana.

AYURVEDIC PERSPECTIVE

The etiology of congenital anomalies is based on the core principle of state of dosha at the time of fertilization. The Ayurvedic perspective of congenital anomalies has its foundation on Adibala pravritha (due to defect in germ cells) & Janmabala pravritha vyadhi (due to defect in somatic cells in the intra-uterine environment). Adibala pravritha vyadhi are because of defective sperm (Shukra) & ovum (Shonita) and are determined right at the time of fertilization. Janmabala pravritha vyadhi are because of improper maternal diet & regimen (maturapacharaja) and has its impact throughout the intrauterine period[8]. According to Charaka Samhita, the factors responsible for congenital anomalies in the fetus are defects in sperm & ovum, the actions associated with the Soul, the uterine environment, climate as well as diet & regimen of the mother[3]. According to Susruta Samhita the factors are new generation life style (without spiritual thought), the unwholesome activities done in the past by both the parents[8]. Among the defective germ cells mentioned, Acharya considered only single Dosha vitiated as curable. The three technical terminologies in case of congenital anomalies as Acharya have mentioned are defect (Dosha) in either Beeja, Beeja bhaga or Beeja bhaga avayava[9], which in modern parlance may be germ cell, chromosome or gene.

The zygotic environment, i.e. the state & nature of Dosha (Dosha-sthiti) maintained at the time of fertilization becomes the Prakriti of the individual and will remain unchanged throughout the span of life. Along with the sperm & ovum, the geo-climatic factors, mother's diet and psychological activities & the nature of Panchamahabhoota that influences at the time of fertilization play significant role in determining the Prakriti of the individual. So, congenital anomalies occur, depending up on the state & nature of Dosha utkata avastha (if it is in vitiated state or dominating) at the time of fertilization[8].

APPROACH TO CONGENITAL ANOMALIES

Personalized preventive health is the very novel treatment principle of Ayurveda, which made it unique from advanced modern medicine. This time tested principle has far-reaching implications in the present day. The physical and mental Dosha is related to one's Prakriti determine susceptibility to disease. The degree of susceptibility to various diseases depends to a large extend based on the Prakriti of the individual. Therefore, Prakriti analysis will not only help in understanding the physical and mental constitution of patient, but also plays a vital role in prognosis, diagnosis, treatment, and prevention of many complex diseases[10]. Ayurveda provide guidelines for maintaining lifestyles in accordance with one's Prakriti for continued healthy living in a personalized manner which became one of the priority areas of research in the modern medical field now. Ayurgenomics is an emerging field of interest, where the selection of a suitable dietary, therapeutic, and lifestyle regime is made on the basis of clinical assessment of individual system biology, based on one's Prakriti. The present review is an attempt to incorporate Ayurgenomics on three aspects such as predictive, preventive and personalized approach to deal with congenital anomalies. Acharya had told that when the progeny is born in a geographical region where people are naturally healthy, when the climatic factors are favorable, both the germ cells & reproductive tract are healthy as well as in a healthy mother; then the progeny will definitely be healthy. Acharya strictly discourage marriage between people belonging to same clan (tulya gotra) or any disease running family[9]. Acharya had even named a chapter as "Atulya gotreeya" in Shareera Sthana of Charaka Samhita. Due consideration was given to marriage to other clan in ancient time because consanguineous marriage increase the risk of congenital anomalies. One of the known examples is the prevalence of sickle cell anemia in Victorian family. The abnormalities happening in beeja (~sperm & ovum), beejabhaga (~chromosome) & beejabhaga avayava (~gene) can be prevented up to an extent by bio-purification therapies before conception (garbhadhana poorva shodhana). It is mentioned that a seed cultivated in a healthy field only can yield supreme variety of crop. The practice of diet & regimen suitable to the Prakriti right from the adolescent period may have very significant and far-reaching implications. Ayurveda emphasizes 'planned pregnancy' than an accidental conception. Strict practices to attain the reproductive health are mentioned, in many chapters of the classics. A healthy couple has to follow certain regimens, bio-cleansing measures, to enhance fertilization & to get the desired progeny. Administration of milk & ghee by male and oil (sesame oil), horse gram by female, may be practiced from the adolescent period onwards. Satisfactory results may be expected if the treatment is started well in advance before conception by considering the Dhatu parinama kala (time taken by the nutrients to reach in all the seven Dhatu). Thus, by proper monitoring and screening of male & female right from adolescent period onwards with an education to adopt diet & lifestyle, that is suitable to their Prakriti may help to achieve a healthy reproductive system as well as overall health.

The preventive measures for Janmabala pravritha roga include the use of Prajasthapana gana (a group of ten drugs for protecting the foetus) and Jeevaneeya oushadha (a group of ten drugs for promoting longevity)[9] with an aim to assure healthy nutrition to the mother. Ayurvedic literatures are the hidden treasures of many ideas that extend up to the level of genetic theory. The description of beeja, beejabhaga, beejabhagavayava, practices to acquire a healthy child, monthly regimens for pregnant lady are elaborated vividly to consider progeny as the greatest wealth.

Monitoring the diet and regimen (Maturahara vihara Prakriti) before conception may help to prevent congenital anomalies to some extent. Each Prakriti has specific physical and psychological attributes (Guna) based on the Dosha involved in their constitution. Every individual must maintain their balance of Dosha as determined by their Prakriti in order to remain healthy. Even though, food is derived by individual from the environment, its processing & use intimately depend on the integrity of internal bio-mechanism. Unless the bio-fire system (Agni) & inner bio-transport (Srotas) are in order, the process of nutrition may not accomplish.

Ayurveda suggests personalized health care. Every individual needs health care based on their state of imbalanced Dosha (Prakriti or Vikruti) in the line of his genomic profile. It is seen that Vata Prakriti will have Vishamagni (abnormal digestive fire) & are prone to Vata vikara (disease). Similarly Pitta Prakriti will have Tiksnagni (enhanced digestive fire) & Pitta vikara tendency. Kapha Prakriti will have Mandagni (decreased digestive fire) and are prone to Kapha vikara (disease). Sama Prakriti will have Samagni (balanced digestive fire) and they will have good resistance to diseases. So a doctor should plan diet by considering the Prakriti of the individual. 'Diet according to Prakriti' can be a unique concept of Ayurveda. While planning a diet consider the Prakriti of the individual,

Agni (digestive fire & tissue fire), Koshta (digestive system), Rasa-guna-veerya-vipaka (pharmacological potency) of the food, & Ritu (seasonal consideration)[11]. The diet of a person should restrain the factors which will keep the doshik balance of the body in equilibrium. By considering the Prakriti of the individual, physician can distinguish the diet that maintains the health. Modern dietary guidelines are totally disease oriented. But Ayurveda has dietary guidelines within the reach of a common man, suitable to the environment. For Vata Prakriti the diet should have opposite properties of Vata like Snigdha (unctuous), Guru (heavy), Ushna (hot) etc. Diet with Ushna veerya (potency) & Katu (pungent) vipaka (state of food after digestion) are ideal for Vata Prakriti. Foods with Sheeta (cold) veerya & Madhura (sweet) vipaka are generally ideal for Pitta Prakriti. Foods of pungent, bitter and astringent taste, warm, light, dry foods, sweet, sour and salty tastes; cold, heavy, unctuous foods are for Kapha Prakriti.

CONCLUSION

Modern medicine recently invented that understanding the genetic makeup of an individual is the key towards personalized therapy, which the Ayurveda system of medicine practices from time eternal as the Prakriti based considerations. Now India is on a glorious path of research and development activities to combine the strength of Ayurveda with the advanced technologies of other allied science so as to place the country in global leadership position to provide quality traditional health care. The National Biotechnology development strategy addresses the utilization of Biotechnology to add value to the Indian System of Medicine. A healthy baby born from healthy parents can be genetically screened & implemented a life style suitable to their phenotype; there a healthy future generation can be generated by blending age-old traditional knowledge with advanced modern scientific knowledge. Ayurgenomics, which amalgamates the knowledge of genomics with the Prakriti of an individual, provide a solid evidence-based scientific foundation for the advancement of personalized treatment. Ayurgenomics by personalized health care approach before conception may help to prevent congenital anomalies to some extent from a preventive aspect in a vulnerable population. Thus, Ayurgenomics may be a new facet in the preventive aspect of congenital disorders based on one's genetic makeup.

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