



## Research Article

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### QUANTITATIVE ESTIMATION OF BALA (PHYSICAL FITNESS) WITH RESPECT TO DHATU SARATA

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#### ABSTRACT

Dhatu sarata is described with respect to Sapta Dhatu viz. Rasa, Rakta, Mamsa, Medas, Asthi, Majja, Shukra and Sattva i. e. Ashtavidhsarata. Dhatu Sarata or Tissue excellence is a quality assessment of seven dhatu. Examination of Dhatu Sarata is done at physical and psychological level. For determining the Dhatu sarata, when the positive features are present above 75 %, it will be considered as best tissue quality (Uttam Sarata). When the positive features are present between 75 % and 25 %, it will be considered as moderate tissue quality (Madhyam sarata). When positive features are present below 25 %, it will be labeled as poor tissue quality (Heen sarata). The bodily movements which are meant for producing firmness and strength in the body are known as Vyayama or physical exercises. 'Bala' (Physical fitness) of each student will be determined by Harvard step test. "Harvard Step Test" is a practical application of Ayurvedic Principal that "Bala should be measured by vyamshakti" (Balam Vyayamshakty Parikshet). The person should be examined with reference to his capacity for exercise which is determined by one's ability to perform work. Therefore this study will estimate Bala in the students and study the Dhatu sarata and their association between them.

**Keyword:** Dhatusarata, Bala, Harvard Step Test

#### INTRODUCTION

As per Acharya Charak, one should not commit the mistakes by deciding any person as strong or weak by merely looking at the good or weak build up of body, as strength is not depend only on physical build up but it depends on the sara means the excellence quality of dhatu. In the text, this dhatusarata is described with respect to Sapta Dhatu; viz. Rasa (skin), Rakta (Blood), Mamsa (muscle tissue), Medas (adipose tissue), Asthi (bone tissue), Majja (marrow), Shukra (semen) and Sattva (mind) i. e. Ashtavidhsarata<sup>1-3</sup>. Dhatu Sarata or Tissue excellence is a quality assessment of seven dhatu. Examination of Dhatu Sarata is done at physical and psychological level. The bodily movements which are meant for producing firmness and strength in the body are known as Vyayama or physical exercises. The person should be examined with reference to his capacity for exercise which is determined by one's ability to perform work<sup>1</sup>. Therefore this study will estimate Bala in the students and study the Dhatusarata and their association between them.

#### Aim

To study the Dhatu Sarata (Tissue quality) with the subjective parameters mentioned in the Text in Ayurvedic Students

#### Objectives

- To study the Bala (Physical fitness) by using "Harvard Step Test" in Ayurvedic Students
- To study the association between Dhatu Sarata (Tissue quality) and Bala

#### MATERIAL AND METHODS

Cross sectional study was conducted among first year Ayurvedic students at Mahatma Gandhi Ayurvedic College and research centre, Salod (H), Wardha, India. Study was conducted from June 2012 to November 2012 for the period of six months. All the 50 healthy students between 17 to 22 year age group were selected for the study. Approval was taken from the Institutional ethics committee (Datta Meghe Institute of Medical sciences, DU, Wardha, India) on 3.3.2012 with Ref. No.DMIMS (DU)/IEC/2012-13/688. Informed written consent was taken from the study subjects. Students were interviewed by pre designed questionnaire that contains the information about Dhatu Sarata (Tissue Quality) and Bala parikshan examination was done by Harvard step test. The allied information of the volunteers were collected like diet (Veg / Non veg), exercise etc.

#### Assessment Criteria

For determining the Dhatu sarata<sup>1</sup>, when the positive features recommended by Acharya Charak are present above 75 %, it will be considered as best tissue quality (Uttam Sarata). When the positive features are present between 75 % and 25 %, it will be considered as moderate tissue quality (Madhyam sarata). When positive features are present below 25 %, it will be labeled as poor tissue quality (Heen sarata).

#### Harvard step test

Physical fitness of each student was determined by Harvard step test. "Harvard Step Test" is a Practical application of Ayurvedic Principal that "Bala should be measured by vyamshakti" (Balam Vyayamshakty Parikshet)<sup>4</sup>. The subject steps up and down on the bench

of having height 20 inches (For male) and 18 inches (For Females). Stepping at rate of 30 steps / min will be performed for period of 5 minutes (Males) or 4 minutes (females) or until exhaustion<sup>5,6</sup>. Physical efficiency Index was calculated with the following Formula.

$$PEI = \frac{\text{Duration of exercise in seconds}}{2 \times (A+B+C)} \times 100$$

Where, A = Pulse of 1 to 1.5 minutes during recovery.  
 B = Pulse of 2 to 2.5 minutes during recovery.  
 C = Pulse of 3 to 3.5 minutes during recovery

**Classification of Fitness according to index**

Physical efficiency index	Fitness
Below 55	Poor
55-64	Low average
65-79	Average
80-89	Good
90 and above	Excellent

**RESULTS**

A total of 50 students between 17 and 22 years of age were assessed for determining Dhatusarata and also Physical fitness. Dhatusarata (Tissue Quality) was found as per positive features recommended by Acharaya Charak (Table 1). Uttam sarata was found in 10 (20 %) Students, Madhyam sarata was found in 27 (54 %) students and heen sarata was found in 13 (26 %) students. Madhyam sarata was found more among females (58.53 %) as compared to male (33.33 %).

**Table 1: Sex-wise distribution of students according to Dhatusarata**

Dhatusarata	Male	Female	Total
Uttam sarata	3	7	10
Madhyam sarata	3	24	27
Heen sarata	3	10	13
Total	9	41	50

**Table 2: Classification of physical fitness as per physical efficiency index**

PEI	Male	Female	Total
Excellent	1	2	3
Good	2	5	7
Average	2	10	12
Low average	1	14	15
Poor	3	10	13
Total	9	41	50

Table 2 shows physical efficiency index of all the students. Most of the students (80 %) were having average, low average and poor physical efficiency index.

**Table 3: Association between Datusarata and physical efficiency index**

PEI	Dhatusarata			Total
	Uttam sarata	Madhyam sarata	Heen sarata	
Excellent	3	0	0	3
Good	7	0	0	7
Average	0	12	0	12
Low average	0	15	0	15
Poor	0	0	13	13
Total	10	27	13	50

It has been observed that those subjects having uttam sarata (10) were excellent with good physical efficiency index, while subjects having madhyam sarata (27) were average with low average physical efficiency index. Subjects having heen sarata (13) were poor physical efficiency index (Table 3). No significant difference was found among Male and female students. There is association between Dhatu sarata and physical fitness as 'P' value (Pearson value) is 0.003\* which is less than 0.05.

**DISCUSSION**

Physical Aerobic fitness by 'Harvard Step Test' has also significant correlation with asthi, majja and to some extent with shukra, Mansa Sarata. 'Harvard Step Test' is very good, universally accepted 'Objective parameter' to access 'Yuktija and Kalaja Bala' (i.e. fitness acquired through practice of exercise, proper diet and healthy season etc)<sup>1</sup>. 'Harvard Step Test' showed significant correlation with some Dhatu Sarata. Fitness, determined by Harvard step test is not sufficient to access the fitness related with Dhatu Sarata. Fitness may be the combined effect of genetically inherent physical, psychological, spiritual and social health<sup>6</sup>. Saratah pariksha is the second important factor of dasavidha pariksha. It can be said that sara pariksha itself is also competent for assessment of bala. Acharya Charaka and Vagbhata during description of sara pariksha frequently mentioned that the main purpose of sara pariksha is to measure the strength of individual (c s. vi. 8/118, A.H. su 3/117) Charaka, Sushruta and Vagbhata stated the number of sara as eight i.e. tvak sara, rakta sara, mamsa sara, meda sara, asthi sara, majja sara and sukra sara and sattva sara. Presence of all the sara is known as sarva sara and the individual possess maximum bala. This study also shows the association between physical fitness and dhatusarata.

**CONCLUSION**

Physical Aerobic fitness by 'Harvard Step Test' has significant co-relation with Dhatusarata i.e. asthi, majja and to some extent with shukra, Mansa Sarata. Majority (54 %) students were having Madhyam sarata. Most of the students (80 %) were having average, low average and poor physical efficiency index. Statistically significant association was found between Dhatu sarata and physical fitness.

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