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Evaluation of *Shareerika Bala* in different *Prakruti* persons w.s.r. to *Ardhashakti Vyayama*

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ABSTRACT

Introduction: *Bala* is considered as the physical and mental strength of the individual. It can be assessed in healthy individuals as well as diseased. The *Shareerika Bala* in healthy individuals varies according to *Prakruti, Vaya, Kala*, *Desha* and others. *Deha Bala* of *Vata Pradhana* individuals have less *Bala, Pitta Pradhana* individuals have *Madhyama* and *Kapha Pradhana* individuals have more *Bala*. *Bala* can be assessed through one's *Vyayama Shakti*. The optimum extent to which the *Vyayama* is to be performed is a question mark, as the *Bala* of *Shareera* varies in accordance with an individual and hence the *Vyayama Shakti*. To attain maximum benefits, practicing *Vyayama* to the optimum extent - *Ardhashakti* of *Vyayama* is of much importance. **Methodology:** In the present study 90 healthy individuals were made to run on electronic tread mill in *Pratha Kala* at a fixed speed for all and time taken to witness the *Ardhashakti Lakshana* and variations in the subjective and objective parameters were assessed statistically. **Results:** There is less time taken to attain *Ardhashakti Vyayama Lakshana* in *Vata Pradhana Prakruti* individuals i.e., 4.532 minutes, More time taken in *Kapha Pradhana Prakruti* individuals i.e., 6.191 minutes and time taken in *Pitta Pradhana Prakruti* individuals i.e., 5.562 minutes at 'f' value of 14.39 which is highly significant at $p < 0.05$, 95% confidence level. **Discussion:** *Ardha Shakti* was more in *Kapha Prakruti*, less in *Vata Prakruti, Madhyama* in *Pitta Pradhana Prakruti* individuals. Hence the study established that *Shareerika Bala* was more in *Kapha Pradhana Prakruti* individuals than the *Pitta* and *Vata Pradhana Prakruti* individuals.

Key words: *Shareerika Bala, Prakruti, Ardhashakti Vyayama, Individual's Constitution*

INTRODUCTION

Bala is considered as the physical and mental strength of an individual. The *Shareerika Bala* in healthy individuals varies from person to person and in the same individual varies with respect to his / her *Prakruti, Vaya, Kala* etc.[1] *Prakruti* in simple words is the "structural and functional make" of a person.[2]

According *to Acharya Caraka*, among seven types of *Prakruti,*[3] the *Vata Pradhana Prakruti* individuals possess *Alpa Bala*, *Ayu*.[4] Hence, it's consider as *Hina Prakruti* and are more susceptible to diseases, *Pitta Pradhana Prakruti* individuals possess *Madhyama Bala* and *Ayu* and are moderately acquire the diseases,[5] Whereas *Kapha Pradhana Prakruti* individuals possess *Uttama Bala* and *Ayu*. Hence it is praised as *Uthama Prakruti* and are less susceptible to diseases.[6]

Vyayama is a boon for health seekers. It is gaining more importance in the prevention of diseases at various levels of the human health and it is a very important part of *Dinacharya.* Every human being will experience the exhaustion by means of exercise or some activities.

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The properly performed exercises yield beneficial results and improperly performed exercises cause adverse effects. Human body has such a mechanism that it shows certain symptoms, which indicate the extent of exhaustion due to exercise. Our *Acharyas* were aware about benefits and adverse effects of *Vyayama,* for that they have mentioned about *Lakshanas* of *Samyak Vyayama*.[7]

The optimum extent to which the *Vyayama* is to be performed is a question mark, as the *Bala* of *Shareera* varies in accordance with the *Rutu, Vaya, Prakrtiti* of an individual and hence the *Vyayama Shakti.* To attain maximum benefits, practicing *Vyayama* to the optimum extent - *Ardhashakti* of *Vyayama* is of much importance.[8] *Bala* of *Shareera* is *Heena, Madhyama* and *Uttama* in *Vata Pradhana, Pitta Pradhana* and *Kapha Pradhana* individuals respectively. The time taken to witness the *Samyak Vyayama Lakshana* also varies.

Many references regarding *Vyayama* are found in various text of *Ayurveda* viz. *Charaka Samhita, Sushruta Samhita, Astanga Sangraha, Astanga Hridaya, Yoga Ratnakara* and *Bhavaprakasha. Acharya Charaka* mentions certain *Lakshanas* of *Samyak Vyayama* which were referred to as *Balardha of Vyayama Lakshanas* by *Acharya Sushruta* and others.

In the present study 90 healthy volunteers were made to run on Electronic tread mill in *Pratha Kala* and time taken to witness the *Ardhashakti Lakshana* and variations in the subjective and objective parameters were assessed statistically.

OBJECTIVES OF THE STUDY

1. To evaluate the relation between *Deha Prakruti* and *Shareerika Bala.*
2. To observe the time duration of *Vyayama Ardha Shakti* according to *Sharirika Bala* in different *Prakruti* individuals.

MATERIALS AND METHODS

The present study was conducted on apparently healthy 90 volunteers at S.J.G.A.M.C. College of Ayurveda, Koppal.

Materials

1. B.P apparatus.
2. Stethoscope.
3. Thermometer for measuring body and room temperature.
4. Weighing machine.
5. Measuring tape.
6. Stop watch.
7. Electronic Tread mill.

To measure circumference of mid-arm, mid-thigh, abdomen, chest and hip, measuring tape was used and noted in centimeters.

A standard weighing machine was used to measure weight and was noted in kilograms.

To note the blood pressure, Sphygmomanometer and stethoscope were used.

On inspection, respiratory rate was noted.

Room temperature and body temperature were recorded with thermometers, and to note the time.

Volunteers were made to run on Tread mill.

Methodology

Source of Data

Apparently healthy 90 volunteers were randomly selected from S.J.G.A.M.C. College of Ayurveda, Koppal.

Collection of Data

Inclusion criteria

1. Apparently healthy 90 volunteers irrespective of religion and sex.
2. Volunteers aged between 18-30 years.
3. Individuals having BMI between 18-25, irrespective of sex.
4. Individuals with normal ECG, Blood sugar & Hb%

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Exclusion criteria

1. Subjects suffering from Acute or Chronic Illness.
2. Handicapped persons.
3. Those who are on long term Medications.
4. Persons who are *Ayogya* (unfit) for *Vyayama*.
5. Individuals accutomed to vigourous or areobic form of Exerice.

Assessment criteria

Subjective parameter

1. *Lalata Sweda*
2. *Thrushna*
3. *Dheerga Swasa*

Objective parameter

1. Blood Pressure
2. Pulse
3. Respiratory rate
4. Temperature
5. Heart rate

Plan of Study

1. Vital parameters were recorded before procedure.
2. Room temperature was recorded.
3. The volunteers were made to run on the electronic tread mill in *Pratha Kala,* at a speed of 5 km/hr.
4. After the appearance of *Lakshanas* of *Ardha Vyayama Shakti*, procedure is terminated
5. Immediately changes in vital signs were recorded.
6. Time taken for vital parameters to return to normalcy was noted**.**

The volunteer's health was assessed before commencement of exercise

General history about health

1. Vital signs - Blood pressure, Pulse, Respiratory rate, Temperature
2. Body mass index was recorded.

During Test

The time of *Vyayama Ardhashakti Lakshanas* and vital signs before and after exercise in individuals were noted.

Post test

By making individuals undergo the test during *Pratha Kala*, the variation of time taken for attaining *Ardhashakti* of *Vyayama* in different *Prakriti* persons was evaluated.

The time taken for the vitals to return to normalcy was noted.

OBSERVATIONS AND RESULTS

In this study 90 individuals who come under inclusion criteria were selected and grouped in 3 groups according to *Prakruti*. The following tables show the observations in the groups.

Among 90 individuals, 15.55% were of 18 - 21 age group, 46.66% were of 22 - 26 age group, 37.77% were of 27 - 30 age group. Out of 90 individuals, 63.33% were males and 36.66% were females. Out of 90 individuals, 90% belonged to Hindu, 5.55% belonged to Muslim and 3.33% belonged to Christian religion. Out of 90 individuals, 63.33% were of medium built, 13.33% were of large built and 23.33% were of small built. Out of 90 Individuals, 48.88% were of *Samaagni*, 17.77% were of *Vishamaagni*, 6.66% were of *Mandaagni* and 25.55% were of *Teekshnaagni*. 33.33% individuals had *Mridu Kostha*, 54.44% individuals had *Madhyama Kostha* and 23.33% had *Krura Kostha***.** 18.88% individuals had *Pravara Ahara Shakti*, 70% individuals had *Madhyama Ahara Shakti* and 11.11% individuals had *Avara Ahara Shakti.* Out of 90 individuals, 11.11% had *Avara Vyayama Shakti,* 75.55% had *Madhyama Vyayama Shakti* and 13.33% had *Pravara Vyayama Shakti.* Out of 90 individuals, 51.11% were vegetarian, and 48.88% were mixed. Out of 90 individuals, 36.66% were of B.M.I between 18- 20, 20% were of B.M.I between 20 to 22 and 43.33%were of B.M.I between 22 - 25.

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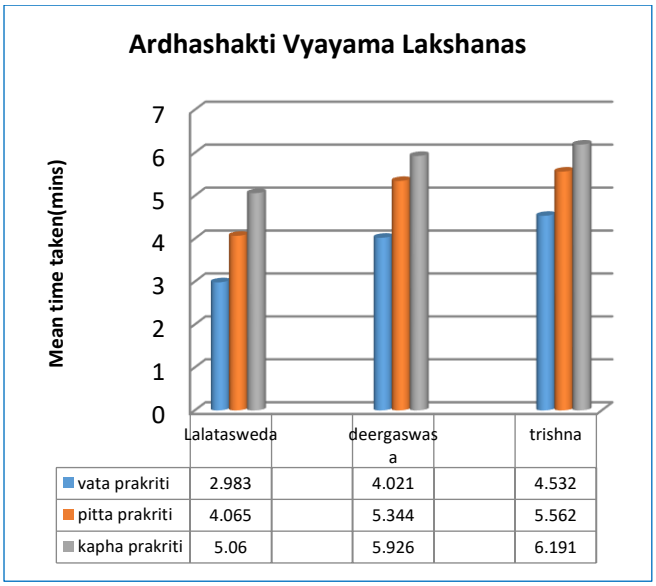
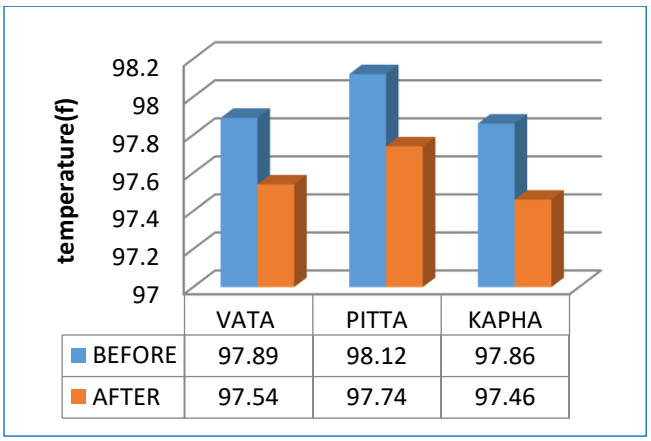
Bar diagram 1: Mean total time taken to attain *Ardhashakti Vyayama Lakshanas* in 90 different *Prakruti* individuals.



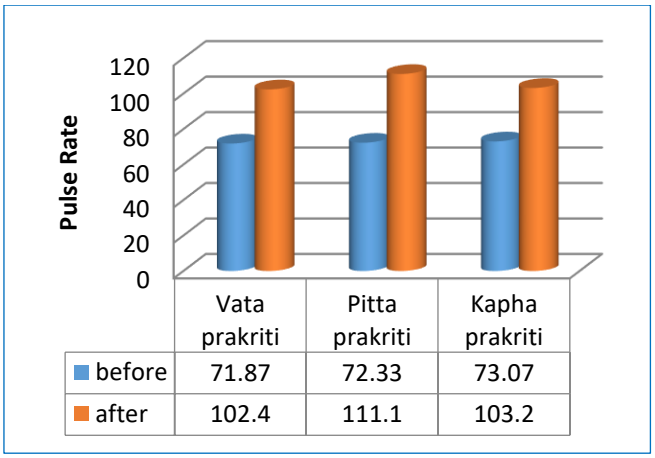
Mean time taken to attain each *Lakshanas* by *Vatapradhan*, *Pitta Pradhan* and *Kapha Pradhan Prakruti* persons, to attain *Lalatasweda* was 2.983 min, 4.065 mins and 5.060 mins, *Deerghashwasa* was 4.021, 5.344 and 5.926 mins. *Thrushna* in 4.532 min, 5.562 and 6.191 mins respectively.

Bar diagram 2: Mean body temperature in 90 different Prakruti individuals is shown in the diagram.



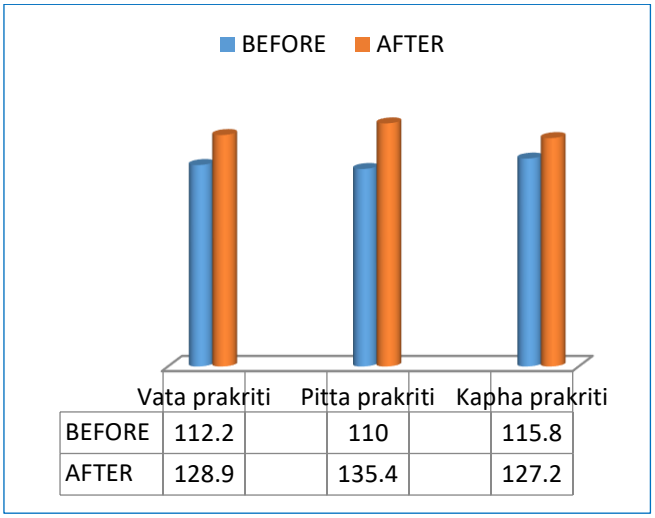
Mean body temperature in *Vata Prakruti* before *Vyayama* was 97.89 which reduced to 97.54 after *Vyayama*, while body temperature in *Pitta Prakruti* before *Vyayama* was 99.12 which reduced to 97.74 after *Vyayama* and body temperature in *Kapha Prakruti* before *Vyayama* was 97.86 which reduced to 97.46 after *Vyayama.*

Bar diagram 3: Mean Pulse rate Before and After Exercise in 90 Different Prakruti individuals is shown in the diagram.



Mean pulse rate in *Vata Prakruti* before *Vyayama* was 71.87 which increased to 102.4 after *Vyayama*, while pulse rate in *Pitta Prakruti* before *Vyayama* was 72.33 which increased to 111.1 after *Vyayama* and pulse rate in *Kapha Prakruti* before *Vyayama* was 73.07 which increased to 103.2 after *Vyayama.*

Bar diagram 4: Mean S.B.P Before and After the Exercise in 90 different *Prakruti* individuals is shown in the diagram.



Mean Systolic Blood Pressure in *Vata Prakruti* before *Vyayama* was 112.2 which increased to 128.9 after *Vyayama*, while Systolic Blood Pressure in *Pitta Prakruti* before *Vyayama* was 110 which increased to 135.4 after *Vyayama* and Systolic Blood Pressure in *Kapha Prakruti* before *Vyayama* was 115.8 which increased to 127.2 mm of Hg after *Vyayama.*

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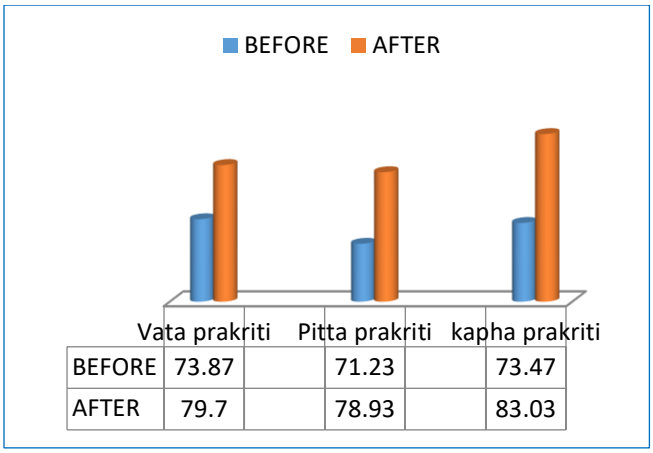
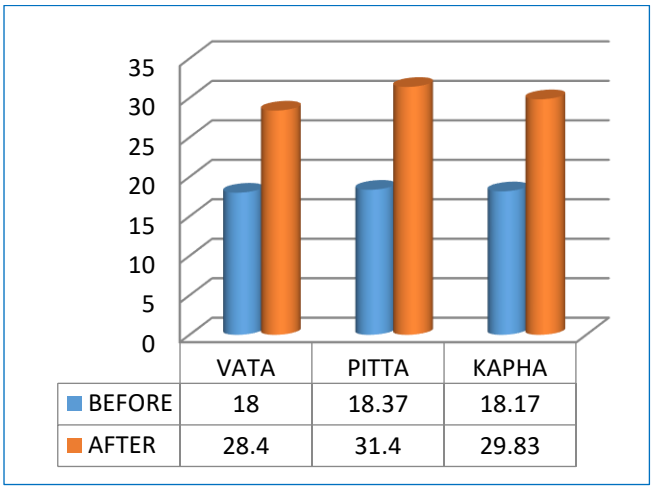
Bar diagram 5: Mean D.B.P Before and After the Exercise in 90 different Prakruti individuals is shown in the diagram



	Vata prakriti	Pitta prakriti	kapha prakriti
BEFORE	73.87	71.23	73.47
AFTER	79.7	78.93	83.03

Mean Diastolic Blood Pressure in *Vata Prakruti* before *Vyayama* was 73.87 which increased to 79.7 after *Vyayama*, while Diastolic Blood Pressure in *Pitta Prakruti* before *Vyayama* was 71.23 which increased to 78.93 after *Vyayama* and Diastolic Blood Pressure in *Kapha Prakruti* before *Vyayama* was 73.47 which increased to 83.03 mm of Hg after *Vyayama.*

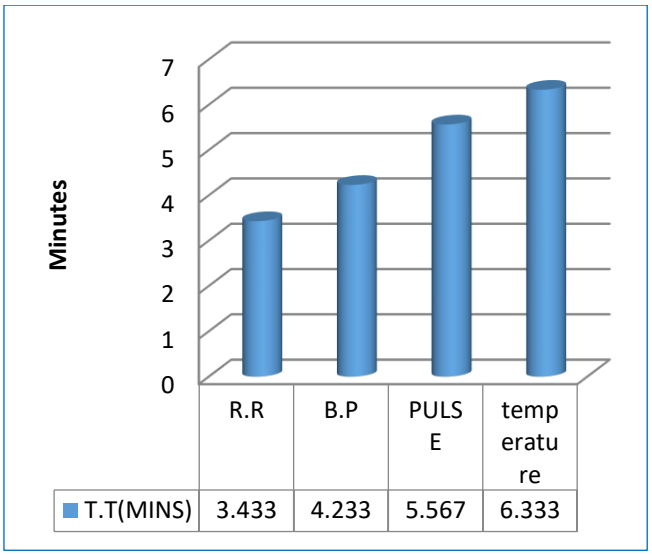
Bar diagram 6: Mean Respiratory Rate (R.R) Before and After the Exercise in 90 different *Prakruti* individuals is shown in the diagram



	VATA	PITTA	KAPHA
BEFORE	18	18.37	18.17
AFTER	28.4	31.4	29.83

Mean Respiratory Rate in *Vata Prakruti* before *Vyayama* was 18 which increased to 28.4 after *Vyayama*, while Respiratory Rate in *Pitta Prakruti* before *Vyayama* was 18.37 which increased to 31,4 after *Vyayama* and Respiratory Rate in *Kapha Prakruti* before *Vyayama* was 18.17 which increased to 29.83 mm of Hg after *Vyayama.*

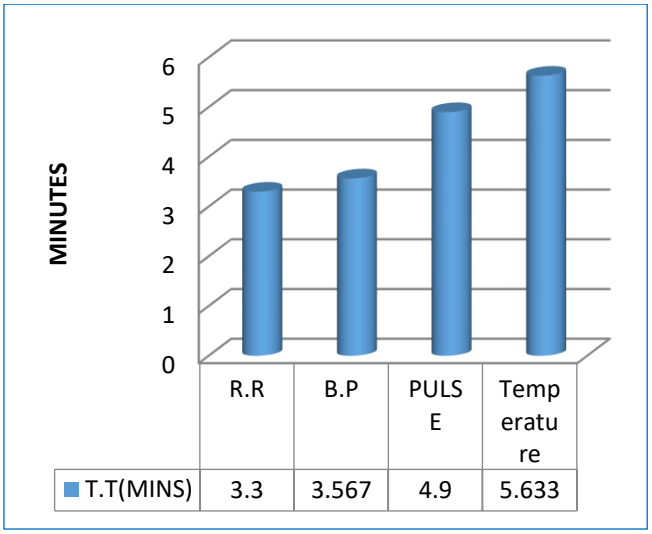
Bar diagram 7: The mean time taken for objective parameters to return to normalcy in 30 *Vata Pradhan Prakruti* individuals are shown in the diagram.



	R.R	B.P	PULSE	temperature
T.T(MINS)	3.433	4.233	5.567	6.333

The mean time taken for blood pressure to return to normalcy was 4.233 minutes, for pulse 5.567 minutes, for respiratory rate was 3.433 minutes and for body temperature was 6.333 minutes in 30 *Vata Pradhana Prakruti* individuals.

Bar diagram 8: The mean time taken for objective parameters to return to normalcy in 30 *Pitta Pradhan Prakruti* individuals are shown in the diagram.



	R.R	B.P	PULSE	Temperature
T.T(MINS)	3.3	3.567	4.9	5.633

The mean time taken for blood pressure to return to normalcy was 3.567 minutes, for pulse 4.900 minutes, for respiratory rate was 3.300 minutes and for body temperature was 5.633 minutes in 30 *Pitta Pradhana Prakruti* individuals.

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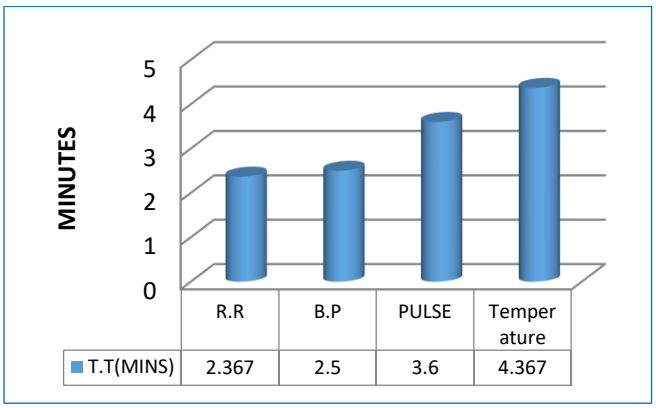
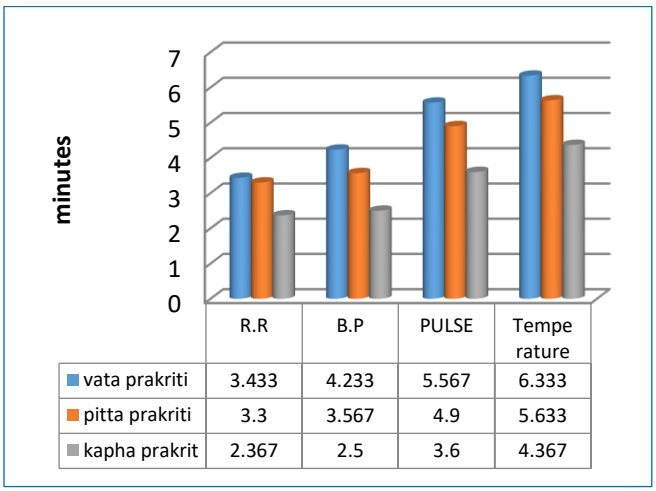
Bar diagram 9: The mean time taken for objective parameters to return to normalcy in 30 *Kapha Pradhan Prakruti* individuals are shown in the diagram.



The mean time taken for blood pressure to return to normalcy was 2.500 minutes, for pulse 3.600 minutes, for respiratory rate was 2.367 minutes and for body temperature was 4.367 minutes in 30 *Kapha Pradhana Prakruti* individuals.

Bar diagram 10: The Mean Total time taken for objective parameters to return to normalcy in 90 different *Prakruti* individuals are shown in the diagram.



The Mean Total time taken for objective parameters to return to normalcy in *Vata Pradhan, Pitta Pradhan,* and *Kapha Pradhan Prakruthi* individuals, for body temperature was 6.333 mins, 5.633 mins, and 4.376 minutes; for pulse rate 5.567 mins, 4.900 mins and 3.600 minutes; for blood pressure was 4.233mins, 3.567 mins, 2.500 mins and for respiratory rate was 3.433, 3.300, 2.367 minutes respectively.

Table 1: The variation in Mean Body temperature before and after the exercise in *Vata Pradhana Prakruti* individuals.

Vataprakruti	Mean	SD	SE	't'	P	Result
BR	97.89	0.3776	0.06894	6.217	<0.0001	Significant
AR	97.54	0.4150	0.07576			

Statistical analysis shows that, the Mean body temperature in *Vata Prakruti* individuals before reading was 97.89°F and after reading it was 97.54°F which is very negligible difference with 't' value 6.217 and highly significant at P<0.0001.

Table 2: The variation in Mean Body temperature before and after the exercise in *Pitta Pradhana Prakruti* individuals.

Pitta Prakruti	Mean	SD	SE	't'	P	Result
BR	98.12	0.3775	0.06893	12.34	<0.0001	Significant
AR	97.74	0.3908	0.07136			

Statistical analysis shows that the mean body temperature in *Pitta Prakruti* individuals before reading was 98.12°F and after reading it was 97.74°F which is very negligible difference with 't' value 12.34 and highly significant at P<0.0001.

Table 3: The variation in Mean Body temperature before and after the exercise in *Kapha Pradhana Prakruti* individuals.

Kaphaprakruti	Mean	SD	SE	't'	P	Result
BR	97.86	0.3683	0.06724	9.165	<0.0001	Significant
AR	97.46	0.3927	0.07170			

Statistical analysis shows that the mean body temperature in *Kapha Prakruti* individuals before reading was 97.86°F and after reading it was 97.46°F

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which is very negligible difference with 't' value 9.165 and highly significant at P<0.0001.

Table 4: The variation in Mean pulse before and after the exercise in *Vata Pradhana Prakruti* individuals.

Vataprakruti	Mean	SD	SE	't'	P	Result
BR	71.8	6.14	1.12	9.868	<0.0001	Significant
AR	102.	20.99	3.833			

Statistical analysis shows that the mean Pulse rate in *Vata Prakruti* individuals before reading was 71.87/min and after reading 102.4/min it was which is very negligible difference with 't' value 9.868 and highly significant at P<0.0001.

Table 5: The variation in Mean pulse before and after the exercise in *Pitta Pradhan Prakruti* individuals.

Pitta Prakruti	Mean	SD	SE	't'	P	Result
BR	72.33	5.040	0.9202	17.76	<0.0001	Significant
AR	111.1	14.12	2.578			

Statistical analysis shows that the mean body temperature in *Pitta Prakruti* individuals before reading was 72.33/min and after reading it was 111.1/min which is very negligible difference with 't' value 17.76 and highly significant at P<0.0001.

Table 6: The variation in Mean pulse before and after the exercise in *Kapha Pradhana Prakruti* individuals.

Kaphaprakruti	Mean	SD	SE	't'	P	Result
BR	73.07	5.192	0.9480	9.785	<0.0001	Significant
AR	103.2	19.30	3.523			

Statistical analysis shows that, the Mean Pulse rate in *Kapha Prakruti* individuals before reading was 73.07/min and after reading it was 103.2 /min which is very negligible difference with 't' value 9. 785 and highly significant at P <0.0001.

Table 7: The variation in Mean systolic blood pressure before and after the exercise in *Vatapradhana Prakruti* individuals.

Prakruti	Mean	SD	SE	't'	P	Result
BR	112.2	8.053	1.470	10.17	<0.0001	Significant
AR	128.9	13.73	2.506			

Statistical analysis shows that, the Mean S.B.P in *Vata Prakruti* individuals before reading was 112.2mmHg and after reading it was 128.9mmHg which is very negligible difference with 't' value 10.17 and highly significant at P<0.0001.

Table 8: The variation in Mean systolic blood pressure before and after the exercise in *Pitta Pradhana Prakruti* individuals.

Pitta Prakruti	Mean	SD	SE	't'	P	Result
BR	110.0	6.026	1.100	16.07	<0.0001	Significant
AR	135.4	10.51	1.919			

Statistical analysis shows that, the Mean S.B.P in *Pitta Prakruti* individuals before reading was 110.0mmHg and after reading it was 135.4mmHg which is very negligible difference with 't' value 16.07 and highly significant at P <0.0001.

Table 9: The variation in Mean systolic blood pressure before and after the exercise in *Kapha Pradhana Prakruti* individuals.

Kaphaprakruti	Mean	SD	SE	't'	P	Result
BR	115.8	6.089	1.112	3.103	0.0042	Significant
AR	127.2	22.80	4.163			

Statistical analysis shows that, the Mean S.B.P in *Kapha Prakruti* individuals before reading was 115.8mmHg and after reading it was 127.2 mmHg which is very

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negligible difference with 't' value 3.103 and highly significant at P<0.0001.

Table 10: The variation in Mean Diastolic blood pressure before and after the exercise in *Vata Pradhana Prakruti* individuals.

Vataprakruti	Mean	SD	SE	't'	P	Result
BR	73.87	5.752	1.050	8.257	<0.0001	Significant
AR	79.70	6.998	1.278			

Statistical analysis shows that, the Mean D.B.P in *Vata Prakruti* individuals before reading was 73.87mmHg and after reading it was 79.70mmHg which is very negligible difference with 't' value 8. 257 and highly significant at P <0.0001.

Table 11: The variation in Mean Diastolic blood pressure before and after the exercise in *Pitta Pradhana Prakruti* individuals.

Pittaprakruti	Mean	SD	SE	't'	P	Result
BR	71.23	5.964	1.089	12.42	<0.0001	Significant
AR	78.93	7.732	1.412			

Statistical analysis shows that, the Mean D.B.P in *Pitta Prakruti* individuals before reading was 71.23mmHg and after reading it was 78.93mmHg which is very negligible difference with 't' value 12.42 and highly significant at P <0.0001.

Table 12: The variation in Mean Diastolic blood pressure before and after the exercise in *Kapha Pradhana Prakruti* individuals.

Prakruti	Mean	SD	SE	't'	P	Result
BR	73.47	4.629	0.8452	12.26	<0.0001	Significant
AR	83.03	6.256	1.142			

Statistical analysis shows that, the Mean D.B.P in *Kapha Prakruti* individuals before reading was 73.47mmHg and after reading it was 83.03mmHg which is very negligible difference with 't' value 12.26 and highly significant at P <0.0001.

Table 13: The variation in Mean Respiratory rate (R.R) before and after the exercise in *Vata Pradhana Prakruti* individuals.

Prakruti	Mean	SD	SE	't'	P	Result
BR	18.00	1.661	0.3032	15.28	<0.0001	Significant
AR	28.40	3.729	0.6808			

Statistical analysis shows that ,the Mean R.R in *Vata Prakruti* individuals before reading was 18.00/min and after reading it was 28.40/min which is very negligible difference with 't' value 15.28 and highly significant at P <0.0001.

Table 14: The variation in Mean Respiratory rate (R.R) before and after the exercise in *Pitta Pradhana Prakruti* individuals.

Pittaprakruti	Mean	SD	SE	't'	P	Result
BR	18.37	2.385	0.4355	15.38	<0.0001	Significant
AR	31.40	5.096	0.9305			

Statistical analysis shows that, the Mean R.R in *Pitta Prakruti* individuals before reading was 18.37/min and after reading it was 31.40/min which is very negligible difference with 't' value 15.38 and highly significant at P <0.0001.

Table 15: The variation in Mean Respiratory rate (R.R) before and after the exercise in *Kapha Pradhana Prakruti* individuals.

Kaphaprakruti	Mean	SD	SE	't'	P	Result
BR	18.37	2.350	0.4291	17.19	<0.0001	Significant
AR	29.83	4.243	0.7747			

Statistical analysis shows that, the Mean R.R in *Kapha Prakruti* individuals before reading was 18.37/min and after reading it was 29.83/min which is very negligible

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difference with 't' value 17.19 and highly significant at P <0.0001.

Table 16: The correlation and variation between Mean Total time taken for attaining *Ardhashakti* in Males and Females among different *Prakruti* individuals.

Prakruti	*V*	*P*	*K*		Sum of squares	Df	Mean square	f	P	Remark
Males										
Mean T.T.T (mins)	4.585	5.643	6.166	**BG**	25.06	2	12.53	9.931	0.0002	S
				WG	68.14	54	1.262			
Females										
Mean T.T.T (mins)	4.410	5.421	6.243	**BG**	17.91	2	8.954	4.560	0.0187	S
				WG	58.90	30	1.963			

The one way anova test results shows that, there is correlation and variation between Mean Total time taken for attaining *Ardhashakti Vyayama* in different *Prakruti* individuals, in males with 'F' value 9.93 which is significant at a level of 'p' value 0.0002 and in females 'F' value 4.560 which is significant at a level of 'p' value 0.0187.

The mean values shows that there is slight difference in the Mean Total time taken for attaining *Ardhashakti Vyayama* in different *Prakruti* males and female individuals respectively.

Table 17: The correlation and variation between Mean Total time taken for vitals to return to normalcy after the exercise in between Males and females among different *Prakruti* individuals

Prakruti	*V*	*P*	*K*		Sum of squares	Df	Mean square	f	P	Remark
Males										
Mean T.T.T (mins)	6.381	5.632	4.000	**BG**	54.52	2	27.26	50.12	<0.00001	S
				WG	29.37	54	0.544			
Females										
Mean T.T.T (mins)	6.222	5.636	4.846	**BG**	10.45	2	5.225	4.930	0.0141	S
				WG	31.79	30	1.060			

The one way anova test results shows that, there is correlation and variation between Mean Total time taken for vital signs to return to normalcy in different *Prakruti* males individuals with 'F' value 50.12 which is significant at a level of 'p' value <0.0001 and in females 'F' value 4.930 which is significant at a level of 'p' value 0.0141

The mean values shows that there is slight difference in the Mean Total time taken for vitals to return to normalcy in different *Prakruti* males and female individuals respectively.

DISCUSSION

Discussion on age: In this study, 18-30 years age group was selected. In that maximum were between 22-26 years, about 42 individuals. The other age groups are, 34 individuals were between 27-30, 14 individuals were between 18-21 years. As the no. of individuals were not equally distributed in each group, the variation in the *Ardhashakti* cannot be assessed.

Discussion based on Body built and BMI: About 63.3% of the individuals were moderately built, 23% were small built and 13.3% were largely built. About 43.3 % of the individuals were in between 22-25 BMI, about 36.6% were in between 18-20 BMI and 20% were in between 20-22 BMI. The time taken for *Ardhashakti* was more in moderate built individuals when compared to small and large built. As *Madhyama Shareera* individuals are *Balavan* when compared to *Sthoola* and *Krusha Shareera* individuals.

Discussion on *Agni*: About 38.8% of individuals had *Sama Agni,* 25.5% had *Tishna Agni,* 18.8% had *Mandagni* and 17.7% had *Vasamagni*. Time taken for *Ardhashakti Vyayama* was more in *Sama Agni* individuals. *Sama Agni* leads to proper digestion and proper nourishment to *Dhatu*. So, *Ardhashakti* was little more in *Samagni* individuals.

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Discussion on *Kosta*: About 54.4% of individuals had *Madhyama Kosta*, 33.3% had *Mridu Kosta,* and 23.3% had *Krura Kosta.* The time taken for *Ardhashakti* was more in the individuals having *Madhyama Kosta*. As *Kapha Prakriti* individuals are having *Madhyama Kosta*, they have more *Bala* compared to other *Prakriti* individuals.

Discussion on *Vyayama Shakti:* Out of 90 individuals, 72.51% had *Madhyama Vyayama Shakti*, 11.11% had *Pravara Vyayama Shakti* and 13.3% had *Avara Vyayama Shakti.* The time taken for *Ardha Shakti* will be more in individuals who has *Pravara Vyayama Shakti.*

Discussion on *Ahara Shakti:* In the study, 70% of the individuals had *Madhyama Aharashakti.* About 18.8% of individuals had *Pravara Ahara Shakti* and 11.11% had *Avara Ahara Shakti.*

The *Ardhashakti* was comparatively more in individuals of *Madhyama Ahara Shakti.* As *Agni* plays important.

Discussion on subjective parameters which is taken for study:

Variation in time taken for appearance of *Lalata Sweda* in different *Prakriti* individuals

The mean time taken for appearance of *Lalata Sweda* in *Kapha Pradhana Prakriti* individuals was 5.060 minutes, in *Pitta Pradhana Prakriti* individuals was 4.065 minutes and in *Vata Pradhana Prakriti* individuals was 2.983 minutes. It is more in *Kapha Prakriti* than that of *Pitta Prakriti* and *Vata Prakriti*, In correlation and variation 'f' value is 14.39, which is significant at p value <0.0001. As body temperature decreases, the time of appearance of *Lalata Sweda* is decreased.

It was observed that with decrease in body temperature, time taken to appear *Lalata Sweda* increases, as in case of *Kapha Prakriti* individuals.

There are factors which will effect on sweat, environmental temperature, duration of exercise and body musculature. As in *Kapha Prakriti* individuals due to increased accumulation of fat has lowest metabolism, this can be compared to *Mandagni* present in *Kapha Prakriti* individuals. Due to low metabolism heat generated will also be low, leading to slow appearance or decreased sweating in *Kapha Prakriti* individuals. But they show high level of endurance level due to increased accumulation of fat in the body.

As in case of *Pitta Prakriti* due to more body musculature and low percentage of body fat will have a higher metabolism compared to others. Due to high metabolism heat generation is also high leading to increased sweating in *Pitta Prakriti* individuals,

Similarly in *Vata Prakriti* individuals as there is quick metabolism. Body temperature rises sweating increases, this is to keep the body temperature normal. Due to increased metabolic activity during exercise the body temperature will also increase in order to keep the body temperature normal.

Study has shown that increased metabolic activity will increase the temperature was seen in *Pitta Prakriti, Vata Prakriti* individuals as compared to *Kapha Prakriti* individuals.

Hence *Lalata Sweda* is seen early in *Vata Prakriti* and *Pitta Prakriti* individuals. As the decreased metabolic activity, decreases the body temperature in *Kapha Prakriti* individuals, so appearance of *Lalata Sweda* is delayed.

Variation in time taken to attain *Dheerga Shwasa* in different *Prakriti* individuals

The time to attain *Dheerga Shwasa* in *Kapha Pradhana Prakriti* individuals was 5.926 minutes, in *Pitta Pradhana Prakriti* individuals was 5.344 mins and in *Vata Pradhana Prakriti* individuals was 4.021 minutes, it was more in *Kapha Prakriti* individuals when compared to *Pitta Prakriti* and *Vata Prakriti* individuals, in correlation and variation 'f' value is 24.19 which is significant at p<0.0001. As Body temperature increases, the time taken for appearance of *Dheerga Swasa* increases.

The chemical and neural factors cause hyperventilation. During exercise hyperventilation increases with increased duration and severity. The environmental temperature, increased BMR, increased

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sweating and other factors cause hyperventilation. Hence *Dheerga Shwasa* appeared early in *Pitta Prakriti, Vata Prakriti* individuals and delayed in *Kapha Prakriti* individuals.

Variation in time taken to attain *Trishna* in different *Prakriti* individuals

The time taken to attain *Thrishna* in *Kapha Pradhana Prakriti* individuals was 6.191 minutes, in *Pitta Pradhana Prakriti* individuals was 5.562 and in *Vata Pradhana Prakriti* individuals was 4.532 minutes, it was more in *Kapha Prakriti* individuals when compared with *Pitta* and *Vata Prakriti* individuals, in correlation and variation 'f' value is 14.39 which is significant at $p<0.0001$, as body temperature decreases the time of appearance of *Trishna* decreases.

Thirst is hunger for water; it is seen whenever there is a loss of fluid. The loss of fluid takes place through sweating during exercise and in increased body temperature in order to regulate and to maintain body temperature.

In the observation it shows that the appearance of thirst was seen early with increased body temperature in *Pitta* and *Vata Prakriti* individuals. As the temperature is decreased, the time taken for appearance of thirst delayed as in case of *Kapha Prakriti* individuals.

Variation in mean time taken to attain *Ardhashakti Lakshana* in different *Prakriti* individuals

The mean time taken to attain *Ardhashakti Lakshana* in *Kapha Pradhana Prakriti* individuals was 6.191 minutes, in *Pitta Pradhana Prakriti* individuals was 5.562 minutes, and in *Vata Pradhana Prakriti* individuals was 4.532 minutes. It was more in *Kapha Prakriti* individuals, which is significant at $p<0.0001$. As body temperature decreases the time taken to attain *Ardhashakti Lakshana* decreases.

The mean time taken to attain *Ardhashakti Lakshana* was less in *Vata* and *Pitta Pradhan Prakriti* individuals because of increased body temperature and BMR and was more in *Kapha Prakriti* individuals, because of decreased Body temperature and BMR.

Achieving *Ardha Shakti Lakshana* in Different *Prakriti* individuals

The study was done in different Prakriti individuals. The time taken to achieve *Ardhashakti* was observed in all the *Prakriti* individuals separately and then calculated. As in *Vata Prakriti* individuals there is quick metabolic activity in the body due to *Shigra Guna,* and due to *Ruksha, Visada* and *Purusha Guna* of *Vata* dries up the moisture content of the body and leads to *Dhatu Soshana* causing fatigue early. *Vayu* is *Theevra* and *Rooksha* there will be *Upashosha* of *Shareera*, and also due to predominance of *Vayu* and *Akasha Mahabhuta*. Hence these individuals will be *Dhurbala*.

In *Pitta Prakriti* individuals due to more muscular and less percentage of fat, will have higher metabolism because of *Tikhna* and *Ushna Guna*. Due to high metabolism heat generation will also be high leading to increased sweating and also due to predominance of *Agni* and *Jala Mahabhuta*, persons will become fatigue early.

Whereas in *Kapha Prakriti* individuals due to *Snigdha, Saandra* and *Pichila Guna* there will be increased accumulation of *Medas* i.e. fat all over the body so these individuals will have less metabolic status as *Medas* is seat of *Kapha* and *Agni* will be *Mandagni* ant they will definitely have low BMR. But in them there will be high levels of endurance level which is due to *Guru* and *Sthaimithya Guna* of *Kapha*. And also due to predominance of *Jala Mahabhuta.*

Hence individuals of *Kapha Prakriti* are endowed with good strength. So, the *Ardha Shakti* attained was late in *Kapha Prakriti* individuals when compared to others *Prakriti* individuals.

Variation of Systolic blood pressure after the exercise in different Prakriti individuals

The mean of systolic blood pressure in *Kapha Pradhan Prakriti* individuals was 127.2mmHg, in *Pitta Pradhana Prakriti* individuals was 135.4 minutes and in *Vata Pradhana Prakriti* individuals was 128.9 mmHg. As there is slight increase in SBP in *Pitta Prakriti Individuals*, there is no such significant difference between them, which is Not significant at $p<0.0001$

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The systolic blood pressure undergoes considerable increase with exercise. The increased systolic pressure indicates the extent of work done by heart. When there is increase in body temperature, systolic blood pressure increases. Due to this there was slight rise in systolic blood pressure in pitta Prakriti individuals compared to others.

Variation of Diastolic blood pressure after the exercise in different Prakriti individuals

The mean of diastolic blood pressure in *Vata Pradhana Prakriti* individuals was 70.79mmHg, in *Pitta Prakriti* was 78.93mmHg and in *Kapha Pradhana Prakriti* individuals was 83.03mmHg. It was more in *Adana Kala*, which is Non significant at $p<0.05$.

The diastolic pressure is due to peripheral resistance. Increase in the time of exercise causes the peripheral resistance by vascular contraction in exercising muscles. Changes in peripheral resistance are less constant, however usually the vasoconstriction in muscles balances vasodilatation in other tissues. And exposure to hot atmosphere causes fall of diastolic blood pressure due to diminished peripheral resistance resulting from vasodilatation.

Variation of Pulse rate after the exercise in different *Prakriti* individuals

The mean of pulse in *Kapha Pradhana Prakriti* individuals was 103.2/min, in *Pitta Pradhnan Prakriti* individuals was 111.1/min and in *Vata Pradhana Prakriti* individuals was 102.4 /min. It was slight more in *Pitta Prakriti*. As there was no much difference between them, which is Not significant at $p<0.0001$.

Pulse rate is pulse per minute. Normally, it corresponds to heart rate. Pulse rate increases as heart rate is increased during exercise. The increase of heart rate is due to several factors which include exercise, body temperature, and environmental temperature. Hence pulse rate is slightly more in *Pitta Prakriti* individuals compared to others.

Variation of Respiratory rate after the exercise in different *Prakriti* individuals

The variation of respiratory rate in *Kapha Prakriti* individuals was 29.83/min, in *Pitta Pradhana Prakriti* individuals was 31.40/min and in *Vata Pradhana Prakriti* individuals was 28.40/min. It was slightly more in *Pitta Prakriti,* there is no much difference between them. which is significant at $p<0.05$. as body temperature increases the respiratory rate also increases.

During exercise due to chemical and neural factors, the rate of respiration increases and there is also some effect due to heat by reflex stimulation of nerves of general sensation in the skin over respiratory center. Hence due to these two effects, there was slight increase in respiratory rate in *Pitta Prakriti* individuals and decrease in respiratory rate in *Vata* and *Kapha Prakriti* individuals.

Variation of Body temperature after the exercise in different *Prakriti* individuals

The variation of body temperature in *Kapha Pradhana Prakriti* individuals was 97.46°F, in *Pitta Pradhana Prakriti* individuals was 97.74 and in *Vata Pradhana Prakriti* individuals was 97.54°F. It was slightly more in *Pitta Prakriti* individuals compared to others, which is significant at $p<0.0001$. As BMR increases the body temperature also increases.

Enhanced metabolic activity during exercise produces additional heat which tends to raise the body temperature and also atmospheric conditions like temperature, will direct concerned amount of heat loss from surface and thus affect body temperature.

Hence the body temperature is affected by both duration of exercise and the Body temperature. Body temperature was more in pitta Prakriti individuals compared to others.

The variation in total time taken for vitals to return to normal in different *Prakriti* individuals

The mean total time taken for vitals to return to normalcy in *Kapha Pradhana Prakriti* individuals was 4.367 minutes, in *Pitta Pradhana Prakriti* individuals was 5.633 minutes and in *Vata Pradhana Prakriti* individuals was 6.333 minutes. It was less in *Kapha Prakriti* individuals compared to others, with a correlation and variation 'f' value is 38.94 which is significant at $p<0.0001$. as body temperature and BMR increases, the time for vitals to return to normal decreases.

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Faster the vitals return to normalcy, healthier the individual is. In kapha Prakriti individuals the vitals returned to normal level faster. In *Pitta Prakriti* and *Vata Prakriti* individuals the vitals returned to normal level slower.

Conclusion

All the parameters correlated in Different *Prakriti* individuals were significant at p value <0.0001. On Comparison the study revealed that; There is less time taken to attain *Ardhashakti Vyayama Lakshana* in *Kapha Pradhan Prakriti* individuals and more time taken in *Vata Pradhna Prakriti* individuals. The variation of vital parameters in different *Prakriti* individuals, was less in *Kapha Prakriti* individuals and was more in *Vata Prakriti* individuals. The average time taken for vitals to return to normal was less in *Kapha Prakriti* individuals. It was observed that the body temperature is less in *Kapha Prakriti* individuals and the time taken to attain *Ardhashakti Lakshana* was more in them, and increases *Bala* in them. Therefore, it may be concluded that with decrease in body temperature and BMR, more exercise is required to achieve *Ardha Vyayama Lakshana,* while less exercise is required to achieve *Ardha Vyayama Lakshana* with increase in body temperature in other *Prakriti* individuals. The time taken for vital parameters to return to normalcy was less in the individuals with low body temperature and BMR and more in the individuals with high body temperature and BMR. *Ardha Shakti* was more in *Kapha Pradhan Prakriti* individuals and less in other *Prakriti* individuals. Vital parameters were slightly increased in *Pitta Prakriti* and *Vata Prakriti* individuals and comparatively less in *Kapha Prakriti* individuals. Vital parameters returned to normalcy faster in *Kaph Prakriti* individuals and slower in others. Hence *Bala* was more in *Kapha Pradhana Prakriti* individuals and comparatively less in other *Prakriti* individuals. *Kapha Prakriti* individuals were having *Uttama Bala* compared to others. Hence on the basis of the results of this study, it may be recommended to perform less exercise in *Vata Prakriti* and *Pitta Pradhana Prakriti* individuals and comparatively more exercise in *Kapha Pradhan Prakriti* individuals.

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