IMPORTANCE OF INVESTIGATING BLOOD VISCOSITY IN DIFFERENT PRAKRUTI PERSONS WITH SPECIAL REFERENCE TO PREHYPERTENTIVE CONDITION

Shekhar G. Uike[1], Nikita P Kursange[2]

[1]MD, Assistant Professor, Dept of Kriyasharir, Shri K.R. Pandav Ayurved College, Nagpur, Maharashtra, India
[2]MD (Scholar-Samhita Siddhant), Shree Ayurved College, Nagpur, Maharashtra, India

Email: sgu141@gmail.com

ABSTRACT

According to Ayurveda, body is made up of three basic pillars i.e. *Dhosha*, *Dhatu* & *Mala*. Ayurveda can explain the subtle differences between individuals and explains why everyone is unique and that two persons can react very differently when exposed to the same environment or stimuli. It is important for each one of us to know our *prakriti*. Therefore it is important to study the physiological variations in different prakritis. According to Sushruta *Garbhaprakriti* formed by combination of *Vata*, *Pitta*, *Kapha* and *Rakta* in the womb of pregnant woman. According to chakrapani's commentary various shades of colour of Raktadhatu are found in normal individuals in different prakriti persons. *Dravata* is called flowing nature of liquid. Thinking about blood, fluidity decreases with increase in the resistance to flow i.e. viscosity. Fluidity of liquid also affected by specific gravity of that liquid and viscosity will be directly proportional to specific gravity. Despite decades of treatments to lower cholesterol, regulate Heart rhythms and reduce salt and fat, cardiovascular diseases are still the number one killer of adults. It has been associated male genders, smoking, obesity, secondary lifestyle, Hypertension. Blood viscosity is the common factor ties all these factors together. These are effective natural treatments that can alter blood viscosity safely reserving health and potentially saving lives. Viscosity and specific gravity of blood by which we can suggest further *investigations* suitable *Aahar-Vihar* to those who have increased or decreased viscosity and specific gravity of blood.

Keywords: *Prakriti,* Viscosity, *Dravata, Raktadhatu.*

1. INTRODUCTION

Ayurveda is not a science dealing with drug only; it is more a way of life and describes method for promotion of positive health. Every individual is a unique entity with a constitution of his /her own. This is called *Prakriti*.[1] *Prakriti* is the physical and psychological constitution of the individual which is determined on the basis of three *doshas*. So, there are basically three constitutions namely *Vata* constitution, *Pitta* constitution, *Kapha* constitution and there combinations. According to Sushruta *Garbhaprakriti* formed by combination of *Vata, Pitta, Kapha* and Rakta in the womb of pregnant woman.[2] Thinking

about Rakta, *Raktadhatu* also formed by collaboration of five *mahabhutas*. But there is dominance of *Aap & Teja mahabhuta*.[3]

According to chakrapani's commentary various shades of colour of *Raktadhatu* are found in normal individuals in different *prakriti* persons[4.] But there is no detailed explanation about *Dravata* guna that endowed to *Raktadhatu* by *Apa mahabhuta*.

Dravata is called flowing nature of liquid. Thinking about blood, fluidity decreases with increase in the resistance to flow i.e. viscosity. Viscosity which represents the mutual attraction between the particles of fluid. Viscometer is used to measure viscosity.[5]

Despite decades of treatments to lower cholesterol, regulate Heart rhythms and reduce salt and fat, cardiovascular diseases is still the number one killer of adults in the industrialized world. It has been associated with nearly 300 independent risk factors, like male genders, smoking, obesity, secondary lifestyle, Hypertension.[6] Blood viscosity is the common factor ties all these factors together. It is associated with each of these risk factors either as a contributor or an effect. These are effective natural treatments that can alter blood viscosity safely reserving health and potentially saving lives.

1.1-Hypertention: Blood pressure is caused by various complete series of factors controlling blood vessels caliber response control of fluid volume within and outside the vascular bed, and resultant cardiac output. All such factors are interrelated with each other making it difficult to determine a single or sure cause for hypertension. Thus, when the definite cause cannot be determined or established the hypertension is called as essential hypertension (EHT). It was named as essential under belief that it springs up as essential for proper circulatory functions of the blood in all organs. But now it is defined as hypertension, the causes of which are not definitely known.

About EHT we may conclude that –

a) Among all hypertensive 95% patients suffer from EHT.

b) The constitutional (genetic), dietary and environmental factors are involved in rising arterial pressure in EHT.

c) This is associated with impaired endothelium mediated vasodilatation.

'Hypertension' (persistent raised arterial pressure) although, the handy literature is not observed in Ayurvedic classic, review of previous theoretical and clinical works on this topic point out certain mode of involvement of *dosha* and *dushya* in the genesis of it. Also, Acharya Charaka permits to treat such disease without nomenclature by judging the involvement of *dosha dushya* only[7]

1.2-Effect of *Raktadhatu* on Blood Pressure: *Rasa–Rakta samvahana* occurs simultaneously in the body. Therefore, the effect of *raktadhatu* on the blood pressure is as the same as of *rasadhatu*. For the maintenance of normal blood pressure, normality of *raktadhatu* in quantity as well as in function is necessary.

The premonitory symptoms appear before the appearances of the disease are known as *purvarupa* or prodromata[8]. *Purvarupa* are manifest when *khavaigunya* in the *srotas* takes place and the excited *dosha* get localized in the impaired *srotas - sthana-samsraya* and *dosha-dusya sammurchhana* takes place i.e. fourth *kriyakala*[9]. Though, EHT is said to be *vata pradhana tridoshaja vyadhi* and the *purvarupa* of the *vata vyadhi* said to be *avyakta* (obscure). Most of the hypertensive patient remains asymptomatic or present with subjective symptoms like headache, vertigo, palpitation etc. Many of the patients of hypertension are diagnosed at the visit to clinician with one or other health problem and being checked the blood pressure. Though, generally the symptoms of EHT are not seen in such patients and premonitory symptoms are also indistinct.

Concept of this study comes from Chakrapani's commentary on different shades of blood (*Raga Guna*) in different *prakriti* persons. So, I study viscosity of Blood in different prakruti persons and as viscosity is inversely proportional to *Dravata* of *Raktadhatu*, viscosity varies as *Drava Guna* varies. Variations in viscosity impacts blood pressure. By using this study we can understand the variations in viscosity of blood by which we can suggest further investigations, suitable *Aahar- Vihar* to those who have increased or de-

creased viscosity of blood like prehypertensive conditioned patients. The following study will be definitely helpful to add some fruitful information and to make a foundation for prehypertensive patients' better prognosis.

2. Aim & Objectives:

1. To evaluate importance of viscosity in prehypertensive condition of different prakriti persons.
2. To study *Dravata* of *raktadhatu* in different *prakriti* persons.
3. To study blood viscosity in prehypertensive persons.

3. Materials & Methods:

3.1-Type of study: Observational Analytical Prevalence Study.

3.2-Sample size: Total number of volunteers included in the study will be 90.

3.3-Method of selection of sample: Appropriate number of volunteers will be screened so as to recruit 30 volunteers of each Ekdoshpradhan prakriti type. Remaining was excluded from study as they can't fulfil the criteria of *Ekdoshpradhan prakriti*.

Vatapradhan Prakriti ≥60% of *vataprakriti lakshanas*
Pitapradhan Prakriti ≥60% of *pittaprakriti lakshanas*
Kaphapradhan Prakriti ≥60% of *Kaphaprakriti lakshanas*

3.3-Place of study: The normal random subjects from R.A. Podar Med.(Ayu) college, worli, Mumbai and its periphery were selected for the research work.

3.4- Sampling Method: Simple Random Sampling

3.5- Sample Selection Criteria

Inclusion criteria:

- Age group- age between 20 to 40 yrs.
- Sex- Both male & female
- Subjects having hemoglobin percentage greater than 10gm%.
- Subjects not having any major illness & surgical history and not on any medications for chronic illness.
- Subject is ready to abide by trial procedure & to give informed consent.

Exclusion Criteria:

- Age group-age below 20 & above 40 yrs.
- The volunteers whose Hematological & Biochemical values will not be in the normal range.
- Pregnant & lactating mothers.

3.6- Study Design:

1. After taking the consent, Prakruti evaluated using questionnaire made and approved by MUHS, Nashik. Percentage of each dosha calculated. Individuals having 60% or more characters included in the sample as *dosha pradhan Prakruti* of that *dosha*, with *anubandha dosha*.
2. Routine haematological and biochemical investigations done for confirmation of their healthy status.
3. Then their viscosity analysis studied with viscometer relative to water.
4. Then *Prakruti* correlated with viscosity based gradation given to *Dravata* of *Raktadhatu*.(Table no. 1)

4. Observations & Results:

Estimation of viscosity of blood by Ostwald's viscometer:

Principle:

The venous blood with proper anticoagulant was collected in the specialized test tube called viscometer. The time required to pass the blood capillary bore from one marking to the next was noted.

Materials and apparatus:

- Viscometer: the viscometer is U-shaped glass tube one limb of which is wider with a bulb near its lower end. The other limb has a bulb near its upper end and a narrow capillary bore below it. There are two markings 2 & 3 above and below the bulb in this limb.
- Stop watch

Procedure:

➢ The limb with the wide tube was filled with anticoagulated blood.
➢ The blood was then sucked up into the narrow limb to above the mark 1.

- The time taken by the blood to fall from mark 1 to 2 was noted.
- The procedure is then repeated with water and is then compared with that of blood.

- Relative viscosity of the blood sample drawn from above formula-

$$\text{Relative viscosity of sample} = \frac{\text{Time taken by blood sample to fall from mark 1-2}}{\text{Time required for water to fall from mark 1-2}}$$

Assessment will be done according to readings as per Table no.-1

It counts relatives to viscosity of water-

Viscosity of Water: 1.002 at 20^0c

Relative Viscosity of blood: 3-5

Statistical analysis

To reach the final result & conclusion, the data that has generated during the study was subjected to statistical analysis. One way ANOVA test for association and correlation coefficient was applied for the evaluation of association of *Prakriti* and Viscosity of blood. Significance of results was studied at 5% level of significance. The graphical representation was applied wherever necessary.

All various objective parameters subjected to statistical analysis in terms of

X $\longrightarrow$ Mean

S.D. $\longrightarrow$ Standard Deviation

The obtained results were interpreted:

Non-significant: $p>0.05$

Significant: $p<0.05, <0.01$

Highly Significant: $p<0.001$

Total 30 *Vatapradhan* subjects have viscosity time 2.56 ± 0.56.Total 30 *Pittapradhan* subjects have viscosity time 3.44 ± 0.71. Total 30 *kaphapradhan* subjects have viscosity time 3.55 ± 0.64 (Table No.3)

High *Dravata*-Out of 90 subjects, 28 subjects were having High *Dravata*. Out of these subjects, only 18 subjects (60%) were having *vata pradhan prakruti*, 06 subjects (20%) were having *pitta pradhan prakruti* and 04 subjects (13%) were having *kapha pradhan prakruti*.

Madhyama *Dravata*-Out of 90 subjects, 60 subjects were having *Madhyama Dravata*. Out of these subjects, 12 subjects (40%) were having *vata pradhan prakruti*, 23 subjects (77%) were having *pitta pradhan prakruti* and 25 subjects (83%) were having *kapha pradhan prakruti*.

Less *Dravata*-Out of 90 subjects, 02 subjects were having Less *Dravata*. Out of these subjects, no one subject has *vata pradhan prakruti*. Only 1 subject (3%) was having *pitta pradhan prakruti* and only 1 subject (3%) was having *kapha pradhan prakruti*. (Table No.2)

	Vata Prakruti	Pitta Prakruti	Kapha Prakruti
Mean viscosity	2.56	3.44	3.55
S.D.	0.56	0.71	0.64

H0 = Viscosity is independent on *Doshpradhan Prakruti*

H1 = Viscosity is dependent on *Doshpradhan Prakruti*

ANOVA test is applied to determine the Significance in *Doshpradhan Prakruti*. The level of significance is set at 5% level, $P<0.05$ level. F $_{calculated}$ > F $_{table}$ value

indicates the significance and it reveals that the effect is due to *Doshpradhanyaja Prakruti*.

From the statistical analysis of the above table it is observed that -

1. In *Vata Pradhan Prakruti* avg. viscosity score is 2.56 ± 0.56

2. In *Pitta Pradhan Prakruti* avg. viscosity score is 3.44 ± 0.71

3. In *Kapha Pradhan Prakruti* avg. viscosity score is 3.55 ± 0.64

One-way Analysis of Variance (ANOVA)
P value is < 0.0001, considered extremely significant. Variation among column means is significantly greater than expected by chance.

ANOVA table			
Source of variation	Degrees of freedom	Sum of squares	Mean square
(between columns)	2	17.743	8.872
(within columns)	87	35.969	0.413
Total	89	53.715	

F = 21.45

On comparing these three groups by applying ANOVA test, the calculated F value is 21.459 Table value for 2 df across and 87 df vertically at 5% level of significance = 3.101. Calculated value is greater than table value. So null hypothesis is rejected and H1 of significant difference between the mean is accepted hence *Doshpradhan Prakruti* and viscosity are dependent and there is significant difference in the viscosity between *Vata*, *Pitta* and *Kapha pradhan Prakruti*.

On looking at the mean viscosity of three *Prakruti* groups, we find that mean of *Kapha pradhan Prakruti* is apparently highest than *Vata pradhan* and *Pitta pradhan Prakruti* and *Vata pradhan Prakruti* has apparently lowest viscosity mean than other *Pitta pradhan* and *Kapha pradhan Prakruti* groups.

Column comparision -ByTukey-Kramer Multiple Comparisons Test

Vata vs. pitta   *** P<0.001

Vata vs. kapha *** P<0.001

Pitta vs. kapha ns   P>0.05

Thus, mean viscosity of *vata Pradhan Prakruti* is significantly low than *Pitta* and *kapha Pradhan Prakruti*.

5. DISCUSSION

The term Essential Hypertension is reserved for about 95 % of hypertensive, in which no immediately evident underlying renal or adrenal cause can be found for the raised Blood Pressure. It can be only detected on routine medical check-up or when patient goes to hospital with its dangerous complications like stroke, angina, myocardial infarction etc. In medical practice, this psychosomatic hemodynamic disease is known as the 'Silent' or 'Hidden Killer' because of its end organ (Trimahamarmas) damages. having disastrous and menacing effects on human beings which ultimately leads to death of a person. Even Indian Council of Medical Research (ICMR) All India Institute of Medical Science (AIIMS) study declared India a nation of hypertension. 40-45 million Indians are believed to be suffering from the disease that is a key risk factor for coronary artery disease, diabetes and renal failure. This is so, because, as a nation India is becoming overweight and consuming more salt, and less of fresh fruits and vegetables plus stress and tension full life than previous generations. Despite so many researches and studies on EHT, both in Modern and Ayurvedic field, the EHT is yet one of the most troublesome, problematic disease for patients as well as physicians. According to Sushruta, in all individuals with any *Prakriti Raktadhatu* is '*Asamhat'* But the degree of *samhanan* i.e., coagulation is *Prakriti* dependent. [10]

Here Sushruta clearly says that normal blood can stop on itself. This we can correlate with the coagulation process. But its degree will minutely differ according to *Prakriti*. I think this can be correlated with viscosity. In the same manner, *Prakriti* does not pathologically change the viscosity, but the viscosity is different in every individual.

6. CONCLUSION

As *Prakriti* defines Basic constitution of human being comparing viscosity of blood with *dravata* of *raktadhatu* we can conclude that *Kaphapradhan prakruti* persons are more prone to atherosclerotic changes and hypertensive condition than *vata* and *pitta prakruti* persons.

7. SCOPE OF STUDY

Although this work is done in a scientific way however there are certain limitations of time and facilities available.

- Majority of volunteers are doing their graduation or post graduation. There may be variation in result, if volunteers of other occupations are included.
- All the volunteers are from age group 20-40 years. There is age related impairment in viscosity, so study can be done specifically including old age volunteers.
- In this study, maximum High *Dravata* subjects were included, since Less *Dravata* is a rare condition in Healthy persons. So still large population is needed to study comparison between different gradations of *Dravata*.
- Hence, to make the value of these parameters more definite and universal, and to explore new things further emphasized study is needed.
- Prakriti can be used as an objective tool for prognosis of Atherosclerotic changes.
- It is suggested that viscosity can be used for determination of the risk group for myocardial infarction.
- Thus, Assessment of Prakriti is an important parameter for advice to avoid the atherosclerotic changes.

- So now from this study we can say that assessment of *Prakriti* is a measure to judge human health, disease proneness.

8. REFERENCES

1. Sushrut Samhita, Translated by Vd.Datto Ballal Borkar, Rajesh Publication, Omkar press Tulsibagh Pune; Sharirsthan; chapter 4; verse no.78; Pg.no.337.
2. Sushrut Samhita,Translated by Vd.Datto Ballal Borkar, Rajesh Publication, Omkar press Tulsibagh Pune; Sutrasthana; chapter 15; verse no.7; Pg.no.57.
3. Sushruta Samhita with Dalhana-Tika,Vd. Yadavji Trikamji Acharya and Narayan Ram Acharya Kavyatirthai, published by Chaukhambha Surbharati Prakashan, Varanasi-2008sutrasthan; chapter 15 verse 8.
4. Ayurveddipika tika by Acharya Chakrapani, Vd.Jadavji Trikamji Acharya; Chaukhambha Publications; New Delhi; 2016; SutrasthanaChapter 24 verse no.22; pg.no.125.
5. C L Ghai, A Textbook of Practical physiology, , section 1 Hematology 1.22 Determination of viscosity of blood, new Delhi, Jaypee Brothers; 7th edition, ;2008;pg no 142-145.
6. Siddharth N. Shah,8th edition, 2008 API Textbook of medicine, volume 1,chapter 9.19 cardiology(Essential Hypertension) ; Mumbai ,The Association of Physicians of India;;pg no 532
7. Vd. Jadavji Trikamji Acharya; Ayurveddipika tika by Acharya Chakrapani; Chaukhambha Publication,; New Delhi;2016 Sutrasthana Chapter 20 verse no.20; pg.no.115.
8. Vd. Jadavji Trikamji Acharya; Ayurveddipika tika by Acharya Chakrapani, Chaukhambha Publications; New Delhi;2016; Nidansthana Chapter 01 verse no.8; pg.no.195.
9. Sushrut Samhita, Translated by Vd.Datto Ballal Borkar, Rajesh Publication, Omkar press Tulsibagh Pune; Sutrasthana; chapter 21 verse no.32; Pg.no.92.
10. Sushrut Samhita, Translated by Vd. Datto Ballal Borkar, Rajesh Publication, Omkar press Tulsibagh Pune; Sutrasthana; chapter 14 verse no.32; Pg.no.53.
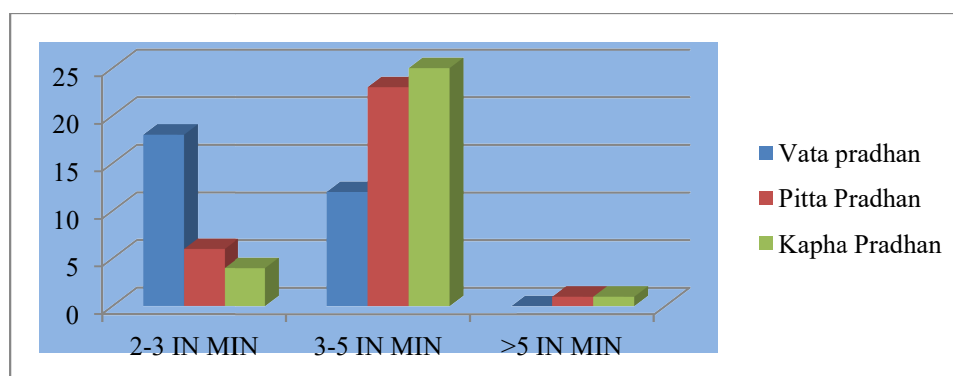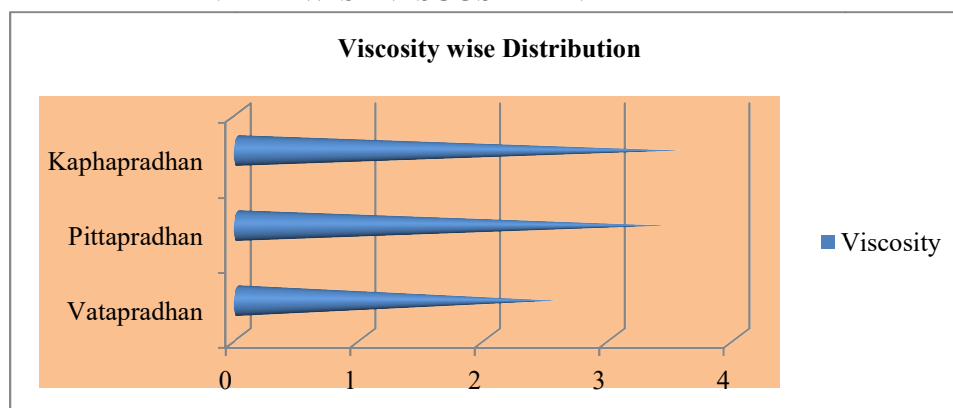
TABLES AND FIGURES:

Table 1: Showing viscosity and Dravata of Raktadhatu correlation

Viscosity	Dravata of Raktadhatu
>5 times water	Less Dravata
3-5 times water	Medium Dravata
<3 times water	High Dravata

Viscosity of Water: 1.002 at 20^0c

Relative Viscosity of blood: 3-5

Table 2: Showing Result of Viscosity assessment in 90 subjects

Viscosity *Prakruti*	2-3 Min	3-5 Min	5min & above
Vata Pradhan	18(60%)	12(40%)	0
Pitta Pradhan	06(20%)	23(77%)	1(3%)
Kapha Pradhan	04(13%)	25(83%)	1(3%)
Total	28	60	2

Table 3 Showing viscosity in different Pradhan prakriti persons

Sr. No.	Prakruti	Viscosity(in min)
1.	Vatapradhan	2.56±0.56
2.	Pittapradhan	3.44±0.71
3.	Kaphapradhan	3.55±0.64

DRAVATA WISE VISCOSITY IN PRAKRITI