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ORIGINAL RESEARCH ARTICLE (CLINICAL)

Variations in Physiological Parameters in Concordance with Constitutional Type of *Ayurveda*

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ABSTRACT

In *Ayurveda,* the pivotal concept of *Tridosha* signifies the three bio-entities viz *Vata*, *Pitta* and *Kapha* which forms the basis for understanding the health, disease process and treatment strategies. *Ayurvedic* scholars have divided the human constitution into seven types on the basis of relative preponderance of three basic humors. Although a lot of studies have been done concerned with *Prakriti* (constitutional types of *Ayurveda*) in different dimensions but still very basic study of physiological parameters in healthy individuals with reference to *Prakriti* is lacking. In present study, conducted on 433 healthy individuals we have investigated for a possible correlation between these *Ekdoshaja* (single dominant bio-entity) constitutional types and certain physiological parameters, viz. heart rate (HR), systolic blood pressure, diastolic blood pressure, total erythrocyte count, total leukocyte count, neutrophil percentage, lymphocyte percentage, hemoglobin (Hb) percentage, mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC), hematocrit, mean corpuscular volume, platelet count, RBC distribution width, platelet distribution width and mean platelet volume. Results suggest that HR, Hb %, MCH and MCHC have strong association to constitutional types of *Ayurveda.*

Key words: *Ayurvedic* constitution, Physiological parameters, *Prakriti*

INTRODUCTION

Central tenet of *Ayurvedic* science lies into fact that each human being is unique having a distinct individual constitution, genetic inheritance and predisposition to certain diseases. In *Ayurveda*, the pivotal concept is the theory of *Tridosha* signifying the three bio-entities viz *Vata*, *Pitta* and *Kapha* which forms the basis for understanding the disease process and for evolving treatment strategies. As per *Ayurveda*, the humoral constitution of an individual is basically determined by genetic variation of different bio-humors (*Doshas*) in the body of course within physiological limit. The words *Prakriti*, *Deha Prakriti* or *Doshaja Prakriti* are used in the same sense and denote the 'psycho-physio-anatomical typology' based on the principle of *Tridosha*. *Ayurvedic* scholars have divided the human constitution into seven types, on the basis of relative preponderance of three basic humors. [1,2,3] *Acharya Charaka* while describing salient features of different *Prakriti,* has very beautifully explained the specific attributes of a particular *Dosha* along with the description of the specific features of these attributes produced in an individual. [4] The idea of dividing population into specific constitutional type is not confined up to Indian system of medicine only, but is well elaborated in other healthcare systems like Kampo, Sasang and Traditional Chinese system of medicine as well. [5,6,7,8]

If we analyze recent few years work, interesting results have been observed in studies related to *Prakriti.* Ghodke Y. and others hypothesized that different *Prakriti* may have different drug metabolism rates associated with drug metabolizing enzyme (DME) polymorphism.

Authors have observed significant association between CYP2C19 genotype and major classes of *Prakriti* types, with extensive metabolizer genotype found to be predominant in *Pitta Prakriti* and poor metabolizer genotype in *Kapha Prakriti.*[9] Prasher B. and others observed that individuals from the three most contrasting constitutional types exhibited striking differences with respect to biochemical and hematological parameters and at genome wide expression levels.[10] In a study, Tripathi P.K and others have reported that the rise in diastolic blood pressure recorded immediately after performing the isotonic exercise was significantly minimal in *Vata-Kapha* individuals in comparison to the other two groups, namely *Vata-Pitta* and *Pitta-Kapha.* It provides indication

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that there could be some possible correlation between autonomic responses and the constitutional types. [11] Govindaraj P. *et.al.* found that PGM1 correlates well with phenotype of *Pitta* as described in *Charaka Samhita*, suggesting that the phenotypic classification of India's traditional medicine has a genetic basis; and its *Prakriti*-based practice in vogue for many centuries resonates with personalized medicine. [12]

Although a lot of work have been done to express the concept of *Prakriti* in terms of contemporary medical science, exact assessment of the constitution of individuals has remained a question mark. [13] The age, physical and psychological status of the individual along with the season prevailing while assessing one's constitution are the major factors that tend to distort the outcome of this exercise. Differences in the subjective perceptions of the physicians also can make the assessment ambiguous. *Prakriti* assessment results are found to be inconsistent with huge inter- and intra- rater inference variability. [14] The main reason behind the poor reliability is thus most probably the lack of a systematic objective methodology and a precise operational definition of the diagnostic methods. In the present study, we administered a newly designed *Prakriti* assessment proforma to randomly chosen 433 healthy volunteers, and their *Prakriti* was assessed in terms of *Ekdoshaja Prakriti*. We investigated for a possible correlation between these *Ekdoshaja* constitutional types and certain physiological parameters viz heart rate (HR), systolic blood pressure (SBP), diastolic blood pressure (DBP), total erythrocyte count, total leukocyte count (TLC), neutrophil percentage, lymphocyte percentage, hemoglobin percentage (Hb%), mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC), haematocrit (Hct), mean corpuscular volume (MCV), platelet count, RBC distribution width (RDW), platelet distribution width (PDW) and mean platelet volume (MPV).

Aims and Objectives of this study

Although a lot of studies have been done concerned with *Prakriti* in different dimensions, but still a very basic study of physiological parameters in healthy individuals with reference to *Prakriti* is lacking and also, we have no reference range for these parameters in relation to the constitutional types. The same encouraged us to have such study to explore the relationship of *Prakriti*, if any, with physiological parameters as Hb%, TLC, MCH, MCV, etc.

MATERIALS AND METHODS

Population

Population for the present study was defined in terms of the students under BAMS course, MD/MS(Ay) course, senior residents, Ph.D. scholars, students of physical education, teachers and university employees. Only the individuals of age between 18-45 years were registered.

Sampling

All the enrolled volunteers were informed about the study through verbal communication. The complete details of study were explained to them and their voluntary participation in the work was solicited. After obtaining the written consent from those volunteers who responded to our request, a thorough clinical examination was carried out to confirm that they were clinically healthy. A detailed proforma was used to record the findings that included history taking and physical examination. The basic intention behind this exercise was to exclude volunteers who had some chronic illnesses or those who suffered from any illnesses during the period of study. Only those volunteers who were declared as 'clinically healthy' were chosen for the study. Initially 457 volunteers were enrolled, out of which 1 female volunteer was excluded due to pregnancy, 2 male volunteers were excluded due to high blood pressure (B.P), 1 male volunteer was excluded due to renal disorder and 3 female volunteers were excluded due to hypothyroidism. In addition, 17 volunteers were excluded from the study later after assessing their *Prakriti* because most dominant *Dosha* in them was less than 50% and the difference between most dominant *Dosha* and the following *Dosha* was less than 7%. So, finally 433 volunteers who had fulfilled all criteria were registered in the study. Among them, 218 volunteers were male and 215 were female.

Ethical clearance

The study was approved by the ethical committee of IMS, BHU vide letter no. Dean/2014-2015/EC/433, dated 18.02.2014.

Assessment of *Prakriti* among the Volunteers

Preparation of the new questionnaire

For it, major *Ayurvedic* classical texts i.e. *Brihadtrayee (Charaka Samhita, Sushruta Samhita* and *Ashtanga Hridaya), Laghutrayee (Bhava Prakasha, Madhava Nidan and Sharangdhara Samhita)* and *Kashyapa Samhita* were consulted to figure out the different features in individuals of different *Prakriti*, and the features elaborated in these treatises were then narrated in a non repetitive manner. Efforts were made to allocate proper weightage to psychological or mental attributes. The proforma was designed in such a way that each trait/ character described in texts was converted into a corresponding simplified form, yet keeping the original idea intact. Each question/trait was allotted equal marks. It was finally found that *Vata* is having 43 traits/questions, *Pitta* is having 36 traits/questions and *Kapha* is having 42 traits/questions. Validation of this new questionnaire was done by comparing its assessed *Prakriti* results with the results of two other *Prakriti* assessing proforma which were developed by Verma V.[15] and Tripathi P.K. [11] Validation result was fairly good. Reliability test of new proforma was also done and was found to be consistent.

Procedure Adopted to Assign the Constitutional Type

Percentage dominance of a *Dosha* in an individual was calculated on the basis of the total scores obtained for each *Dosha* by simple mathematical calculation as shown below:

$$\% \text{ of } Dosha = \frac{\text{Marks scored by an individual for a } Dosha}{\text{Total marks allotted to that } Dosha} \times 100$$

We decided to go with *Ekdoshaja Prakriti* assignment along with restrictions that only those volunteers will be selected for study who would be having:

1. Most dominant *Dosha* score at least 50% or more of its maximum possible score.
2. There is at least 7% of difference in between the most dominant *Dosha* and secondary *Dosha*.

These 433 volunteers were then subjected to some simple experiments in the human physiology laboratory as described in the further paragraphs.

After assessment of *Prakriti*, individuals were divided into three categories on the basis of most dominant *Dosha*, i.e. *Vata Doshaja Prakriti*, *Pitta Doshaja Prakriti* and *Kapha Doshaja Prakriti*.

Recording the Parameters

HR and BP was recorded according to the universally accepted standard protocol.

Collection of venous blood and hematological analysis: For all the hematological parameters regarding this study, 5ml. of venous blood was collected from the subjects and hematological parameters i.e total erythrocyte count, TLC, neutrophil percentage, lymphocyte percentage, Hb%, MCH, MCHC, Hct, MCV, platelet count, RDW, PDW and MPV were estimated by Automated Hematology Analyzer pocH-100i of Sysmex (Japan). Stromatolyser-WH and Cell pack (whole blood diluent) chemicals were used for the estimation of these hematological parameters.

Calculations and Statistical Analysis

The data entry was carried out using the Software Statistical Package for Social Sciences (SPSS version 16.0). The means were calculated for all the recorded parameters with respect to each *Prakriti* group. For the purpose of intergroup comparison, One-way ANOVA was used.

OBSERVATIONS

Assessment of *Prakriti* of these 433 (218 males and 215 females) individuals revealed that 83 (19.17%), 138 (31.87%) and 212 (48.96%) respectively belonged to *Vata*, *Pitta* and *Kapha Prakriti*. Statistical analysis is as follows [Table 1 to 4]:

Table 1: Relationship of heart rate and different *Prakriti* types

Parameter	Descriptive Statistics	*Vata* n=83	*Pitta* n=138	*Kapha* n=212	ANOVA	Post Hoc Test
Heart rate (beats/min)	Mean	83.59	80.12	80.59	Highly Significant p=.01 f=4.320	V vs P=.017 V vs K=.031 K vs P=1.00
	Standard Deviation	10.005	8.798	8.685		
	Minimum, Maximum	60, 108	54, 102	54, 108		
	95% of CFI for Mean	81.41, 85.77	78.64 81.60	79.42, 81.77		
	Median	84	80	80		

V=*Vata Doshaja Prakriti*, P= *Pitta Doshaja Prakriti*, K= *Kapha Doshaja Prakriti*

Table 2: Relationship of Hb% and different *Prakriti* types

Parameters	Descriptive Statistics	*Vata* n=83	*Pitta* n=138	*Kapha* n=212	ANOVA	Post Hoc Test
Hb (in gm %)	Mean	12.539	13.323	13.116	Highly Significant p=.001 f=6.780	V vs P=.001 V vs K=.013 K vs P=.675
	Standard Deviation	1.793	1.572	1.432		
	Minimum, Maximum	7.40, 15.60	9.20, 16.10	9.20, 16.10		
	95% of CFI for Mean	12.148, 12.931	13.058, 13.587	12.923, 13.310		
	Median	12.600	13.600	13.250		

V=*Vata Doshaja Prakriti*, P= *Pitta Doshaja Prakriti*, K= *Kapha Doshaja Prakriti*

Table 3: Relationship of MCH and different *Prakriti* types

Parameter	Descriptive Statistics	*Vata* n=83	*Pitta* n=138	*Kapha* n=212	ANOVA	Post Hoc Test
MCH (in pg)	Mean	26.867	27.884	27.711	Highly Significant p=.01 f=4.071	V vs P=.019 V vs K=.046 K vs P=1.00
	Standard Deviation	3.356	2.354	2.574		
	Minimum, Maximum	18.100, 34.600	19.200, 38.000	17.500, 37.100		
	95% of CFI for Mean	26.134, 27.600	27.488, 28.281	27.362, 28.059		
	Median	27.800	28.350	28.200		

V=*Vata Doshaja Prakriti*, P= *Pitta Doshaja Prakriti*, K= *Kapha Doshaja Prakriti*

Table 4: Relationship of MCHC and different *Prakriti* types

Parameter	Descriptive Statistics	*Vata* n=83	*Pitta* n=138	*Kapha* n=212	ANOVA	Post Hoc Test
MCHC (in gm/dl)	Mean	30.026	30.615	30.499	Highly Significant p=.002 f=6.251	V vs P=.002 V vs K=.010 K vs P=1.00
	Standard Division	1.255	1.180	1.269		
	Minimum, Maximum	26.800, 32.800	25.200, 32.900	24.700, 32.900		
	95% of CFI for Mean	29.752, 30.300	30.417, 30.814	30.327, 30.670		
	Median	30.100	30.700	30.600		

Parameters like SBP, DBP, total erythrocyte count, TLC, neutrophil percentage, lymphocyte percentage, Hct, MCV, platelet count, RDW, PDW and MPV do not significantly vary according to *Prakriti* and so the tables related these parameters are not shown.

DISCUSSION

If we consider [Table 1], mean HR of *Vata*, *Pitta* and *Kapha Prakriti* individuals is found to be 83.59 ± 10.005, 80.12 ± 8.798 and 80.59 ± 8.685 per minute respectively. ANOVA test reveals that

HR of individuals varies significantly according to different *Prakriti* groups (p=.01). It is very much possible that due to *Chal Guna* (property of mobility), *Vata* may motivate heart with a higher pace whereas due to *Manda* (dullness), *Sthir Guna* (property of stability), the *Kapha* may be responsible for lower pace of the heart. In a study Buchiramulu R.S.*et al*, [16] have found that individuals with *Kapha* as the most dominant *dosha* contributing to their *Prakriti* tend to have parasympathetic dominance with respect to their cardiovascular activity, whereas individuals with *Vata* as the most dominant *dosha* contributing to their *Prakriti*, tend to have the dominant sympathetic activity in relation to cardiovascular activity. It means that individuals with *Vata* as the most dominant *dosha* will be having higher HR due to sympathetic predominance and individuals with *Kapha* as most dominant *dosha* will be having lower HR due to parasympathetic predominance. Our study finds similar type of results.

In [Table 2], mean Hb % of *Vata, Pitta* and *Kapha Prakriti* individuals is found to be 12.539 ± 1.793, 13.323 ± 1.572 and 13.116 ± 1.432 gm percent respectively. ANOVA test reveals that Hb of individuals varies significantly according to different *Prakriti* groups (p=0.001). In a study, Amin H. and Sharma R. [17] have found that *Pitta, Kapha* and *Vata Prakriti* individuals are having maximum, moderate and minimum Hb %**.** In a study Singh P.K *et al* [18] have also found that *Pitta Prakriti* individuals are having maximum Hb %**.**

According to [Table 3], mean of MCH of *Vata, Pitta* and *Kapha Prakriti* individuals is found to be 26.867 ± 3.356, 27.884 ± 2.354 and 27.711±2.574 picogram respectively. ANOVA test reveals that MCH of individuals varies significantly according to different *Prakriti* groups (p=.01).

In [Table 4], mean of MCHC of *Vata, Pitta* and *Kapha Prakriti* individuals is found to be 30.026 ± 1.255, 30.615 ± 1.180 and 30.499 ± 1.269 gm/dl respectively. ANOVA test reveals that MCHC of individuals varies significantly according to different *Prakriti* groups (p=.002).

It is not surprising that Hb%, MCH and MCHC is found to be highest in *Pitta Prakriti* individuals. These parameters are related to the blood and especially the RBCs. [19] *Rakta dhatu* is one of the major sites where *Pitta* resides, so any increase or decrease in *Rakta dhatu* proportionately affects the *Pitta* and vice versa; e.g. in aggravation and vitiation of the *Pitta dosha*, *Raktamokshana* (therapeutic bloodletting) is one of the best treatment. This is why the value of these indices is found to be highest in *Pitta Prakriti* individuals. In a study Gunawat C.P. *et al*, [20] have found that *Raktasaar* (RBC and Hb indices at upper limit of normal physiological range) individuals are having statistically significant levels of Hb%, MCH and MCHC in comparison to individuals of other *Saar* (excellence of tissues). As *Rakta* is one of the major sites of *Pitta*, we can say that Hb%, MCH, and MCHC level may be on higher side in *Pitta Prakriti* individuals in comparison to rest of the two *Ekdoshaja Prakriti*. This study justifies our finding. Study by Ghate U.S.*et al*,[21] showed that Hb%, MCH and MCHC have statistically significant correlation to *Raktasaar* individuals, which further supports our study.

CONCLUSIONS

Study indicates that heart rate varies significantly according to constitutional type of *Ayurveda* and can be fairly explained by the specific attributes of particular *dosha.* Study further indicates that Hb %, MCH and MCHC has strong correlation to constitutional type of *Ayurveda* and these parameters are found to have highest value in *Pitta Prakriti* individuals which is in accordance with the concepts of Indian system of medicine. But rest of the parameters does not show significant relationship with *Prakriti*.

REFERENCES

1. Pandey G.S., Chaturvedi G.N.,editor,(reprint edition).Charak Samhita of Charak, vol 1. Vimaanstan; Rogbhishagjiteeya Adhyaya: Chapter 8, Verse 95. Varanasi: Chaukhamba Bharati Academy 2001; p.772.
2. Shastri K.A.,editor (14th edition).Sushruta Samhita of Sushruta, vol 1. Shaareersthana; Garbhavyaakaran naam Adhyaya: Chapter 4, verse 61. Varanasi: Chaukhamba Sanskrit Sansthan 2003;p. 37.
3. Rastogi S. Building bridges between Ayurveda and Modern Science. International Journal of Ayurveda Research 2010; vol.1, no.1: 41–46.
4. Ibidem (1) Charak Samhita Vimaanstan; Rogbhishagjiteeya Adhyaya: Chapter 8, .verse 96-98. p. 772-774
5. S. Kanba, K. Yamada, H. Mizushima, M. Asai. Use of herbal medicine for treating psychiatric disorders in Japan. Psychiatry and Clinical Neurosciences supple. 1998; vol. 52: S331–S333.
6. Patwardhan B.,Warude D.,Pushpangadan P., Bhatt N. Ayurveda and Traditional Chinese Medicine: A Comparative Overview. Evidence-Based Complementary and Alternative Medicine 2005; vol. 2, no. 4: 465-473, doi:10.1093/ecam/neh140.
7. Kim J.Y., Pham D. D., Koh B.H. Comparison of Sasang Constitutional Medicine, Traditional Chinese Medicine and Ayurveda. Evidence-Based Complementary and Alternative Medicine 2011; 6 pages. Article ID 239659, 6 pages, 2011. doi:10.1093/ecam/neq052.
8. Kim J.Y.,Pham D.D. Sasang Constitutional Medicine as a Holistic Tailored Medicine. Evidence-Based Complementary and Alternative Medicine 2009; vol. 6, no. S1: 11-19, doi:10.1093/ecam/nep100.
9. Ghodke Y., Joshi K., Patwardhan B. Traditional Medicine to Modern Pharmacogenomics: Ayurveda Prakriti Type and CYP2C19 Gene Polymorphism Associated with the Metabolic Variability. Evidence-Based Complementary and Alternative Medicine 2011; Article ID 249528, 5 pages, 2011. doi:10.1093/ecam/nep206.

10. Prasher B., Negi S., Aggrawal S., Mandal A.K., Sethi T.P., Deshmukh S. R., *et. al*. Whole genome expression and biochemical correlates of extreme constitutional types defined in Ayurveda. Journal of Translational Medicine 2008; 6:48 DOI: 10.1186/1479-5876-6-48
11. Tripathi P.K., Patwardhan K., Singh G. The Basic Cardiovascular Responses to Postural Changes, Exercise, and Cold Pressor Test: Do They Vary in Accordance with the Dual Constitutional Types of Ayurveda?. Evidence-Based Complementary and Alternative Medicine 2011; Article ID 251850, 10 pages, 2011. doi:10.1155/2011/251850.
12. Govindaraj P., Nizamuddin S., Sharath A., Jyothi V., Rotti H., Rayal R., et.al. Genome-wide analysis correlates Ayurveda Prakriti. Nature 2015; Article no 15786 doi:10.1038/srep15786.
13. Tripathi P.K. Gehlot S. Critical analysis of concept of Prakriti and challenges in its assessment: A review. Int. J. Res. Ayurveda Pharma 2016;7 (3):1-4.doi.org./10.7897/2277-4343.07399.
14. Kurande V., Bilgrau A. E., Waagepetersen R., Toft E., Prasad R. Interrater Reliability of Diagnostic Methods in Traditional Indian Ayurvedic Medicine. Evidence-Based Complementary and Alternative Medicine 2013; Article ID 658275, 12 pages, 2013. doi:10.1155/2013/658275.
15. Verma V., Gehlot S. A comparative study of stress response in health and certain psychosomatic conditions and its relevance in assessment of Prakriti. Thesis (Ph.D) work in Dept. of Kriya Sharir Faculty of Ayurveda, IMS BHU Varanasi, Dec 2009.
16. Rapolu S.B., Kumar M., Singh M., Patwardhan K. Physiological variations in the autonomic responses may be related to the constitutional types defined in Ayurveda. Tang 2015; Volume 5, Issue 1, e7. doi.org/10.5667/tang.2014.0031.
17. Amin H., Sharma R. Biochemical and Anthropometric Profiles of Different Prakriti (Ayurvedic Constitution) Patients of Non-insulin Dependent Diabetes Mellitus. Journal of obesity and medical research 2015;Volume: 2, Issue : 2 :120-124.
18. Singh P.K., Tripathi N.S. Impact of season and constitution on lipid parameters. AYU 2013; Jan -Mar; 34(1): 77–80.
19. Agrawal S, Verma V, Gehlot S. Ayurvedic Perspectives on Physiology of Blood (Rasa-Rakta Dhatu) and its Applied Aspects. Int J Ayurveda & Med Sc. 2016; 1(3): 70-76.
20. Gunawat C.P., Gehlot S. Variation of haematological parameters in different dhatu saar individuals as per sex. Int. J. Res. Ayurveda Pharm 2015;6(5): 598-601. doi.org/10.7897/2277.4343.065112.
21. Ghate U. S., Indapurkar K. V. Study of Dhatu Sarata and its association with blood indices. Int. J. Res. Ayurveda Pharm.2014; 5(3):309-314 doi.org/10.7897/2277.4343.05363.

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