



**Research Article**

**EFFECTS OF EIGHT WEEK SUPPLEMENTATION OF *ASHWAGANDHA* AND *AMALAKI CHURNA* AS A *RASAYANA* W.R.T GENERAL PHYSICAL FITNESS AND CARDIORESPIRATORY ENDURANCE**

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**ABSTRACT**

In India and around the world, people are spending more and more time enjoying sedentary lifestyle. This type of lifestyle decreases our physical fitness and compromises our cardio respiratory endurance. Under such circumstances along with a dynamic change in lifestyle and enhanced physical activity, there arises a need of drugs which can improve the physical fitness and cardio respiratory endurances among the youngsters and the adults. **Purpose:** The aim of the present study was to evaluate the efficacy of *Ashwagandha* and *Amalaki Churna* as a *Rasayana* with respect to general physical fitness and cardio-respiratory endurance. **Material and Methods:** 60 healthy individuals were registered for the present study. The individuals were divided into four groups. Each group comprised of 15 individuals. Group-I individuals were given *Amalaki Churna*, group-II individuals were given *Ashwagandha Churna*, group-III individuals were given both *Ashwagandha* and *Amalaki Churna* and group-IV individuals were given starch capsules as placebo therapy. The *Ashwagandha* and *Amalaki Churna* were given in the dose of 5gm each. Outcome measures: The study subjects were asked to perform tread mill test and TMT related parameters like exercise time, work load attained in terms of Mets, VO<sub>2</sub> max, heart rate reserve index and rate pressure product were measured both before and after the completion of 8 weeks of therapy. Apart from this vital capacity and BMI were also measured. **Results:** After the therapy there was a statistically significant improvement in general physical fitness and cardiorespiratory endurance on various parameters in group-I, group-II, group-III, whereas placebo group did not show any statistically significant improvement. **Conclusion:** *Ashwagandha* and *Amalaki* improved the general physical fitness and cardiorespiratory endurance of the individuals.

**INTRODUCTION**

In present era human life is full of mental stress and strain. Everybody is enjoying sedentary lifestyle. Therefore today's materialistic society is facing weak, unsteady and changing life style. In short, the more sedentary we are, the higher our health risks are. This type of lifestyle decreases our physical fitness and compromises our cardio respiratory endurance. Under such circumstances along with the

implementation of physical activity, there arises a need of drugs which can improve the physical fitness and cardio respiratory endurances among the youngsters and the adults.

*Ashwagandha* and *Amalaki* are the two miraculous herbs that are extensively used in Ayurveda as a *Rasayana*. Both of them have been shown to possess certain activities that not only cleanse our body but also our minds. *Ashwagandha* and *Amalaki* had been an ingredient in many formulations prescribed for a variety of musculoskeletal disabilities, as a general tonic to increase energy, to improve overall health and longevity, to prevent diseases in athletes and elderly,

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to improve the functioning of cardio respiratory system.

Thus, keeping all these things in view this study is an attempt to evaluate the efficacy of *Ashwagandha* and *Amalaki* as a *Rasayana* w.r.t. general physical fitness and cardio respiratory endurance.

## AIMS AND OBJECTIVES

### Primary Objectives

To determine the efficacy of *Ashwagandha* and *Amalaki* as a *Rasayana* with respect to general physical fitness and cardio-respiratory endurance.

### Secondary Objectives

To determine the clinical safety of *Ashwagandha* and *Amalaki* when used as a *Rasayana* w.r.t general physical fitness and cardio-respiratory endurance.

## MATERIALS AND METHODS

60 healthy individuals were registered for the study. Study subjects were randomly selected from OPD/campus of R.G.G.P.G. Ayurvedic College and Hospital, Paprola, Dist. Kangra (H.P.) 176115. A detailed history was obtained, physical examination was conducted and relevant investigations were carried out before the enrolment of healthy individuals in the study.

All participants were interviewed in the local language. Written informed consent was taken from patients after offering sufficient explanations about the study and its aims.

The study subjects were randomly divided into four groups. Each group comprised of 15 individuals. Group-I individuals were given *Ashwagandha Churna*, group-II individuals were given *Amalaki Churna*, group-III individuals were given both *Ashwagandha* and *Amalaki Churna* and group-IV individuals were given starch capsules as placebo therapy.

Out of 60 registered study subjects, 9 individuals dropped out from the study due to their inconsistent attendance and 51 individuals completed the full course of therapy.

Out of 15 registered individuals from each group 13 individuals from group-I, 12 from group -II, 13 from group-III and 13 from group-III completed the full course of therapy.

### (a) Inclusion Criteria

- i. Healthy volunteers who were willing to undergo the treatment.
- ii. Individuals of either gender aged between 30-60 years.
- iii. (iii) Individuals who were willing and able to participate for 8 weeks of duration.

### (b) Exclusion Criteria

- i. Individuals who were not willing to undergo the treatment.
- ii. Individuals < 30 years and > 60 years of age
- iii. History of hypersensitivity to any of the treatment drug.
- iv. Individuals who completed participation in any other clinical treatment during the past six months.
- (v) Any other condition which the Principal investigator thought may jeopardize the study.

### (c) Criteria for Withdrawal

- i. Individuals non-compliant to treatment regimen.
- ii. Individual who himself/herself wanted to withdraw from the treatment.
- iii. Individuals who developed any other co-morbidity during the treatment period which required immediate pharmacological intervention.
- iv. Adverse drug reaction to treatment drug.

### Laboratory Investigations

- TLC
- DLC
- ESR
- FBS
- Blood urea
- Serum creatinine
- SGOT
- SGPT
- S.cholesterol

### Assessment Criteria

#### Objective Criteria

##### (a) TMT related parameters like

- Exercise time
- Maximum work load attained in terms of Mets
- VO2 max
- Rate pressure product
- Heart rate reserve index

##### (b) BMI

##### (c) Vital capacity

The study subjects were asked to perform tread mill test both before and after the completion of therapy. TMT related parameters like exercise time and work load in terms of Mets were generated automatically by the computer connected to the TMT machine. Other TMT related parameters like Rate pressure product, Heart rate reserve index and VO2 max were obtained manually with the help of following formulae:

$$\text{VO2 max} = 15 \times (\text{HR Max} / \text{HR Rest})$$

$$\text{RPP} = \text{Heart Rate (HR)} \times \text{systolic blood pressure (SBP)}$$

$$\text{HRR index} = (\text{Peak HR} - \text{Baseline HR}) \times 100$$

BMI was calculated by Weight (kg) / Height (m<sup>2</sup>)

Vital capacity was obtained with the help of spirometry.

### Trial Drugs

Dried fruits of *Amalaki* and roots of *Ashwagandha* were procured from Jogindernagar Pharmacy (H.P). The trial drugs *Ashwagandha* and *Amalaki Churna* were prepared in the Charak Rajkiya Ayurvedic Pharmacy Paprola (H.P) and samples were approved from Drug Testing Laboratory Jogindernagar, (H.P). *Ashwagandha* and *Amalaki Churna* were given in the dose of 5gm each once a day.

### Placebo

In this study the placebo group was supplemented with starch capsules which were prepared from Baijnath Pharmacy, Paprola (H.P)

### Statistical Analysis

Statistical analysis was done using Microsoft Office 2011 Excel. The objective parameters were analyzed using paired 't' test. Intergroup comparison was done with the help of one way ANOVA test.

### Follow up and assessment of the study subjects

A thorough assessment of the study subjects was done before commencement of the therapy and at the day 0<sup>th</sup>, 14<sup>th</sup>, 28<sup>th</sup>, 42<sup>nd</sup> and 56<sup>th</sup> day i.e., at the time of the completion of therapy. Laboratory investigations were carried out before commencement and after completion of the treatment.

### DISCUSSION

After the completion of eight week of therapy, the individuals of group-I showed an increase of 5.81% in VO<sub>2</sub> max, statistically significant improvement was observed from 34.41ml/kg/min to 36.41ml/kg/min. Group-II individuals also showed statistically significant improvement from 37.03ml/kg/min to 40.17ml/kg/min with an increase of 8.47%. Group-III individuals showed the maximum increase of 12.45% with statistically significant improvement from 37.02ml/kg/min to 41.63ml/kg/min. Contrary to this, the individuals in the placebo group showed statistically insignificant results with an increase of only 0.82%. The observations were made on HRR index after the completion of eight weeks of therapy. The HRR index of the individuals in group I increased by 5.76% with statistically significant improvement from 81.13% to 85.81%. In group II it increased by 6.43%. In group III the maximum increase was noticed that is by 7.58% with statistically significant improvement from 81.50% to 87.68%. Group IV showed statistically insignificant results with negligible increase of 0.05%. Previous studies have reported that exposure of the heart to oxidation stress depresses the ventricular functions and cardiorespiratory endurance and these changes are

significantly prevented by antioxidants. The results of the present study also support these observations. A concept is now emerging of 'adaptogenic drugs', drugs that increase non specific resistance of the users to a variety of stresses, which was first time reported by Brehman and associates in *Eleutherooccus* and *Panax ginseng*.<sup>[10]</sup> Adaptogenic property of various herbs like *Embllica officinalis* and *Withania somnifera* has already been reported in various experimental studies.<sup>[11]</sup> The major active constituents of *Ashwagandha* from which its primary medicinal properties emanate, are based upon the actions of certain steroidal alkaloids and lactones as a class of constituents called withanolides.<sup>[12]</sup> The root contains the steroid lactone (withaferin A) and related withanolides, along with various alkaloids. It is reported that sitoindosides VII, VIII, IX and X are likely adaptogenically active substances present in *Withania somnifera*. The exact mechanism of such myocardial adaptation is not known. However, it has been proposed that it works through the induction of a number of antioxidant enzymes such as superoxide dismutase, catalase and glutathione peroxidase and antioxidant such as glutathione and proteins like heat shock protein.<sup>[13]</sup> *Embllica officinalis*, is an important medicinal plant in the Indian traditional system of medicine, Ayurveda and is classified as a *Hridya dravya* which when translated means cardiogenic drug. Numerous preclinical studies with laboratory animals have shown that *Amalaki* does possess cardioprotective and anticoagulant effects and is useful in delaying/preventing/reducing experimentally induced cardiotoxicity, atherosclerosis, myocardial infarction, hypertension and reducing ischemic-reperfusion injury. The pleiotropic effect of *Amalaki* is believed to be due to the presence of various phytochemicals and studies have shown that the tannoids (emblicanin-A and -B), gallic acid, ellagic acid and corilagin also possess cardioprotective properties. Additionally, clinical studies have also shown that the regular intake of *Amalaki* was effective in reducing the cholesterol levels. However in present study no such effect was noticed.

In the present study the duration of exercise was also noticed before and after the completion of therapy. It was observed that after the completion of eight weeks of therapy the duration of exercise in group I increased to a tune of 8.15% whose mean value was 8 min 58 sec before trial and 9 min 28 sec after the completion of therapy. In group II it increased by 25% from 8 min 47 sec to 10 min 68 sec. and in group III it increased by 33.42% which was 7 min 57 sec before the trial and 10 min 10 sec after the completion of therapy. The results obtained in all the three groups were statistically significant with maximum improvement in group-III. Contrary to this group IV

individuals showed statistically insignificant improvement of only 0.30%. *Ashwagandha* is a well known adaptogen. It helps our body to adapt to various physical and mental stressors. Various researches claims that *Ashwagandha* improves body composition and increase strength.<sup>[14]</sup> Even in *Brihatrayi Ashwagandha* is kept under *Balya* drugs. A study was conducted by Shweta shenoy et al. in which they found that duration of exercise in TMT was increased after individuals were given aqueous extracts of *Ashwagandha* for 8 weeks<sup>[15]</sup>.

Hence we can say that *Ashwagandha* plays a vital role in increasing the physical fitness.

As far as *Amalaki* is concerned, it contains Vitamin C, Vitamin A, calcium, potassium, phosphorous, iron, polyphenols, alkaloids. All these components improve cardiac health, reduce excess cholesterol formation, improves blood circulation and increases generalized physical fitness. (American Journal of Food Technology).

Hence *Ashwagandha* and *Amalaki* both are very good in increasing the physical fitness when used. However when given in combination they can give miraculous results. That is why the combination of *Ashwagandha* and *Amalaki* in group III showed maximum increase in exercise duration as compared to group I and group II when *Ashwagandha* and *Amalaki* were used alone.

When individuals were asked to perform tread mill test the work of work load taken by them was also noticed both before and after the completion of therapy. It was observed that after the completion of eight weeks of therapy the work load attained by the individuals in group I increased by 11.15% from 9.86 Mets to 10.96 Mets. In group II it increased by 17.28% from 9.95 Mets to 11.66 Mets. In group III work load attained before treatment was 8.95 Mets which increased to 11.43 Mets after the completion of therapy with the maximum increase (27.70%) as compared to all other groups. The results obtained in all the three groups were statistically significant. Group IV showed statistically insignificant results with percentage increase of only 1.37%.

This increase in the work load attained by individuals is may be due to the presence of abundance of phytochemicals with antioxidant properties both in *Ashwagandha* and *Amalaki* which were accountable for their rejuvenating properties. This explains the inclusion of these herbs in the Indian system of Ayurvedic medicines in promoting longevity. *Ashwagandha* and *Amalaki* both are proven to have an anti-fatigue action<sup>[16]</sup>. This could be the reason that individuals were able to bear maximum work load during TMT test when both *Ashwagandha* and *Amalaki* were administered together.

The vital capacity of the individuals was also noticed and it was observed that after the completion of eight weeks of therapy, the vital capacity increased by 1.17%, 1.32%, 1.74% in group-I, group-II, group-III respectively.

Even though mild increase in vital capacity was noticed among the three groups but the changes were statistically significant proving that the change occurred was not by chance but rather the effect of therapy. The placebo group IV showed insignificant results with a percentage increase of only 0.29%.

The increase in vital capacity may be attributed to the strengthening action of *Ashwagandha*. In Ayurvedic literature *Ashwagandha* has been classified as a *Balya* herb. It can increase the vital capacity by strengthening the muscles of respiration, by boosting the immune system. Moreover the phytochemicals present in it can be the reason for increasing the vital capacity. On the other hand *Amalaki* has been the ingredient of number of formulations given in respiratory disorders like *Amalak Avleha*, *Chayavan prash* etc. It has vitamin E and beta carotene which acts as antioxidants. As a *Rasayana* both *Amalaki* and *Ashwagandha* has a *Strotoshodhak* activity and improving the functioning of *Pranvaha Strotas*.

Though certain studies claims that *Ashwagandha* helps in weight gain, but no such observation was made during the present study when BMI of the study subjects was observed. The BMI of the individuals showed negligible changes after the completion of therapy which was statistically insignificant results in all the four groups. *Ashwagandha* has been mentioned under *Balya* drugs. It's quite possible that its *Balya* nature contributes to the upliftment of general health and muscle strength and not to the gain in weight.

## RESULTS

There was statistically significant improvement in all the parameters in group-I, group-II, group-III, whereas placebo group did not show any statistically significant improvement. Table 1 to 7 indicates the statistical analysis and results of the present study.

## CONCLUSION

- Now days people follow sedentary lifestyle and faulty food habits which is the main cause of decreased physical fitness and cardio-respiratory endurance.
- Statistically significant increase in the parameters like exercise time, maximum work load attained, Vo<sub>2</sub> max, HRR index, RPP was noticed in the individuals who were treated with *Ashwagandha* and *Amalaki* alone. Best results on objective parameters were noticed when the combination of *Ashwagandha* and *Amalaki* was given.

- It was observed during the study that vital capacity was not altered to a large extent, only a marginal increase was found in the vital capacity after the administration of *Ashwagandha* and *Amalaki*.
- It can be concluded from the above findings that *Ashwagandha* and *Amalaki* when given individually are good in improving general physical fitness and cardiorespiratory endurance but for obtaining best results both of them should be administered together.
- The BMI remained almost unchanged. Thereby indicating that *Ashwagandha* and *Amalaki* doesn't

have any remarkable effect on BMI whether given alone or in combination.

- No untoward effect of therapy was seen during the entire trial period.

Hence we may conclude that *Ashwagandha* and *Amalaki* are effective in increasing the general physical fitness and cardiorespiratory endurance but they are required to be given in combination to yield best results.

Results of this study are encouraging, still trial should be conducted for longer duration on large sample to establish the results.

**Table 1: Effect of therapy on Exercise Time**

Groups	N	Timing	Mean	% Change	SD±	SE±	't' value	'p' value	F value	P value																																		
Group - I	13	Before	8.58	8.15%	1.92	0.53	4.45	<0.01	2.02	<0.01																																		
		After	9.28		1.78	0.49					Group - II	12	Before	8.47	25.14%	1.42	0.50	4.48	<0.01	After	10.60	2.53	0.70	Group - III	13	Before	7.57	33.42%	2.26	0.63	3.16	<0.01	After	10.10	1.56	0.55	Group - IV	12	Before	6.56	0.30%	1.45	0.42	0.11
Group - II	12	Before	8.47	25.14%	1.42	0.50	4.48	<0.01																																				
		After	10.60		2.53	0.70					Group - III	13	Before	7.57	33.42%	2.26	0.63	3.16	<0.01	After	10.10	1.56	0.55	Group - IV	12	Before	6.56	0.30%	1.45	0.42	0.11	>0.05	After	6.54	2.34	0.32								
Group - III	13	Before	7.57	33.42%	2.26	0.63	3.16	<0.01																																				
		After	10.10		1.56	0.55					Group - IV	12	Before	6.56	0.30%	1.45	0.42	0.11	>0.05	After	6.54	2.34	0.32																					
Group - IV	12	Before	6.56	0.30%	1.45	0.42	0.11	>0.05																																				
		After	6.54		2.34	0.32																																						

**Table 2: Effect of therapy on Maximum Work Load Attained (Mets)**

Groups	N	Timing	Mean	% Change	SD±	SE±	't' value	'p' value	F value	P value																																		
Group - I	13	Before	9.86	11.15%	1.37	0.38	4.01	<0.01	2.68	<0.01																																		
		After	10.96		1.92	0.53					Group - II	12	Before	9.95	17.28%	2.20	0.63	4.37	<0.01	After	11.66	1.67	0.48	Group - III	13	Before	8.95	27.70%	2.31	0.64	3.01	<0.01	After	11.43	1.82	0.50	Group - IV	12	Before	9.43	1.37%	22.72	0.30	0.92
Group - II	12	Before	9.95	17.28%	2.20	0.63	4.37	<0.01																																				
		After	11.66		1.67	0.48					Group - III	13	Before	8.95	27.70%	2.31	0.64	3.01	<0.01	After	11.43	1.82	0.50	Group - IV	12	Before	9.43	1.37%	22.72	0.30	0.92	>0.05	After	9.30	1.79	0.49								
Group - III	13	Before	8.95	27.70%	2.31	0.64	3.01	<0.01																																				
		After	11.43		1.82	0.50					Group - IV	12	Before	9.43	1.37%	22.72	0.30	0.92	>0.05	After	9.30	1.79	0.49																					
Group - IV	12	Before	9.43	1.37%	22.72	0.30	0.92	>0.05																																				
		After	9.30		1.79	0.49																																						

**Table 3: Effect of therapy on VO2 Max**

Groups	N	Timing	Mean	% Change	SD±	SE±	't' value	'p' value	F value	P value																																		
Group - I	13	Before	34.41	5.81%	1.51	0.42	3.29	<0.01	2.74	<0.01																																		
		After	36.41		1.53	0.42					Group - II	12	Before	37.03	8.47%	3.18	0.91	3.74	<0.01	After	40.17	3.68	0.06	Group - III	13	Before	37.02	12.45%	3.93	1.09	4.29	<0.01	After	41.63	3.57	0.99	Group - IV	13	Before	34.00	0.82%	2.83	0.78	1.91
Group - II	12	Before	37.03	8.47%	3.18	0.91	3.74	<0.01																																				
		After	40.17		3.68	0.06					Group - III	13	Before	37.02	12.45%	3.93	1.09	4.29	<0.01	After	41.63	3.57	0.99	Group - IV	13	Before	34.00	0.82%	2.83	0.78	1.91	>0.05	After	34.96	2.72	0.75								
Group - III	13	Before	37.02	12.45%	3.93	1.09	4.29	<0.01																																				
		After	41.63		3.57	0.99					Group - IV	13	Before	34.00	0.82%	2.83	0.78	1.91	>0.05	After	34.96	2.72	0.75																					
Group - IV	13	Before	34.00	0.82%	2.83	0.78	1.91	>0.05																																				
		After	34.96		2.72	0.75																																						

**Table 4: Effect of therapy on Rate Pressure Product**

Group	N	Timing	Mean	% Change	SD±	SE±	't' value	'p' value	F value	P value
Group - I	13	BT	25853.38	7.46%	2875.82	797.60	3.43	<0.01	2.75	<0.01
		AT	27784.00		3210.60	890.46				
Group - II	12	BT	26083.00	8.66%	3244.93	936.73	3.80	<0.01		
		AT	28342.00		3415.07	985.84				
Group - III	13	BT	25197.53	11.65%	3478.24	964.69	4.39	<0.01		
		AT	28134.15		2962.61	821.68				
Group-IV	13	BT	25793.69	0.25%	3236.98	897.77	0.46	>0.05		
		AT	25727.53		3029.88	840.33				

**Table 5: Effect of therapy on HRR Index**

Groups	N	Timing	Mean	% Change	SD±	SE±	't' value	'p' value	F value	P value
Group - I	13	Before	81.13	5.76%	1.37	.38	5.99	<0.01	3.35	<0.01
		After	85.81		7.26	2.01				
Group - II	12	Before	81.65	6.43%	2.20	.63	3.98	<0.01		
		After	86.90		6.83	1.97				
Group - III	13	Before	81.50	7.58%	2.31	.64	4.52	<0.01		
		After	87.68		4.82	1.33				
Group - IV	13	Before	81.98	0.05%	22.72	6.30	0.92	>0.05		
		After	82.02		8.23	2.28				

**Table 6: Effect of therapy on Vital Capacity**

Groups	N	Timing	Mean	% Change	SD±	SE±	't' value	'p' value	F value	P value
Group - I	13	Before	3.41	1.17%	0.69	0.19	3.12	<0.01	2.45	<0.01
		After	3.45		0.72	0.20				
Group - II	12	Before	4.54	1.32%	0.95	0.27	3.42	<0.01		
		After	4.60		0.77	0.22				
Group - III	13	Before	3.45	1.74%	0.77	0.21	3.56	<0.01		
		After	3.51		0.59	0.16				
Group - IV	13s	Before	3.35	0.29%	0.77	0.21	0.61	>0.05		
		After	3.36		0.57	0.16				

**Table 7: Effect of therapy on BMI**

Groups	N	Timing	Mean	% Change	SD±	SE±	't' value	'p' value	F value	P value
Group - I	13	Before	22.52	0.26%	0	0	1.94	>0.05	4.01	>0.05
		After	22.46		0	0				
Group - II	12	Before	24.48	0.40%	0	0	1.81	>0.05		
		After	24.38		0	0				
Group - III	13	Before	23.48	1.10%	0	0	1.78	>0.05		
		After	23.22		0	0				
Group - IV	13	Before	24.15	0.04%	0	0	1.31	>0.05		
		After	24.14		0	0				

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