



An observational study to analyse the association between *Deha Prakriti* and *Bala W. S. R.* to Harvard step test

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ABSTRACT:

According to *Ayurveda* A person's health depends on his 'constitution' by which he or she is born and how he adapts himself to his environment. Constitution explains his achievements in 'Health' and defeats in 'Disease'. *Prakriti* is mainly considered as the *Svabhava* of an individual. It is the genetically determined constitution that categorizes individuals into differentiating characteristics. *Acharya Charaka and Sushruta* described *Bala* whose function is closely to physical strength. *Bala* is to support and maintain the power inherent in the body which opposes,

inhibits, contains, and binds the virulence and strength of disease-causing factors. The *Bala* is tested by analyzing the person's physical fitness index through the Harvard step test. It is a kind of physical endurance test. It is a good measurement of fitness and a person's ability to recover after a strenuous exercise. The people who have *Kapha Prakriti* are more "Balavanta" or having "Uttamabala", people of *Pitta Prakriti* possess "Madhyamabala" and those who have *Vata Prakriti* possess "Alpabala. In context to the present study, the *Vata Prakriti* individual has a poor physical fitness index, hence should be monitored with special care, and *Kapha Prakriti* have a

good physical fitness index so they can do strenuous work more efficiently. So, *Ayurveda* has given significant importance of *Bala and Prakriti* for survival and performing important functions inside the body.

KEY WORDS : *Bala, Kapha Prakriti, Dosha, Vyayama*

INTRODUCTION:

Prakriti is mainly considered as the *Svabhava* of an individual. It is the genetically determined constitution that categorizes individuals into differentiating characteristics. Every individual is unique; in physiological, psychological, and physical terms. It is influenced by the preponderance of *Tridosha, Panchmahabhuta* (basic elements), and *Triguna* at the time of conception together with the internal environment of the womb, dietary habits, and life forms of parentages. From the very time of conception, some persons are having equilibrium of *Vata, Pitta, and Kapha* while others are seen as *Vatala, Pittala, And Sleshmala* (having a predominance of *Vata or Pitta or Kapha*) dominance. Amongst them, those of the primary category (equilibrium of *Vata, Pitta, and Kapha*) are not prone to diseases, while others (having predominance of *Vata or Pitta or Kapha*) are always prone to certain ailments.

In *Ayurveda Bala, Ojas and Prakriti Shleshma* are the three terms used in similarity to physical strength. *Acharya Charaka and Sushruta* described *Bala* whose function resemble closely to physical strength. The *Bala* (Vitality) of the body is

the base of life, it covers all areas of humans because it is the conjugative expression in the form of physical strength, psychological strength and immune strength of body. The *Bala* is tested by analyzing the person's physical fitness index through the Harvard step test. It is a kind of physical endurance test. It is a good measurement of fitness and a person's ability to recover after a strenuous exercise. The test computes the capability to exercise continuously for extended intervals of time without tiring.

The people who have *Kapha Prakriti* are more "*Balavanta*"¹ or having "*Uttamabala*", people of *Pitta Prakriti* possess "*Madhyamabala*"² and those who have *Vata Prakriti* possess "*Alpabala*"³. If the constitution is understood the *Aushadh-Vyavastha, Ahar-Vihar*, and other regimens are often advised correctly both for disease, and treatment and to promote longevity.

In context to the present study, the *Vata Prakriti* individual has a poor physical fitness index, hence should be monitored with special care and *Kapha Prakriti* have a good physical fitness index so they can do strenuous work more efficiently. So, *Ayurveda* has given significant importance of *Bala and Prakriti* for survival and performing important functions inside the body.

CONCEPT OF PRAKRITI:

VYUTPATTI: *Prakriti* word is formed by the combination of two words '**PRA + KRITI**'. **PRA** word means beginning, source of origin and **KRITI** means to form or to perform. Put together, **Prakriti** means "natural form" or "original form" or "original source". When there is any change

in this original form of constitution at the physiological or psychological level, it leads to **Vikriti**.

NIRUKTI:

- प्रकृतिमिति स्वभावम् ।⁴

Prakriti is an expression of one's own constitution.

- स्वभावमिति प्रत्यात्मनियतरूपम् ।⁵

It is specific for an individual and idiosyncratic that is expression of one's own characteristics.

DEFINITION:

शुक्र शोणित संयोगे यो भवेद्दोष उत्कटः
।

प्रकृतिर्जायते तेन तस्या में लक्षणं शृणु ॥
6

Prakriti is organized in accordance to attributes of predominance *Dosha* at the time of sperm -ovum union.

- According to *Brahma Vaivarta Purana*, *Prakriti* is created from 3 letters viz, *Pra*, *Kri* and *Ti*. The letter *Pra* stands for the *Prakrastha Guna* i.e. superior quality- *Satva*, *Kri* for the moderate one the *Rajas* & *Ti* for *Tamas*. *Pra* also suggests the superior or most excellent and *Kriti* stands for creation. Thus, the best of creation or the superior creation is *Prakriti*. It is the presentation or expression of oneself in terms of morphological, physiological, psychological or social aspect.⁷

FORMATION OF PRAKRITI:-

Prakriti is formed by the union of male and female gametes, at the time of conception process due to *Dosha* predominance which is after reflected by an individual as a set of characters determining his or her behavior itself. For example, at the time of birth, if *Vata Dosha* is predominant (quantitatively and qualitatively) compared to *Pitta* and *Kapha*, then we call the individual having *Vataja Prakriti*.

TABLE NO 1 :TYPES OF PRAKRITI

As per <i>Shareerika Prakriti</i> ^{8,9,10}	As per predominance of <i>Panchabhautika</i> ¹¹	According to predominance of <i>Triguna</i> ^{12,13}	As per <i>Jatyadi Prakriti</i> ¹⁴
<i>Vataja Prakriti</i>	<i>Akashiya</i>	<i>Satvika Prakriti</i>	<i>Jati Prasakta Prakriti</i>
<i>Pittaja Prakriti</i>	<i>Vayaviya</i>	<i>Rajasika Prakriti</i>	<i>Kula Prasakta Prakriti</i>
<i>Kaphaja Prakriti</i>	<i>Agneya</i>	<i>Tamasika Prakriti</i>	<i>Deshanupatini Prakriti</i>
<i>Vata-Pittaja Prakriti</i>	<i>Apya</i>		<i>Kalanupatini Prakriti</i>
<i>Vata-Kaphaja Prakriti</i>	<i>Parthiva</i>		<i>Vayanupatini Prakriti</i>
<i>Pitta-Kaphaja Prakriti</i>			<i>Pratyatmaniyata Prakriti</i>
<i>Vata-PittaKaphaja (SamaDoshaja</i>			

CONCEPT OF BALA :**ETYMOLOGY OF BALA: -**

According to *Amara-Kosha*: -The term *Bala* is derived from the *Sanskrit* root 'Bal' having two meanings viz.: - *Pranane, Sancharne*. (*Am.Ks.* -3/3/19), (*Am.Ks.* - 3/1/118)

DEFINITION :

- **According to *Charaka-Samhita*¹⁵:**

Kapha, in normal state is (responsible for) *Bala* but when abnormal become excretion (*Mala*). In other words, the normal *Kapha* is said as *Bala* while the abnormal one is sinful (cause of various disorders).

- **According to *Acharya Sushruta*¹⁶:**

It is quoted that the essence of the *Dhatu*s commencing from *Rasa* and ending with *Sukra*, is known as *Ojas*, and that itself is *Bala*

- **According to *Dalhana*¹⁷ :**

Bala is energy to perform any action and it is known by the capacity of exercise which is indicative of the physical power of an individual. But some other authors accept *Bala* as the growth of body (*Sariropacaya*), which is based upon *Prakitvadi* ten points for the assessment of *Bala*..

- **According to *Bhava-Prakasa*¹⁸ :**

A clear cut definition of *Bala* is given by *Bhava-Prakasa*, according to which the

ability to carry out *Cestas* (includes coition, exercise, massage etc.) is termed as *Bala*

TYPES OF BALA:-

Sahaja Bala: - Congenital is that which is natural to the body and mind; It is resistance to disease states to be *Prakrit* (natural/inborn) and exists from birth. *Acharya Charaka* mentioned that the natural *Bala* of the *Sharir* and *Satva* i.e. the body and mind are termed as *Sahaja Bala*. *Sahaja Bala* can be correlated with constitutional strength of an individual.

Kalaja Bala: - Time-effected *Bala* is due to seasonal variations and age factor. This *Bala* is influenced by seasonal traits and age of the person. *Bala* is dissipated and lowest in *Aadan-Kala*. This *Kala* corresponds to *Shishir, Basant* and *Grishm*, which represents the hottest season of the year. On the other hand, *Bala* is conserved and its highest optimum level is witnessed in *Visarg-Kala* corresponding to *Varsha, Shard, Hemant Ritu* that represents the cooler seasons of year. As regards to *Bala* the childhood and age come in last descending order.

Yuktikrita Bala:- It refers to the induction of body resistance against diseases by resort to appropriate nutrition and *Rasayan*.

Table .No : 2 Types of *Bala* (According Age, *Dosha, Ritu*)

Bala (According Age, Dosh, Ritu)	Uttam-Bala (Excellent)	Madhyam-Bala (Medium)	Alpa-Bala (Minimum)
Age¹⁹	Childhood	Adulthood	Old age
Dosh-Bala (According to Age)	Kapha	Pitta	Vata
Ritu²⁰	Hemant and Shishir	Basant and Sharar	Grishm and Varsha

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Table No : 3 - CLASSIFICATION OF BALA

Charak Samhita	Dalhan Tika	Sushruta Samhita
<i>Sahaja Bala</i>	<i>Upchaya Lakshan Bala</i>	<i>Sharirik Bala</i>
<i>Kalaja Bala</i>	<i>Shakti Lakshan Bala</i>	<i>Indriya Bala</i>
<i>Yuktikrita Bala</i>		<i>Mano Bala</i>
		<i>Atma Bala</i>

HARVARD STEP TEST:

The **Harvard step test**, in scientific literature sometimes referred to as the **Brouha Test**. It is a good measurement of fitness and a person's ability to recover after a strenuous exercise by checking the recovery rate. The test was developed by Lucien Brouha and his associates in 1942. Harvard step test is used for physical fitness and should not be used in patients.

EQUIPMENT REQUIRED:

- Step or platform 20 inches (50 cm) high for men,
- 40 cm (16 inches) for women,
- [Stopwatch](#),
- Metronome or Cadence Tape.

PROCEDURE:

- The Subject steps up and down on the platform at a rate of 30 steps per minute (every two seconds) for 5 minutes or until exhaustion.
- Exhaustion is defined as when the subject cannot maintain the stepping rate for 15 seconds.
- The subject immediately sits down on completion of the test.

RESULT:

The subject performs the exercise for maximum 5 minutes, unless he stops from exhaustion before that. The pulse rate is inversely proportional of the degree of cardiac efficiency, to obtain an approximate idea of Physical fitness index, count the pulse rate at the following intervals: -

1. between 1 and 1:30 minutes =
2. between 2 and 2:30 minutes =
3. between 3 and 3:30 minutes =

PHYSICAL FITNESS INDEX FORMULA:

$$\text{PFI} = \frac{\text{Duration of exercise in seconds}}{2(\text{Pulse 1} + \text{Pulse 2} + \text{Pulse 3})}$$

EFFICIENCY OF PHYSICAL FITNESS INDEX: ²¹

- Over 97% = Efficiency in Excellence

- 83- 96% = Efficiency is Good
- 68 -82% = Efficiency is Average
- 54-67 % = Low average
- Below 55% = Efficiency is Poor

MATERIALS:

SOURCE OF DATA:

Clinical Source : 60 Healthy subjects were randomly selected from campus of Shri Krishna Govt. Ayurvedic college & Hospital , Kurukshetra.

Literary Source : All the relevant knowledge from ayurvedic classics, commentaries, was searched compiled & analyzed systematically.

Experimental Source : It was a human observational study ; no animal experimentation done.

METHODS:

The study was primarily divided into two sections:

1. **Assessment of Prakriti :** Assessment of Prakriti by using *AYUR PRAKRITI WEB PORTAL OF CCRAS (STANDARDIZED PRAKRITI ASSESSMENT SCALE)*

2. **Assessment of Bala :** Assessment of Bala by Harvard step test .

• TYPE OF THE STUDY: -

Observational study.

• STUDY DESIGN: -

Cross-Sectional Study.

• **STUDY AREA: -**

The subject included in the study were mainly from nearby area of the Shri Krishna Govt. Ayurvedic college and Hospital Kurukshetra Haryana 136118.

• **STUDY POPULATION: -**

Individuals of various *Prakriti* were selected for study.

• **SAMPLE SIZE: -**

Observational study was done on 60 healthy individuals.

• **DURATION OF STUDY: -**

The trial design of the Study was Cross Sectional which completed in a duration of one and half year.

INCLUSION CRITERIA:

- Healthy young male & female individuals.
- The individuals between age 17 to 34 years and willing to give their written informed consent.

EXCLUSION CRITERIA:

- Subject below 17 years & above 34 years of age will excluded.
- Subject with Locomotor & Musculoskeletal disability.
 - History of Cardiovascular disorder.
 - History of Respiratory disorders.
 - History of Diabetes mellitus, Hypertension.
 - History of Major surgery in the recent past.
 - History of Drug intake.
 - History of Alcohol & Smoking Patients.
 - Pregnant women will be excluded

METHOD OF STUDY: -

- 60 Healthy volunteers were selected randomly for study.
- *Prakriti* was determined using **AYUR PRAKRITI WEB PORTAL OF CCRAS (STANDARDIZED PRAKRITI ASSESSMENT SCALE)**
- Physical Fitness Index Test of the volunteers was done.
- All the data was statistically analysed and results are presented

OBSERVATIONS :

Table No. 4 :Association between *Prakriti* and *Bala* by Harvard Step Test:

			PHYSICAL FITNESS INDEX					TOTAL
			Poor	Low Average	High Average	Good	Excellent	
PRAKRITI	<i>Vataja</i>	Count	1	0	0	0	0	1
		%	100%	0%	0%	0%	0%	100%
	<i>Pittaja</i>	Count	0	1	0	0	0	1
		%	0%	100%	0%	0%	0%	100%
	<i>Kaphaja</i>	Count	0	0	0	4	0	4
		%	0%	0%	0%	100%	0%	100%

		%	0%	0%	0%	100%	0%	100%
	Vata-Pittaja	Count	2	2	2	0	0	6
		%	33.33%	33.33%	33.34%	0%	0%	100%
	Vata-Kaphaja	Count	0	1	1	3	0	5
		%	0%	20%	20%	60%	0%	100%
	Pitta-Kaphaja	Count	1	0	3	2	0	6
		%	16.66%	0%	50%	33.34%	0%	100%
	Pitta-Vataja	Count	0	4	3	0	2	9
		%	0%	44.44%	33.34%	0%	22.22%	100%
	Kapha-Vataja	Count	0	0	1	2	2	5
		%	0%	0%	20%	40%	40%	100%
	Kapha-Pittaja	Count	0	1	8	11	3	23
		%	0%	4.34%	34.78%	47.82%	13.06%	100%
Total		Count	4	8	19	22	7	60
		%	6.66%	13.34%	31.67%	36.66%	11.67%	100%

In the study, Maximum of 36.66% of subjects were reported with good physical fitness index, 31.67% with High average physical fitness index, 13.34% with low physical fitness index, 6.66% with poor physical fitness index, 11.67% with excellent physical fitness index.

average physical fitness index, 11.67% with excellent physical fitness index & 6.66% with poor physical fitness index.

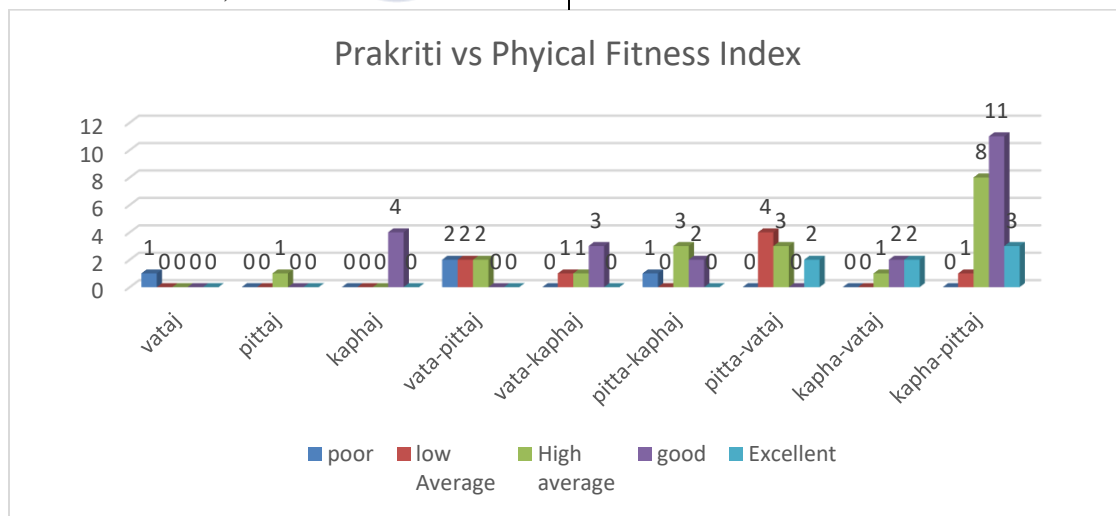


Figure 1: Association Between *Prakriti* and *Bala* by Harvard Step Test

RESULTS

Data was observed of 60 subjects, according to Harvard Step Test Assessment. Chi-square test was used & p values were calculated in the analysis of association in

qualitative variables by using SPSS software.

[P value < 0.05] as significant whereas [P value of >0.05] was considered as non-significant. All the results were calculated by using Microsoft Excel, SPSS software.

The obtained results were interpreted as a Level of Significance

- Non-significant: P-value > 0.05
- Significant: P-value < 0.05
- Highly Significant: P-value < 0.01
- Very Highly Significant: P-value < 0.001

DESCRIPTIVE STATISTICS OF OBJECTIVE PARAMETERS AMONG STUDIED SUBJECTS.

Table No. 5: Result of association of Prakriti and Bala by Harvard step test

Chi-Square Tests			
	Value	Df	P-value
Pearson Chi-Square	59.054	32	0.0024
N of Valid Cases	60		

Chi-Square test is carried out to test the association between *Prakriti* and *Bala* by Harvard step test. From above table we can observe that P-value is less than 0.01. Hence we can conclude that, there is highly significant association of *Prakriti* and *Bala*.

DISSCUSSION:

- In this study among *Ekal Prakriti*, only 1 individual belongs to *Vataja*

Prakriti who have 100% Poor Physical Fitness Index. In this study only 1 individual belongs *Pittaja Prakriti* who have 100% low average Physical Fitness Index & 4 individuals belongs to *Kapha Prakriti* all have 100 % High average Physical Fitness Index.

- Among *Dwandaja Prakriti*, In *Vata-Pittaja* there are total 6 individuals among them 33.33% have Poor Physical Fitness Index, 33.33% have low average Physical Fitness Index & 33.34% have high average Physical Fitness Index.
- In *Vata-Kaphaja* there are total 5 individuals among them 20% have low average Physical Fitness Index, 20% have high average Physical Fitness Index & 60% have Good Physical Fitness Index.
- In *Pitta-Kaphaja Prakriti* out of 6 individuals 16.66% have Poor Physical Fitness Index, 50% have high Average Physical Fitness Index & 33.34% have Good Physical Fitness Index.
- There are total 9 individuals of *Pitta-Vataja Prakriti* out of them 44.44% have low Average Physical Fitness Index, 33.34% have high average Physical Fitness Index & 22.22% have excellent Physical Fitness Index.
- Total 5 individuals belong to *Kapha-vataja Prakriti* out of them. 20% have high average Physical Fitness Index, 40% have good Physical Fitness Index, 40% have excellent Physical Fitness Index.

- In *Kapha-Pitta Prakriti* there are total 23 individuals out of them 4.34% have low average Physical Fitness Index, 47.82% have high average Physical Fitness Index, 34.78% good have Physical Fitness Index , 13.06% have excellent Physical Fitness Index

Acharya Charaka and *Sushruta* described *Bala* and *Ojas* whose function resemble closely to strength of the body. *Kapha Dosha* is responsible for stability. Moreover, the *Kapha Dosha* has constitution of *Prithvi* and *Aapaya Mahabhuta* which are meant for structural development to provide *Moorta Swaroopa* to any object. Thus, this *Kapha Dosha* may resemble with *Ojas* which is said as *Somatmaka* due to presence of *Aapa - Mahabhuta*.

Kapha Dosha creates a Bala of individual. The factors responsible for increase or decrease of *Kapha Dosha*, also lead to *Bala & Ojas- Vriddhi* and *Kashya*.

The *Bala* is tested by analysing the person's Physical Fitness Index through Harvard Step Test. It is a kind of physical endurance test. It is a good measurement of fitness and person's ability to recover after a strenuous exercise. The test computes the capability to exercise continuously for extend intervals of time without tiring.

The *Bala* was observed *Pravar* in *Kapha dominating Prakriti* individual. The probable reason is that *Kapha Prakriti* individual have dominance of *Kapha Guna* (unctuous, smooth, soft, sweet, firm, dense, slow, stable, heavy, cold, viscous, and

clear) and *Kapha Guna* is similar to *Ojas Guna*.

- **The *Bala* was observed *Avara* in *Vata Prakriti* individual,** the probable reason is *Vata* and *Vata* afflicted *Ojas*.

- **The *Bala* was observed *madhyam* in *Vata-Pitta Prakriti* and *Vata - Kapha Prakriti* individual.** Therefore, by interpretation of these points, we may conclude that ***Kapha dominant individual and Pitta -Kapha Prakriti individuals (when Kapha Dosha gets Association with Pitta Dosha) had Pravar Bala.***

CONCLUSION:

Without finding some conclusion of any study, it would not become successful in its aims. *Acharya Charaka* states *Bala* is state of *Prakrit Kapha*. According to modern parameters *Bala* of individual is represented by the Physical Fitness Index. It was measured using Harvard Step Test. Physical fitness index was observed good in *Kapha Pardhana Prakriti* , average in *Pitta Pardhan Prakriti* & poor in *Vata-Pardhan Prakriti*. In context to present study, the *Vata Prakriti* individual have poor physical fitness index, hence should be monitored with special care and *Kapha Prakriti* have good physical fitness index so they can do strenuous work more efficiently So, *Ayurveda* has given significant importance of *Bala and Prakriti* for survival and performing important functions inside the body. If *Prakriti* is kept in mind, individual can perform physical exercise to appropriate manner and strength. So we can successfully prevent the complication of *Vyayama*

(*Bala- kshya*). Hence, the whole concept of health, disease and treatment is based on constitution. The result of the study showed that there is association between *Deha Prakriti* and *Bala* with p value <0.001

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