



“STUDY ON STATUS OF DHATU SĀRATA AND ITS RELATION WITH ARDHA SAKTHI VYAYAMA LAKSHANA USING TREADMILL EXERCISE TEST AMONG HEALTHY SUBJECTS”.

Aishwariya B K*

Pg Scholar, Dept. Of Kriya Sareera, Govt. Ayurveda College, Pariyaram, Kannur.
*Corresponding Author

Hakkeem Panthappulan

Assistant Professor, Dept. Of Kriya Sareera, Govt. Ayurveda College, Pariyaram, Kannur.

ABSTRACT

The science of Ayurveda gives much importance to *Agni, Prakrithi, Dosha* and *Dhatu sārata* on which diagnosis, treatment and research are based. The description of *Dhatu sāratha* has been given under *Dashavidha Pariksha* in *Charaka Samhita*, which is an important criterion for the examination of a *rogi bala*. *Bala* is the strength of the body to resist and conquer over diseases. It is the vital force which makes a person to perform both physical and psychological tasks effectively. As per *Anumana pramana* of Caraka, *Bala* is assessed using *vyayama sakthi*. Practically, *Vyayama sakthi* can be assessed by using Treadmill exercise. Thus the relationship between *Dhatusaarata* and *Vyayama sakthi* is assessed using Treadmill exercise

KEYWORDS : Dhatu sārata, Ardha sakthi vyayama lakshana, Treadmill exercise test

INTRODUCTION

As per Ayurvedic classics, physical foundations of the body are *dosha, dhatu* and *mala*. Among them *Dhatu*s are the physiological entities of the body that promotes the growth of *sareera* and supports everything in the living body¹. Nutritive elements of food are acted on by *jataragni, bhutagni* and *dhatwagni* before they are converted to *dhatu*. The formation and maintenance of *dhatu*s are explained by certain theories, known as *dhatuparinama nyayas*. It is essential that this process of nourishing must be uninterrupted in the body as to repair the wear and tear of the bodily tissues. *Sāra* is the essence of *dhatu*s, which signifies the ultimate qualities of *dhatu*. There are *Ashtavidha saara* and *Acharya Kashyapa* has mentioned *ojo saara*² also

Acharya Chakrapani has mentioned *sāra* as '*vishudhadaro dhatu*'³ i.e. the purest form of *dhatu*. Acharya Charaka has mentioned *sāra pariksha* among *dasavidha pariksha* of *rogi*, which forms an integral part of examination of an individual. *Dhatu sārata* is a quality assessment of seven *dhatu*s. Thus the corresponding *sāras* represent qualitatively and quantitatively perfect *dhatu*s. Charaka and Susruta has emphasized that sometimes the physician may take a wrong decision only by seeing the body of the patient such a mistake can be avoided by the examination of *sāra*.⁴ Individuals are classified on the basis of *sāra* depending upon the excellence of particular *dhatu* in the body by the virtue of its quality and functions.

Physical fitness is a general state of health and well-being and it is the measure of the body's ability to function efficiently and effectively in work. The level of physical fitness shows individual variations. A physical action, which is desirable and is capable of bringing about bodily stability and strength, is known as *Vyayama*, this has to be practiced according to need. Ayurvedic system encourages finding the balance between the body, mind and spirit because all these three are connected and are known as '*Tridanda*'.⁵ To maintain this balance one has to follow the guidance of this ancient wisdom. One should make choices in diet and lifestyle that will lead to health, longevity and to reach fullest potential in life. Human body responds to this diet and regimen, the environment and even the seasons of the year. Imbalances can come from the wrong diet, improper sleep, having emotional disturbances, doing *vyayama* in improper way and many other factors.

Bala or strength is the ability to perform work. According to Charaka Acharya, *bala* is assessed by *anumana pramana*.⁶ A person's capacity to do *vyayama* is the *vyayama sakthi* which determines the *bala* of a person. Avoiding harmful sedentary lifestyle and incorporating bodily movements like *vyayama* benefit the physical and psychological condition of the individual. *Bala* should be examined through *vyayama sakthi*.⁷ but it is important to know up to what extent one should perform *vyayama* according to his capacity. *Vyayama* should not be performed all of a sudden and a person should be more careful during the process of *Vyayama*.

In Ayurveda it has been mentioned as *ardha sakthi vyayama lakshana* which includes certain symptoms appearing on doing *vyayama*.

According to Sushruta, Vagbhata, Bhava Mishra and Yoga Ratnakara individuals should perform the *Vyayama* up to the appearance of '*Ardhasakti lakshana*'. After the appearance of these symptoms one should stop performing *vyayama*, or else he may succumb to death. The *ardha sakthi lakshanas* mentioned in Ayurvedic classics are *Swedapravrtti, Hrdisthita vayu vaktrm prapadyate* and *Mukha sosha*. Depending upon the body strength, one can perform mild, moderate and severe exercises up to appearance of *Ardhasakti lakshana*.

Physical activity is seeking prime importance in the present scenario, since there are occurrences of so many life style diseases. So measurement of physical fitness and the measures to improve it are the need of the present situation. Previous study regarding the topic has been conducted where estimation of *bala* was done by Harvard step test and in that study, the result showed there was significant correlation with *Dhatu sārata* i.e. *Asthi, Majja sārata* and to some extent with *Sukra, Mamsa sārata*.⁸ Many studies are being done for revalidation of concepts like *Dhatu sārata, Bala etc.* but evaluation of *dhatu sārata* using Ayu soft software is not done. Hence, assessment of *bala* with reference to *Ardha sakthi lakshana* has been planned using Treadmill exercise test and compare with *Dhatu sārata* assessment using Ayu soft software.

MATERIALS AND METHODS

Study design

This was an observational study. A total of 96 healthy subjects of age between 20 to 40 years were selected for the study from the subjects residing in 11th & 13th wards of Kadannappalli Panapuzha Panchayath. The sampling frame was prepared from the voters list and samples were drawn from this sampling frame randomly. The study was conducted at GAVC Kannur for a period of 18 months. Approval was taken from institutional ethical committee. Informed written consent was taken from the study subjects.

Inclusion Criteria

- Apparently healthy subjects
- Sex: irrespective of gender
- Age: between 20 to 40 years

Exclusion Criteria

- Pregnancy
- Subjects with severe respiratory and cardiovascular system illness
- Diabetes mellitus
- Those who practice regular exercise for 20 minutes.

Assessment criteria

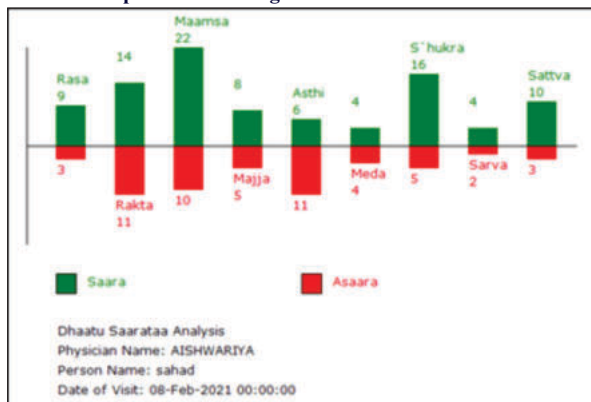
The status of *Dhatu saarata* was assessed using ayu-soft software and the scores of *saara* and *asaara* were tabulated. *Ardha sakthi vyayama lakshanas* were assessed using treadmill and time to attain the *lakshanas* were noted and appropriate statistical test were done using SPSS vers. 20.

Details of Materials

The study was conducted by using Treadmill for assessing *Ardhasakti*

vyayama lakshana and Ayu-soft software for *Dhatu sārata* assessment. The tool for the assessment of status of dhatu saarata was done with a validated computer assisted questionnaire software Ayu-soft developed by C- Dac Pune, Department of information technology MCIT, India. There are mainly 4 types of application in the software for various purposes viz. *Vaidya sanmitra*, *Ayur vidyaana*, *Anveshaka*, *Shabdha Nidhi*. Questionnaire for dhatu saarata assessment is based on the classical guidelines regarding saara assessment. Questions are based on general physical attributes and psychological attributes commencing from general body characteristics. There are 38 main questionnaires which is comprising a total of 165 sub questions. There are saara and asaara signs in the list. Any of the saara or asaara signs can be selected if it is predefined, where multiple selections can also be done.

Chart 1: sample chart showing Dhatu saarata assessment



Treadmill used in the present study was having table sizes of about 150 cm (59 in) length and 50 cm (20 in) width, a speed range of about 0-20 km/hr. (0-12 mph) and slope angle of 0-20%.

The speed was adjusted in such a way that the subject could walk in a slow pace initially and when the subject becomes stable, then the speed was increased gradually, up to 5km/hr. The subjects were grouped into different vyayama group based on the appearance of *ardha sakthi lakshana* as group 1, group 2, and group 3.

Table 1 showing vyayama group

Time to attain <i>Ardha sakthi</i>	group
2:00 to 4:00 minutes	1
4:01 to 6:00 minutes	2
6:01 to 8:00 minutes	3

Observation And Analysis

The test used were ANOVA and multiple comparisons were done using Tukey's HSD test. Among 96 subjects 20 were coming under group 1, who attained *ardha sakthi vyayama lakshana* within 2:00- 4:00 minutes, 60 subjects were coming under group 2 who attained *ardha sakthi vyayama lakshana* within 4:01 -6:00 minutes and 16 subjects were coming under group 3 who attained *ardha sakthi vyayama lakshana* within 6:01 – 8:00 minutes.

Table 2 Multiple Comparisons Tukey HSD

Dependent Variable	Tukey HSD						
	(I) TIME TO ARDHA SAKTHI	(J) TIME TO ARDHA SAKTHI	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
ASTHI	1	2	-.933	.980	.608	-3.27	1.40
		3	-3.813*	1.273	.010	-6.84	-.78
	2	1	.933	.980	.608	-1.40	3.27
		3	-2.879*	1.067	.022	-5.42	-.34
	3	1	3.813*	1.273	.010	.78	6.84
		2	2.879*	1.067	.022	.34	5.42

RESULT

The *ardha sakthi lakshana* assessment using treadmill exercise test had significant correlation with *asthi sārata* and to some extent with *mamsa saarata*. Any positive relation could not be identified with

vyayama sakthi and other *sāratas*.

DISCUSSION

The individuals predominant with *asthi sārata* had better capacity to perform *vyayama*. This may be due to the combined effect of their inherent physical, psychological, spiritual and social health. *Mahotsāha*, *kriyavantha* and *klesha saha* are cardinal features of *asthi sārata*. *Kriyavantha* and *klesha saha* indicate the elevated physical fitness while, *mahotsaha* indicates the endurance and perseverance of the individual to perform physical activities. So better the *asthi sārata*, better is the exercising capacity. As per the classical references, individuals predominant with *mamsa sārata* could have better capacity to perform *vyayama*. This may be due to the combined effect of their inherent physical and psychological health. But in this study such a variation could not be observed. The better excellence of *mamsa sārata* was observed in group 1 who could perform *vyayama* for shorter duration. *Klesha saha*, *kriya vantha* etc. are the qualities attributed to *asthi sārata*, and therefore excellence of *asthi dhatu* is required for a better physical performance. Even if *mamsa sārata* individual had a better *mamsa dhatu*, their subsequent *dhatvagnis* may not be perfect so that they may fail to produce better *asthi dhatu* which is required for better physical performance. Assessment of *sārata* was done with Ayu soft software, which had some restriction in the assessment of subjective parameters of *sārata*.

CONCLUSION

The time taken to attain *ardha sakthi vyayama lakshana* depends upon the status of *Asthi sārata*, i.e *vyayama sakthi* improves according to the improvement in excellence of *Asthi sārata*.

REFERENCES

1. C Dwarakanatha *Introduction to Kayachikitsa*, 3rd ed. Varanasi: Chaukambha Orientalia; 1996. Chapter 17.p.376, 377
2. Tiwari PV, *Vridha Jivakiyatana or Kasyap Samhita* of Vridha Jivaka, Marica Kasyap, Vatsya, Sutra Sthana; Lakshana Adhyaya. 1st .ed. Ch. 28.Verse 37. Varanasi: Chowkhanbha Vishwabharati Publication; 1996.p. 86
3. Ram Karan Sharma and Vaidya Bhagwan Das. *Rogabhishakjithieyam vimanam*. (ed). *Agnivesa's Charakasamhita*, Reprint edition 2015 ed. Varanasi: Chowkambha Sanskrit series; 2015. Pp. 271.Karan SR, Bhagwan DY, editors. *Charaka Samhita of Agnivesa*. Vimana Sthana; Rogabhishitijiyam Adhyaya. 1st ed. Vol.2. Ch. 8. Verse 102. Varanasi: Chaukambha Krishnadas Academy; 2008.p.922
4. Ram Karan Sharma and Vaidya Bhagwan Dash. *Rogabhishakjithieyam vimanam*. (ed). *Agnivesa's Charakasamhita*, Reprint edition 2015 ed. Varanasi: Chowkambha Sanskrit series; 2015. Pp. 271
5. Ram Karan Sharma and Vaidya Bhagwan Das. *Rogabhishakjithieyam vimanam*. (ed). *Agnivesa's Charakasamhita*, Reprint edition 2015 ed. Varanasi: Chowkambha Sanskrit series; 2015. Pp. 32
6. Ram Karan Sharma and Vaidya Bhagwan Dash. *Rogabhishakjithieyam vimanam*. (ed). *Agnivesa's Charakasamhita*, Reprint edition 2015 ed. Varanasi: Chowkambha Sanskrit series; 2015. Pp. 271
7. Ram Karan Sharma and Vaidya Bhagwan Das. *Rogabhishakjithieyam vimanam*. (ed). *Agnivesa's Charakasamhita*, Reprint edition 2015 ed. Varanasi: Chowkambha Sanskrit series; 2015. Pp. 271
8. jagruti Chaple, Ajay Dawale et al. *Quantitative estimation of bala (physical fitness) with respect to Dhatu saarata*, www.mokshaph.com (accessed 10 october 2013)