JOURNAL OF NATURAL REMEDIES
DOI:10.18311/jnr/2019/23584

REVIEW ARTICLE

Concepts of *Prakriti* (Human Constitution) and its Association with Hematological Parameters, Body Mass Index (BMI), Blood Groups and Genotypes

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Abstract

Background: *Ayurveda* is an ancient system of personalized medicine, documented and practiced in India since 1500 B.C. According to this system an individual's basic constitution to a large extent determines predisposition and prognosis to diseases as well as the therapy and life-style regime. *Ayurveda* describes seven broad *Prakriti* (Physical constitution) *Prakriti* is *de*fined as the sum of physical, physiological, psychological traits of an individual which represents genotypes. **Objective:** In this article we have attempted to narrate concepts of *Prakriti* and its relation with hematological parameter, body mass index, blood groups and genotypes. **Material and Method:** Present article is based on critical review of *Ayurvedic* textual information, published research works, modern literature and research works conducted at various institutes. The possible correlation has been made between collected information and has been presented in systematic way. **Result:** In *Pitta Prakriti* individual's hematological parameters like Hemoglobin (Hb%), Packed cell volume (PCV), and Red blood corpuscles (RBC) count are significantly on the higher side of normal range in comparison to *Vata* and *Kapha Prakriti*. Higher level of cluster of differentiation (CD) 14 markers in *Pitta Prakriti*, CD25 and CD56 in *Kapha Prakriti* individuals. *Vata Prakriti* individuals have "A" blood group, maximum *Pitta Prakriti* individuals have "O" blood group while maximum *Kapha Prakriti* individuals have "B" blood group and genotype correlation shows that HLA DRB1 ((human leukocyte antigen, dimer beta chain) gene polymorphism, CYP2C19 (Cytochrome P450 2C19) gene polymorphism and PGM1 (*Phosphoglucomutase 1*) polymorphism have scientific variations with the human *Prakriti* concept. **Conclusion:** *Prakriti* of individual has strong relation with Hematological parameters (CBC, lipid profile, Liver function test (LFT)), Body mass index (BMI), anthropometry, blood groups and genotypes.

Keywords: Body Mass Index, Blood Groups, Constitution, Hematological Parameters, *Prakriti*

1. Introduction

Ayurveda, *unani* (arabic medicinal system), *sasang* constitution (Korean medicinal system), and Chinese medicinal system are well recognized branches of traditional medicine in the world, which classify individuals based on body temperament by deciphering specific characters for health management[1–3]. The purpose of *Ayurveda* has been described as to protect the health of a healthy person and to eliminate the ailments

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Article Received on: 19.04.2019 Revised on: 16.09.2019 Accepted on: 25.11.2019

of a diseased man[4]. *Prakriti* is the sum total of physical, physiological and psychological characteristics of any individual and represents the genotype[5]. Knowledge of *Prakriti* can help in prevention and diagnosis of diseases, in determining the treatment guidelines and forecast future diseases[6,7]. It explains unique traits that are decided by specific and permanent arrangement of *Doshas* in an individual[8]. One or more than one *Dosha* predominates at the time of conception, and reflects the *Doshika Prakriti* of the individuals and can be manifested by *Dosha* specific characteristics[9]. *Vata* is considered as an originator for the actions of *Kapha* (K) and *Pitta* (P). *Pitta* is generally responsible for metabolism, thermoregulation, pigmentation and energy homeostasis whereas the anabolism function, growth and maintenance of structure are functions of *Kapha*[10,11].

Prakriti is not only determined by *Shukra* & *Shonita* (genetically) but also influenced by various other factors such as *Matur Ahara Vihara* (maternal diet and lifestyle), *Kala-Garbhashaya* (season of conception) and *panch mahabhuta vikara*[12]. *Acharya Charaka* also explained some other extra uterine factors which influenced *Prakriti* of individuals such as, Racial/ Caste (*Jati-Prasakta*) Familial (*Kula-Prasakta*), Country or place (*Desh-anupatinee*), Natural change according to age (*Vayo-nupatinee*) Time period of life (*Kala-nupatini*) and individual specific character (*Pratyatmaniyata*)[13]. *Ayurvedic* scholars have divided the human constitution (*Prakriti*) into seven types on the basis of relative preponderance of three basic *Doshas*[14–17]. The *Prakriti* (human constitution) of an individual is finalized at conception and is articulated through physical, physiological and psychological traits as described elaborately in original *Ayurvedic* texts written by *Acharya Charaka, Sushruta, Vagbhata, Sharangadhara* and *Harita*[18–22]. *Prakriti* influences the manifestation of diseases, course of diseases and response to treatment in an individual[23–25].

In present era many supportive parameters have been developed for confirmation of *Prakriti* such as hematological parameters, Body Mass Index (BMI), blood groups and genetic parameters. Hence, the present article explores the details about concept of *Prakriti* (Human body constitution) in *Ayurveda* and its correlation with hematological parameters, BMI, blood groups and genotypes of individuals.

2. Aims and Objectives

- To elaborate the concept of *Prakriti*.
- To establish interrelationship between *Prakriti* with hematological parameters, BMI, Anthropometrics parameters, blood groups and genetic parameters.

3. Materials and Methods

A*yurvedic* texts, used in this study, are *Charak Samhita, Sushruta Samhita, Ashtanga Sangrah, Ashtanga Hridya* and research works conducted at various institutes etc. Search was undertaken in MEDLINE (www. pubmed. com) or the PubMed database, using keywords such as *Prakriti,* human constitution, physical Constitution, *Dosha*, Hematological parameters, blood groups, body mass index and genetic study. The search was limited to only English literature including those studies which were published from 2002 to 2018. A possible correlation has been made between collected information and has been presented in a systematic way.

4. Observation and Results

Based on the critical review of classical and recent information, the following observations have been found pertinent to this study.

4.1 Concept of *Prakriti* (Human Constitution)

Prakriti (human constitution) comprises of both "physical constitution" as well as "psychological constitution". *Prakrita Dosha* quanta are present in a person since birth till death without changing. If changed, death is definite[26]. *Prakriti* type can be represented in terms of their body structure, mental makeup, tolerance to various types of food & environment and susceptibility to various diseases including the prognosis. *Prakriti,* also establishes the knowledge regarding the effects of various diet, lifestyle, environment, and treatment on different *Prakriti* individuals[27]. *Prakriti* assessment can be done

by a questionnaire prepared on the basis of *Prakriti* characteristics mentioned in different textbooks of *Ayurveda*[28]. Traditional *Ayurvedic* method of *Prakriti* determination assessed by *Trividha pariksha* of *Ayurveda* as *Darshan* (visual assessment), *Sparshana* (tactile assessment) and *Prashana* (interrogative assessment)[29,30]. Morphological features can be assessed by visual assessment (*Darshan Pariksha*) such as color of skin, color of hair, consistency of hair and bony tissue proportions etc. Tactile assessment (*Sparshana pariksha*) for dryness/oiliness of skin, body temperature and pulse (*Nadi*) *pariksha*. Physical findings can be assessed by interrogation such as physical strength, endurance, hunger, sleep and dream patterns, bowel habit, memory and anger response. Knowledge of *Prakriti* can guide the parents for prevention of expected disorders and deciding to choose carrier at a very early age[31].

4.2 *Prakriti* (Human constitution) and Hematological Parameters

Common risk factor for cardiovascular diseases like triglycerides such as Total Cholesterol (TG), VLDL (Very Low Density Lipid), LDL (Low Density Lipid), LDL/HDL (low density lipid/ high density lipid) ratio was higher in *Kapha Prakriti* individuals. *Kaphaj Prakriti* persons had lower levels of High Density Lipid (HDL) while compared to *Vata Prakriti* persons. The levels of serum uric acid, SGPT (Serum Glutamic Pyruvic Transaminase), SGOT (Serum Glutamic-Oxaloacetic Transaminase) and serum Zinc were also elevated in *Kapha Prakriti* individuals.

Level of serum Prolactin and Prothrombin time were high in *Vata Prakriti* individuals in comparison to *Kapha* and *Pitta Prakriti* individuals. Other hematological parameters like hemoglobin, PCV (packed cell volume), and RBC (red blood corpuscles) count significantly on the higher side of normal range in *Pitta Prakriti* in comparison to *Vata* and/or *Kapha*[32,33]. In another study *Kapha-Pittaja Prakriti* were found more prone to develop hyperlipidaemia and associated risks. Therefore, they need effective life style modifications to lower the lipid level in *Kapha-Pittaja Prakriti*[34]. Blood sugar level, HbA1c% (hemoglobin A1c test) , total serum insulin level, HOMA-IR, (Homeostatic Model Assessment of Insulin Resistance) level and total cholesterol level have higher value in *Kaphaja Prakriti* individuals while decrease in LDL (low density lipid), triglycerides and increase in HDL (low density lipid) was obtained in *Pitta* and *Kapha Prakriti* individuals[35].

4.3 *Prakriti* (Human Constitution) and BMI

The BMI or Quetelet index is a value derived from the mass (weight) and height of an individual. The BMI is defined as the body mass divided by the square of the body height, and is universally expressed in units of kilograms/meters^2. BMI can be helpful in deciding and also for the conformation of the dominant *Prakriti* in the individual. BMI (body mass index) can be broadly classified into three groups like BMI less than 20 (low), in between 20 to 25 (moderate) and more than 25 (high). In one study maximum cases of *Vata Prakriti* (71%) have less than 20 BMI followed by *Pitta Prakriti*, (19%) and *Kapha* (10%) *Prakriti* respectively. The moderate BMI (20-25) was found more in *Kapha Prakriti* individuals (47%) followed by *Vata Prakriti* (32%) and *Pitta Prakriti* (21%), respectively. BMI more than 25 were mainly found in *Kapha Prakriti* individuals (79%) followed by *Vata Prakriti*, (11%) and *Pitta Prakriti*, (44%) respectively[36].

Anthropometry can be helpful in deciding and for the conformation of the dominant *Prakriti* in the in children. *Vata Prakriti* children are *Krisha Sharira* (lean and thin) or *Alpasharira* (short stature) and will have lower weight, CHL (Crown Heel Length) etc.; while *Kapha Prakriti* or *Pitta-Kapha Prakriti* infants are *Sthulanga* (stout body built) with better weight and CHL (crown heel length) as well as *Mahalalata* i.e. higher head circumference and *Prithu Peena Vaksha* (big and elevated chest)[37].

4.4 *Prakriti* (Human Constitution) and Blood Groups

The ABO system was first discovered by Landsteiner and Weiner and it comprises four type blood types like A, B, AB and O blood groups[38]. In a study incidence of A^+ blood group was more in *Kapha Prakriti* individuals (23.3%) followed by *Vata Prakriti* (20.4%) and *Pitta Prakriti* (16.7%), respectively. Prevalence of B^+ blood group was higher in *Pitta Prakriti* (29%) followed by

Vata Prakriti (28.2%) and *Kapha Prakriti* individuals (25.6%) respectively. The allocation of O^+ blood group was more among *Pitta Prakriti* (41.3%) followed by *Vata Prakriti* (39.3%) and *Kapha Prakriti* individuals (35.2%). The distribution of AB+ blood group was more among *Kapha Prakriti* individuals (10%) followed by *Pitta Prakriti* (8.0%) and *Vata Prakriti* individuals (7.1%), respectively. Rh factor has no significant distribution of among *Prakriti*[39].

In another study maximum incidence of *Vata Prakriti* in A blood group, maximum occurrence of *Pitta Prakriti* in O blood group and maximum occurrence of *Kapha Prakriti* in B blood group is seen. Maximum occurrence of *Vata-Kapha Prakriti* in AB blood group and maximum occurrence of *Pitta Kapha Prakriti* was founded in O blood group[40].

4.5 *Prakriti* (Human Constitution) and Genetic Study

The concepts of *Ayurveda* pulsate with the aims, observations and assure of contemporary P4 - it is predictive, preventive, personalized and participatory medicine[41–43]. Ayurgenomics is the new division in the field of research between genomics and *Ayurveda* which describes differences between individuals in response to the treatment for different diseases[44]. Evidences are being generated regarding the association between *Prakriti* and various genes which explain their working mechanism[45].

In one genetic study it was found that PGM1 gene was associated with energy production which was more homogenous in *Pitta Prakriti* individual than in *Kapha Prakriti* and *Vata Prakriti*. Characteristics of *Pitta* in *Ayurveda* is digestion, metabolism and energy production. This study shows that *PGM1* (*Phosphoglucomutase 1)* gene is in the center of many metabolic pathways *i.e.* glycolysis and sucrose metabolism. This finding suggests that the function of the gene directly correlates with the role of *Pitta* in metabolism as described in *Ayurveda*[46].

Another study shows the link between HLA (Human Leukocyte Antigen) allele and *Tridosha*-based constitutional types. The HLA (human leukocyte antigen) complex helps the immune system by foreign invaders such as viruses and bacteria. The complete absence of the HLA DRB1*02 ((human leukocyte antigen, dimer beta chain) allele in the *Vata Prakriti* and of HLA DRB1*13 in the *Kapha Prakriti* are significant. HLA DRB1*10 had higher allele frequency in the *Kapha Prakriti* than in the *Pitta* and *Vata Prakriti*[47].

Another study shows possible connection of CYP2C19 (Cytochrome P450 2C19) gene polymorphism with *Prakriti* of individuals. Observation of this study was, predominance of extensive metabolizers (EM) genotypes (∗1/∗1, ∗1/∗2, ∗1/∗3) in *Pitta Prakriti* individuals with quick metabolism. The poor metabolizers (PM) genotypes (∗2/∗2, ∗2/∗3, ∗3/∗3) was highest in *Kapha Prakriti* individuals that is expected to be metabolically slow. In *Kapha Prakriti* individuals the CYP2C19 ∗2/∗2 genotype frequency was significantly of higher type as compared to *Vata Prakriti* and *Pitta Prakriti* individuals[48].

The basic concept behind Ayurgenomics is the fact that if the system of *Tridosha* is prevalent in all organisms then there must be ways in which it is inherited. *Prakriti* must be a phenotypic phenomenon arising from a particular genotype.

5. Discussion

The practice of *Ayurveda*, the traditional medicine of India, is based on the concept of three major constitutional types (*Vata, Pitta* and *Kapha*) defined as "*Prakriti*". In *Ayurveda*, *Prakriti* determination is very essential for diagnostics, management, and prognosis of a disease. *Prakriti* also plays a very important role in prevention of diseases and *Pathyapathya ahara* and *vihara* of life. Method of *Prakriti* determination includes pulse detection, development of questionnaires, software such as AyuSoft[49] (especially for adult *Prakriti*) and PRS-IPA (especially for children *Prakriti*)[50]. Determining the *Prakriti* of a newborn can lead to a healthier life for an individual. For example, if we know children have *Kapha Prakriti* then from the *Balyavastha* (Childhood period) he/she should be encouraged to participate in sports and physical activity. Because *Kapha Prakriti* individuals have a natural tendency to reduce movement and if involved in sports from childhood, it will lead to a better life and will prevent from most of the chronic diseases such as obesity, diabetes and cardiovascular diseases[51]. After research many parameters were

developed which help in confirming the *Prakriti* such as hematological parameters, BMI, anthropometrics parameters, blood groups and genetic parameters. Hematological parameters like Hemoglobin, PCV, and RBC count significantly on the higher side of normal range in *Pitta Prakriti* in comparison to *Vata* and *Kapha Prakriti*. Serum Prolactin and Prothrombin time were high in *Vata Prakriti* in comparison to *Kapha* and *Pitta Prakriti*.

Kapha Prakriti individuals have better immune response than *Vata Prakriti* and *Pitta Prakriti* individuals and *Pitta Prakriti* individuals have better immune response than *Vata Prakriti* because higher level of CD14 markers in *Pitta Prakriti* and CD25 and CD56 in *Kapha Prakriti*, individuals[52] CD (cluster of differentiation) is a human gene that is a component of the innate immune system. Many cross sectional study related to blood group shows maximum *Vata Prakriti* individuals have "A" blood group, maximum *Pitta Prakriti* individuals have "O" blood group while maximum *Kapha Prakriti* individuals have "B" blood group. In relation to BMI it is found that *Vata Prakriti* individuals have BMI less than 20 and *Kapha Prakriti* individuals have more than 25. Many researchers work on *Prakriti* and phenotype-genotype correlation showing that Human leukocyte antigen (HLA) DRB1 gene polymorphism, CYP2C19 polymorphism and PGM1 polymorphism have systematic variations with the human *Prakriti* concept.

6. Conclusion

Prakriti (body constitution) is an important concept of *Ayurveda* which is decided at the time of conception. It shows differences in physical, physiological and psychological characteristics of an individual. *Prakriti* is important in preventive and curative aspects. *Prakriti* of an individual has strong relation to Hematological parameters (blood groups, complete blood count, lipid profile, Liver function test, BMI, Anthropometry, Human Leukocyte Antigen (HLA) DRB1, CYP2C19 (Cytochrome P450 2C19) polymorphism and PGM1 polymorphism. These parameters can help in confirmation of *Prakriti* which is decided by *Prakriti* characteristics based questionnaires as described in *Ayurveda*. The importance of each individual's variations in health and disease is an important basic principle rightly described hundreds of years ago as 'every individual is different from another and hence should be considered as a different entity; as many variations are there in the Universe.

7. Source of Support

Nil

8. Conflict of Interest

None Declared

9. References

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