

EVALUATION OF EFFECT OF SHATAVARI (ASPARAGUS RACEMOSUS) ON PHYSICAL PERFORMANCE THROUGH FITNESS TEST

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ABSTRACT

Physical Performance depends on Physical fitness. Fit persons can accomplish the tasks. Fitness is modifiable and hence the fitness level can be increased. Bala, arbitrarily quoted to the word “strength” is an important concept of Ayurveda. Ayurveda has Proposed Balya Dravyas enhance the Strength. In this background a need was felt to validate the efficacy of the Shatavari, a Balya Dravya for its Physical Performance enhancing activity by fitness tests. Objectives were To evaluate the effect of Shatavari Choorna (root powder) on Physical Fitness Index (PFI) and on Maximal oxygen consumption (VO₂ Max). All norms of Good Clinical Practice (GCP) and Ethics were abided. The subjects were assigned in two homogenous groups, as Control and Trial groups. The Trial group was given Shatavari Choorna 3 gms bid

for 21 days. To evaluate the efficacy Harward Step Test (HST) was conducted before and after the intervention. None of the subjects reported adverse events throughout the study duration. The test group showed statistically significant increase in the Physical Fitness index (P value 0.044). The test group also showed statistically significant increase in the Maximal Oxygen Consumption (VO₂ Max) (P value 0.045). The increase in Physical Fitness level can be attributed to balya action of Shatavari Choorna. It was Concluded that, Healthy volunteers who received Shatavari Choorna 3 gms bid for 21 days reported statistically significant

increase in their Physical Fitness Index and VO₂ Max. This indicates the Shatavari Choorna Increases Physical Fitness level.

KEYWORDS: Shatavari Choorna, Physical Fitness index, Maximal Oxygen Consumption (VO₂ Max), Physical Performance Enhancing Activity and Harvard Step.

INTRODUCTION

Ayurveda has proposed many novel concepts much before the followers of modern medicine can think or imagine. Concept of Bala is one of the fundamental principles that serve as a substratum for many related concepts. Bala, arbitrarily quoted to the word “strength” is an important concept of Ayurveda. The increase of Bala is said to be good for health, where as Bala is said to be lost in disease condition and in certain stage of life too, the Bala will be minimal. Ayurveda proposes many modules to increase the Bala. Bala governs the Success in any field.^[1]

Success is the most important pursuit of mankind. Everyone realizing or not always strive to succeed in any field. Success is measured by the Performance. In relation to the health Physical Performance attain paramount significance. It is innate craving of everyone to be strong and physically fit to accomplish any task. Physical fitness implies not only the absence of disabling deformity or disease and the capacity to perform a sedentary task efficiently but also a sense of physical well being and the capacity to deal with emergencies demanding unaccustomed physical effort. Fitness is a relative term. An individual is considered to be fit for a particular task or activity when he can accomplish it with a reasonable degree of efficiency, without undue fatigue and with rapid recovery from the effects of exertion.

Physical Fitness

Physical fitness is defined as a general state of health and well-being or specifically the ability to perform aspects of sports or occupations. Physical performance is generally achieved through drugs, diet, age, somatotype and personality, correct nutrition, exercise, hygiene and rest. It is a set of attributes or characteristics that people have or achieve that relates to the ability to perform physical activity.^[2] Among these the important modifiable factors are the exercise and the nutrition.

Exercise Testing

In human physiology, the functional capacity of the various systems determines the physical performance. Men and women participation in physical activity improves the functional capacity of the various systems. Competitive sports events represent the classical test of physical fitness or performance capacity.

Harvard Step Test^[3]

Harvard step test (HST) appeared in 1937. HST was based on the assumption that “A satisfactory estimate of a man’s fitness can be obtained by exposing him to a standard exercise that no one can perform in a steady state for more than a few minutes and taking into account two factors; “ The length of time he can sustain it and Deceleration of his heart rate after exercise.” This test measures the general capacity of the body, in particular to the cardiovascular system, that adapts itself to hard work and to recover from it. The objective of Harvard step test is to measure physical fitness for muscular work, and the ability to recover from work.

The step test is based upon the idea that a client with a higher level of cardiovascular fitness will have a smaller increase in heart rate, and that following the exercise, the heart rate will return to normal faster than a client who has much lower level of cardiovascular fitness. This is known as pulse recovery rate. The recovery rate can then be used to predict VO₂ max.

Physical Fitness Index^[4]

It is used to evaluate the cardiopulmonary fitness; it is a powerful indicator cardiopulmonary fitness and there by physical performance. The regular exercise and nutritious food intake can increase PFI by increasing oxygen consumption.

Table1 Showing the scoring pattern of PFI

Evaluation of Activity Score		
Score	Evaluation	Activity Category
81 to 100	Very active lifestyle	High
60 to 80	Active and healthy	Very good
40 to 59	Acceptable but could be better	Fair
20 to 39	Not good enough	Poor
Under 20	Sedentary	

Maximal Oxygen Consumption (Vo₂ Max) ^[5]

It is the term used to define the level of oxygen consumption beyond which no further increase in O₂ consumption occurs with further increase in the severity of exercise. It is also defined as the highest oxygen uptake an individual can achieve during exercise while breathing air at sea level.

Shatavari (*Asparagus racemosus*)

Shatavari means “who possesses a hundred husbands or acceptable to many”. It is considered both a general tonic and a female reproductive tonic. Shatavari may be translated as “100 spouses”, implying its ability to increase fertility and vitality. It belongs to family Liliaceae and is found at low altitudes throughout India. The dried roots of the plant are used as drug. The roots are said to be tonic and diuretic and galactogenic, the drug has ulcer healing effect probably via strengthening the mucosal resistance or cyto protection.

Pharmacological activities

Shatavari possess Galactogenic effect, antisecretory and antiulcer activity, antitussive effect, adaptogenic activity, Antihepatotoxic activity, Antineoplastic activity, Immunomodulatory activity, Immunoadjuvant potential activity etc.^[6]

METHODOLOGY**Objectives**

- ✓ To evaluate the effect of Shatavari Choorna on Physical Fitness Index (PFI)
- ✓ To evaluate the effect of Shatavari Choorna on Maximal oxygen consumption (VO₂ Max).
- ✓ To compare with the control.

Study Design

It was a randomized, parallel group, single centre, controlled clinical study.

Sample size

A total of 70 healthy subjects registered for the trial. Subjects were randomly assigned in two groups in a 1:1 ratio comprising 35 in each group.

Inclusion Criteria

1. Healthy young male and female Subjects.
2. Aged between 18 to 25.
3. Willing to come for regular follow up
4. Able to give written informed consent.

Exclusion Criteria

1. Intake of over the counter health supplements,
2. Locomotor and musculoskeletal disorders
3. History of cardiovascular diseases
4. History of Diabetes Mellitus,
5. Hypertension and Bronchial Asthma
6. History of major surgery in the past
7. History of anabolic steroids in the past 6 months
8. History of drug intake
9. History of alcohol and smoking
10. Pregnant and lactating
11. History of Hypersensitivity to any drugs
12. Volunteers who have participated in any other clinical trials during the past 6 months.
13. Any other condition which the principal investigator thinks may jeopardize the study.

Intervention

Subjects of Group 2 received the following formulation whereas Subjects of Group 1 did not receive anything and they served as Negative control.

Table 2 Showing the Intervention

Groups	Volunteers	Drug	Test
Group I (Control)	35	-	Harward step test
Group II (Trial)	35	Shatavari	Harward step test

Formulation name: Shatavari Choorna(root powder)

Source of drug: Pharmacy, Govt Ayurveda Medical College, Mysore

Dose: 3 gms bid.

Mode of administration: Orally

Duration of administration: 21 days

Time: Morning and Night

Recording of Physical Fitness Index by Using modified Harvard Step Test

Physical fitness index of each subject was recorded by using modified Harvard step test with step height 40 cms for males and 33 cms for females, which is a wooden step, heavily constructed such that it remains steady always during the test. The observer calls the rhythm, at the signal “start” stopwatch is started. The subject places one foot on the platform and later the other, and immediately steps down, bringing down first the same foot which he placed up first. Subject was instructed not to touch anything with his hands but may move his arms freely. The subject is exercised at the rate of 22 times a minute for 5 minutes continuously unless he stops from exhaustion.

The duration of effort to the nearest second was noted. All subjects were stopped at 5 minutes if they could go that long. Exhaustion is defined as when the subjects could not maintain the stepping rate for 15 per minute. Immediately when the subject successfully completes the test Pulse rate is recorded (P max). Radial pulse rate is recorded after 1,2 and 3 minutes of Test as P1, P2 and P3 respectively.

The PFI score was calculated as follows:

$$\text{PFI} = \frac{\text{Exercise Duration} \times 100}{(\text{Sum of 1, 2 and 3 min Pulse counts})}$$

Determination of VO₂ Max

The VO₂ was calculated by sub maximal exercise heart rate using the Margania's equation^[7].

$$\text{VO}_2 \text{ Max} = 111.33 - (0.42 \times \text{P max})$$

Data was collected before the intervention and after the intervention. It was compared and analyzed.

RESULTS AND DISCUSSION

Out of 64 volunteers 16 volunteers were of 19 years (25%), 17 were of 20 year age (26.6%), 9 each with 21 and 22 years age (14.1%), 13 were 23 year age (20.3%). 24 volunteers were male. The mean height weight and BMI of Group I volunteers was 160.3(9.5), 51.5(8.1) and 19.1(2.1) respectively. Whereas that of Group II volunteers was 162.4(8.6), 54.9(7.2) and 20.8(2.1)

The mean duration of exercise in test group was 253.6 ± 55.8 seconds which increased to 267.9 ± 47.9 seconds after the intervention. Whereas duration in the control group was (table 3) 244.6 ± 65.7 and 245.2 ± 51.3 respectively. The change was not statistically significant.

Table 3: Showing the effect of Shatavari Choorna on duration of exercise in seconds

	Group	Mean	Std. Dev	N
Pre	I	244.6	65.7	34
	II	253.6	55.8	30
Post	I	245.2	51.3	34
	II	267.9	47.9	30

The mean Physical Fitness Index in test group was 68.3 ± 13 which increased to 73.8 ± 12 after the intervention. Physical Fitness Index showed statistically significant change with P value 0.044. (Table 4). Whereas PFI in the control group was 67.5 ± 15.9 and 68.3 ± 9.1 respectively (Graph 2).

Table 4: Showing the effect of Shatavari Choorna on Physical Fitness Index (PFI)

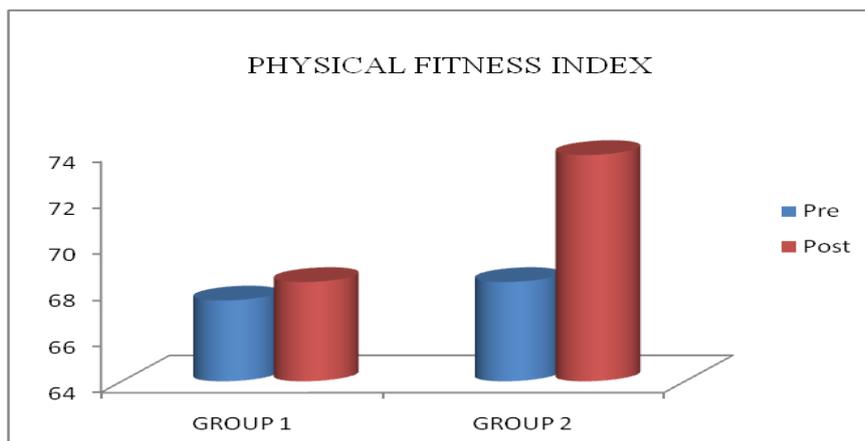
	Group	Mean	Std. Dev	N
Pre	I	67.5	15.9	34
	II	68.3	13	30
Post	I	68.3	9.1	34
	II	73.8	12	30

The mean Maximal Oxygen Consumption (VO_2 Max) in test group was 44.1 ± 6.3 which increased to 48.3 ± 3.9 after the intervention. Whereas duration in the control group, it was (table 5) 43.29 ± 6.45 and 45.3 ± 5.65 respectively (graph 2). The VO_2 Max showed statistically significant change.

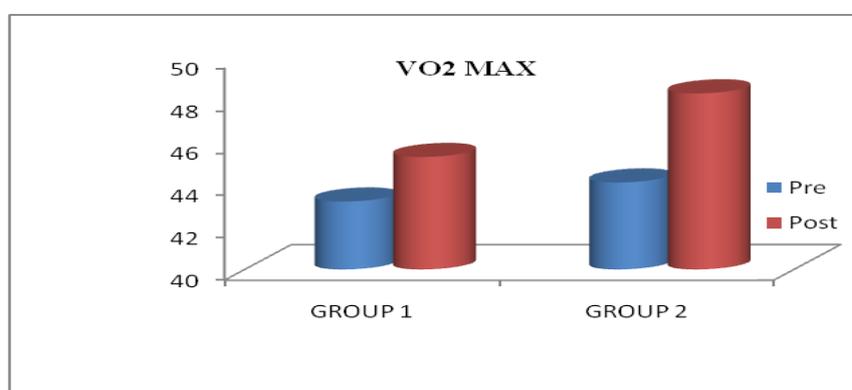
Table 5 Showing the effect of Shatavari Choorna on Maximal Oxygen Consumption (VO_2 Max)

	Group	Mean	Std. Dev	N
Pre	I	43.2	6.4	34
	II	44.1	6.3	30
Post	I	45.3	5.6	34
	II	48.3	3.9	30

The increase in Physical Fitness level can be attributed to Balya and rasayana activity of Shatavari



Graph 1: Showing the effect of Shatavari Choorna on Physical Fitness Index (PFI)



Graph 2: Showing the effect of Shatavari Choorna on Maximal Oxygen Consumption (VO₂ Max)

CONCLUSION

Healthy volunteers who received Shatavari Choorna 3 gms bid for the duration of 21 days reported statistically significant increase in their Physical Fitness Index and VO₂ Max. This indicates the Shatavari Choorna increases in the Physical Fitness level. There were no adverse effects noticed hence Shatavari Choorna is safe for administration.

BIBLIOGRAPHY

1. Ashok, Sridhar Reddy, Anand Katti, V A Chate, Shreevathsa, Physical Fitness Tests- A Tool to Assess Sharirika Bala, [cited on 2015 Jan 19] Available from: http://www.jbsoweb.com/admin/php/uploads/173_pdf.pdf.
2. Cited on 16/10/2014 available at <http://www.secretservice.gov/join/images/PhysicalFitnessFlierFinal.pdf>
3. Neisner JS, Laurie JA. Human Biology – A guide to field methods, 2nd Edition. Oxford and Edinburgh; Blackwell Scientific Publications., 1969; 325–328.

4. Chaterjee S, Anirban M. The relationship of physical fitness score with different morphological parameters and VO₂ Max on adult female athletes and non athletes. *Ind J Physioland Allied Sci.*, 2001; 55: 7–11.
5. Dr. Shivappa G C, 'Study Of Physical Fitness Index With Modified Harvard Step Test In Medical Students' submitted to RGUHS, 2012, Available at dspacerguhs.
6. J.L.N. Sastry, Dravyaguna vijnana, 2nd Ed, Varanasi, Chaukhambha orientalia, 2005
7. Margaria R, Aghemo P, Rovelli E. Indirect determination of maximal oxygen consumption in man. *J Appl Physiol.*, 1965; 20: 1070–1073.